

Insulating Material Data Sheets

Project title : **Brahmaputra Petrochemical Complex Project**
Location : **Lepetkata, Dibrugarh, Assam, India**
Owner : **Brahmaputra Cracker and Polymer Ltd. (BCPL)**
Owner Reference :
Customer : **Brahmaputra Cracker and Polymer Ltd. (BCPL)**
Customer Reference : **BCPL-BPCP**
Unit : **Ethylene Cracker Unit**
Heater : **4 Gas/Naphtha Cracking Furnaces**
Heater Item Number : **113-FF-101/113-FF-102/113-FF-103/113-FF-104**
LHT Reference : **62559**
Attached : **Sheet 1-11**

General Note:

These datasheets show the basic requirements for Insulating materials. Adherence to these requirements does not relieve heater vendor from other requirements to the refractory. In particular, heat loss calculations shall be provided to show max allowable casing temperatures are not exceeded using data from Sheet 9 of heater datasheet NA6-2559-DSH1001

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Rev.	Date	Description	Prepared	Checked	Project	



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NA62559 **DSH1058**

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INSULATING MATERIAL DATA SHEET

1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Insulating Firebrick			
5	Specification	Class 23 LW	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Backup layer of radiant walls, Upflow Convection			
8					
9	Exposed / Non-exposed	#1)	NA		
10	Maximum calculated operating temperature	°C	1040		
11	Method of application	Bricklaying			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Insulating Firebrick Cl. 23 LW			X
15	Classification temperature	°C	1260		
16	Material required per m² of construction	kg	NA		
17	Estimated water required per 100 kg dry material	kg	NA		
18		maximum	normal	minimum	tolerance
19	Density				X
20	as placed	kg/m³	530	500	X
21	after 5 hours drying at 110 °C	kg/m³			X
22	after 5 hours heating at 800 °C	kg/m³			X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		1.0	0.7
26	500 °C	N/mm²			X
27	800 °C	N/mm²			X
28					
29	Permanent linear change (after 5 hours heating at)				
30	1230 °C	%	0	-0.5	-2
31	°C	%			X
32					
33	Reversible thermal expansion				
34	1100 °C	%	0.8		X
35					
36	Maximum grain size	mm	Quartz size max. 1 mm		
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.16	0.14	X
40	500 °C	W/m.K	0.18	0.16	X
41	800 °C	W/m.K	0.21	0.19	X
42	1100 °C	W/m.K	0.26	0.23	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		33	X
47	SiO ₂	wt%	57		X
48	Fe ₂ O ₃	wt%	1		X
49	TiO ₂	wt%			X
50	CaO	wt%	18		X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
Document No.:		NA62559 DSH1058	Revision No.	0	Item No.: 113-FF-101/-102/-103/-104

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1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Insulating Firebrick			
5	Specification	Class 26	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Hot face layer of radiant walls			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1215		
11	Method of application	Bricklaying			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Insulating Firebrick Cl. 26			X
15	Classification temperature	°C	1430		
16	Material required per m² of construction	kg	NA		
17	Estimated water required per 100 kg dry material	kg	NA		
18			maximum	normal	minimum
19	Density				
20	as placed	kg/m³	860	815	X
21	after 5 hours drying at 110 °C	kg/m³			X
22	after 5 hours heating at 800 °C	kg/m³			X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		1.6	1.1
26	500 °C	N/mm²			X
27	800 °C	N/mm²			X
28					
29	Permanent linear change (after 5 hours heating at)				
30	1400 °C	%	0	-1.5	-2
31	Hot load deformation 1200 °C (0.7 bar , 1 ½h)	%	0.3		X
32					
33	Reversible thermal expansion				
34	1100 °C	%	0.8		X
35					
36	Maximum grain size	mm	Quartz size max. 1 mm		
37					
38	Thermal conductivity				
39	400 °C	W/m.K	0.36	0.32	X
40	600 °C	W/m.K	0.39	0.35	X
41	800 °C	W/m.K	0.42	0.38	X
42	1000 °C	W/m.K	0.44	0.40	X
43	1200 °C	W/m.K	0.47	0.42	X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		35	X
47	SiO ₂	wt%	60		X
48	Fe ₂ O ₃	wt%	1		X
49	TiO ₂	wt%			X
50	CaO	wt%	3		X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes X means data by manufacturer				
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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INSULATING MATERIAL DATA SHEET

1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Insulating Block			
5	Specification	Cal-Sil, 1100 °C	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Backup layer in arch and transition walls			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	860		
11	Method of application	push over anchors			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Calcium Silicate Block			X
15	Classification temperature	°C	1100		
16	Material required per m² of construction	kg	NA		
17	Estimated water required per 100 kg dry material	kg	NA		
18		maximum	normal	minimum	tolerance
19	Density				X
20	as placed	kg/m³	300	260	220
21	after 5 hours drying at 110 °C	kg/m³			X
22	after 5 hours heating at 800 °C	kg/m³			X
23					
24	Cold crushing strength (at 10 % compression)				
25	110 °C	N/mm²		1.6	1.1
26	500 °C	N/mm²			X
27	800 °C	N/mm²			X
28					
29	Permanent linear change (after 12 hours heating at)				
30	1050 °C	%	0	-1.5	-2
31					X
32					
33	Reversible thermal expansion				
34	°C	%			X
35					
36	Maximum grain size	mm	Quartz size max. 1 mm		
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.11	0.09	X
40	400 °C	W/m.K	0.13	0.11	X
41	600 °C	W/m.K	0.16	0.13	X
42	800 °C	W/m.K	0.19	0.16	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%			X
47	SiO ₂	wt%		45	X
48	Fe ₂ O ₃	wt%		0.2	X
49	TiO ₂	wt%			X
50	CaO	wt%		44	X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
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2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Insulating Block			
5	Specification	Cal-Sil, 1000 °C	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Backup layer in walls, floor and convection			
8					
9	Exposed / Non-exposed	#1)	NA		
10	Maximum calculated operating temperature	°C	710		
11	Method of application	push over anchors			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Calcium Silicate Block			X
15	Classification temperature	°C	1000		
16	Material required per m² of construction	kg	NA		
17	Estimated water required per 100 kg dry material	kg	NA		
18		maximum	normal	minimum	tolerance
19	Density				X
20	as placed	kg/m³	320	280	240
21	after 5 hours drying at 110 °C	kg/m³			X
22	after 5 hours heating at 800 °C	kg/m³			X
23					
24	Cold crushing strength (at 10 % compression)				
25	110 °C	N/mm²		1.6	1.1
26	500 °C	N/mm²			X
27	800 °C	N/mm²			X
28					
29	Permanent linear change (after 12 hours heating at)				
30	1000 °C	%	0	-1.3	-2
31					X
32					
33	Reversible thermal expansion				
34	°C	%			X
35					
36	Maximum grain size	mm	Quartz size max. 1 mm		
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.11	0.09	X
40	400 °C	W/m.K	0.13	0.11	X
41	600 °C	W/m.K	0.14	0.12	X
42	800 °C	W/m.K	0.18	0.15	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%			X
47	SiO ₂	wt%		45	X
48	Fe ₂ O ₃	wt%		0.2	X
49	TiO ₂	wt%			X
50	CaO	wt%		42	X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
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1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	MLW Insulating Castable Cl. 24			
5	Specification	Insulating concrete (1400 °C)	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Arch and Transition Walls			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1150		
11	Method of application	Casting/Gunning			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Piline XL-25 or equivalent			X
15	Classification temperature	°C	Min 1320		
16	Material required per m² of construction approx.	kg	980		
17	Estimated water required per 100 kg dry material	kg	X		
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m³			X
21	after 5 hours drying at 110 °C	kg/m³	1400	1000	X
22	after 5 hours heating at 800 °C	kg/m³		850	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		9.0	5.0
26	500 °C	N/mm²		5.0	X
27	800 °C	N/mm²		5.0	X
28					
29	Permanent linear change (after 5 hours heating at)				
30	1000 °C	%		-0.3	X
31	1200 °C	%	0	-0.7	-1.2
32					
33	Reversible thermal expansion				
34	1100 °C	%			X
35					
36	Maximum grain size	mm	5		X
37					
38	Thermal conductivity				
39	260 °C	W/m.K	0.27	0.23	X
40	540 °C	W/m.K	0.28	0.24	X
41	815 °C	W/m.K	0.32	0.27	X
42	1000 °C	W/m.K	0.36	0.31	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		45	X
47	SiO ₂	wt%		36	X
48	Fe ₂ O ₃	wt%		1	X
49	TiO ₂	wt%			X
50	CaO	wt%		16	X
51	MgO + K ₂ O + Na ₂ O	wt%		1.2	X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	MW Insulating Castable CI.26			
5	Specification		Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Floor and Transition Floor Top Layer			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1200		
11	Method of application	Casting			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	ASTM C-401 Class C			X
15	Classification temperature	°C	1430		
16	Material required per m ² of construction approx.	kg	1310		
17	Estimated water required per 100 kg dry material	kg	X		
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m ³			X
21	after 5 hours drying at 110 °C	kg/m ³	2200	1390	X
22	after 5 hours heating at 800 °C	kg/m ³		1280	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm ²		13.0	11.0
26	815 °C	N/mm ²		10.0	X
27	1000 °C	N/mm ²		6.0	X
28	1200 °C	N/mm ²		5.0	
29	Permanent linear change (after 5 hours heating at)				
30	1000 °C	%			X
31	1370 °C	%	0.5		X
32					
33	Reversible thermal expansion				
34	1260 °C	%	0.2		X
35	from unburned state to max. service temp.	%	2.2		
36	Maximum grain size	mm	5		X
37					
38	Thermal conductivity				
39	260 °C	W/m.K	0.59	0.45	X
40	540 °C	W/m.K	0.60	0.46	X
41	815 °C	W/m.K	0.63	0.48	X
42	1000 °C	W/m.K	0.64	0.49	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%	Main component		X
47	SiO ₂	wt%	Main component		X
48	Fe ₂ O ₃	wt%			X
49	TiO ₂	wt%			X
50	CaO	wt%			X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes X means data by manufacturer				
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Dense Erosion resistant castable			
5	Specification		Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Around decoking connections in radiant floor			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1200		
11	Method of application	Casting			
12	PROPERTIES				
13			LHT Requirements		Manufacturer's Data
14	Material description		ASTM C-401 Class G		X
15	Classification temperature	°C	1430		X
16	Material required per m ² of construction approx.	kg	1310		X
17	Estimated water required per 100 kg dry material	kg			X
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m ³			X
21	after 5 hours drying at 110 °C	kg/m ³		2560	X
22	after 5 hours heating at 800 °C	kg/m ³		2400	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm ²		7.0	X
26	815 °C	N/mm ²			X
27	1000 °C	N/mm ²			X
28	1200 °C	N/mm ²			
29	Permanent linear change (after 5 hours heating at)				
30	1000 °C	%			X
31	1370 °C	%		-0.5	X
32					
33	Reversible thermal expansion				
34	°C	%			X
35	from unburned state to max. service temp.	%		+0.8	
36	Maximum grain size	mm			X
37					
38	Thermal conductivity				
39	200 °C	W/m.K		1.74	1.44
40	425 °C	W/m.K		1.64	1.36
41	650 °C	W/m.K		1.58	1.31
42	870 °C	W/m.K		1.57	1.30
43	1320 °C	W/m.K		1.68	1.40
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		97	X
47	SiO ₂	wt%		NONE	X
48	Fe ₂ O ₃	wt%			X
49	TiO ₂	wt%			X
50	CaO	wt%		2	X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes X means data by manufacturer				
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
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2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Insulating High Temp Concrete			
5	Specification	Class Q	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	End Tube Sheets, etc.			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1150 / 1200		
11	Method of application	Casting			
12	PROPERTIES				
13			LHT Requirements		Manufacturer's Data
14	Material description	Insulating concrete Class Q		X	
15	Classification temperature	°C	1350		X
16	Material required per m² of construction approx.	kg	1100		X
17	Estimated water required per 100 kg dry material	kg			X
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m³			X
21	after 5 hours drying at 110 °C	kg/m³	1440	1200	X
22	after 5 hours heating at 800 °C	kg/m³		1080	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		8.5	5.0
26	815 °C	N/mm²		6.0	X
27	1000 °C	N/mm²		4.0	X
28					
29	Permanent linear change (after 5 hours heating at)				
30	815 °C	%		-0.25	X
31	1200 °C	%	0	-0.7	-1.5
32					
33	Reversible thermal expansion				
34	1100 °C	%			X
35					
36	Maximum grain size	mm	5		X
37					
38	Thermal conductivity		Gunned max.Cast/ Gunned		
39	260 °C	W/m.K	0.39	.26 / .35	X
40	540 °C	W/m.K	0.40	.29 / .36	X
41	815 °C	W/m.K	0.41	.31 / .37	X
42	1000 °C	W/m.K	0.47	.35 / .42	X
43	°C	W/m.K			X
44					
45	Chemical analysis		indic. Values		
46	Al ₂ O ₃	wt%	50		X
47	SiO ₂	wt%	50		X
48	Fe ₂ O ₃	wt%	1		X
49	TiO ₂	wt%			X
50	CaO	wt%	10		X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
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2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	LW Insulating Concrete			
5	Specification	LHV 1:2:4 equivalent	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Top layer of upper convection, hot flue duct, downflow convection			
8		section, all convection header boxes			
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	450		
11	Method of application	Casting			
12	PROPERTIES				
13			LHT Requirements		Manufacturer's Data
14	Material description	LHV 1:2:4 equivalent		X	
15	Classification temperature	°C	980		X
16	Material required per m² of construction approx.	kg	920		X
17	Estimated water required per 100 kg dry material	kg			X
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m³			X
21	after 5 hours drying at 110 °C	kg/m³	1100	1020	X
22	after 5 hours heating at 800 °C	kg/m³		900	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		3.0	1.0
26	815 °C	N/mm²		2.0	X
27	1000 °C	N/mm²		1.5	X
28					
29	Permanent linear change (after 5 hours heating at)				
30	815 °C	%		-0.2	X
31	1100 °C	%	0	-0.6	-1.5
32					
33	Reversible thermal expansion				
34	1100 °C	%	0.4		X
35					
36	Maximum grain size	mm			X
37					
38	Thermal conductivity				
39	260 °C	W/m.K	0.20	0.17	X
40	540 °C	W/m.K	0.23	0.20	X
41	815 °C	W/m.K	0.26	0.22	X
42	1000 °C	W/m.K	0.33	0.28	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%	Main component		X
47	SiO ₂	wt%	Main component		X
48	Fe ₂ O ₃	wt%	About 10%		X
49	TiO ₂	wt%			X
50	CaO	wt%	Main component		X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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INSULATING MATERIAL DATA SHEET

1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	MW Insulating Concrete			
5	Specification	LH 1:4 equivalent	Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	End tube sheets			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	950		
11	Method of application	Casting			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	LHV 1:4 equivalent			X
15	Classification temperature	°C	1150		
16	Material required per m² of construction approx.	kg	1500		
17	Estimated water required per 100 kg dry material	kg	X		
18			maximum	normal	minimum
19	Density				
20	as placed	kg/m³		1450	X
21	after 5 hours drying at 110 °C	kg/m³	1500	1400	X
22	after 5 hours heating at 800 °C	kg/m³		1300	X
23					
24	Cold crushing strength (after 5 hours heating at)				
25	110 °C	N/mm²		16.0	10.0
26	815 °C	N/mm²		9.5	X
27	1000 °C	N/mm²		7.5	X
28					
29	Permanent linear change (after 5 hours heating at)				
30	815 °C	%		-0.2	X
31	1100 °C	%	0	-0.2	-1.5
32					
33	Reversible thermal expansion				
34	1100 °C	%			X
35					
36	Maximum grain size	mm			X
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.38	0.27	X
40	400 °C	W/m.K	0.41	0.29	X
41	600 °C	W/m.K	0.44	0.31	X
42	800 °C	W/m.K	0.47	0.33	X
43	°C	W/m.K			X
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%	Main component		X
47	SiO ₂	wt%	Main component		X
48	Fe ₂ O ₃	wt%	About 10%		X
49	TiO ₂	wt%			X
50	CaO	wt%	Main component		X
51	MgO + K ₂ O + Na ₂ O	wt%			X
52	Balance	wt%			X
53					
54	Apparent porosity	%			X
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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INSULATING MATERIAL DATA SHEET

1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Ceramic Fibers Cl.26			
5	Specification		Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Top layer arch, trough walls and floor.			
8					
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	1230		
11	Method of application	push over anchors/ fix with Cuplocks			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Ceramic Fiber Blanket			X
15	Classification temperature	°C	1420		
16	Material required per m² of construction	kg	160		
17	Estimated water required per 100 kg dry material	kg	NA		
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m³	175	160	130
21	after 5 hours drying at 110 °C	kg/m³			
22	after 5 hours heating at 800 °C	kg/m³			
23					
24	Cold crushing strength (at 10 % compression)				
25	110 °C	N/mm²			
26	500 °C	N/mm²			
27	800 °C	N/mm²			
28					
29	Permanent linear change (after 24 hours heating at)				
30	1200 °C	%		2.5	
31					
32					
33	Reversible thermal expansion				
34	°C	%			
35					
36	Maximum grain size	mm			
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.07	0.06	
40	400 °C	W/m.K	0.12	0.1	
41	600 °C	W/m.K	0.17	0.15	
42	800 °C	W/m.K	0.23	0.20	
43	1000 °C	W/m.K	0.31	0.27	
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		43	
47	SiO ₂	wt%		54	
48	Cr ₂ O ₃	wt%		2.75	
49	Fe ₂ O ₃	wt%		0.1	
50	CaO	wt%		0.05	
51	MgO + K ₂ O + Na ₂ O	wt%		0.17	
52	Balance	wt%			
53					
54	Apparent porosity	%			
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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INSULATING MATERIAL DATA SHEET

1	Customer	Brahmaputra Cracker and Polymer Ltd. (BCPL)	Customer's Reference	BCPL-BPCP	Rev
2	Location	Lepetkata, Dibrugarh, Assam, India	LHT Reference	62559	
3	Service	4 Gas/Naphtha Cracking Furnaces	Heater Item Number	113-FF-101/113-FF-102/113-FF-103/113-FF-104	
4	Material	Ceramic Fiber Blanket Cl.23			
5	Specification		Manufacturer	X	
6	PROJECT RELATED DATA				
7	Location	Backup layer arch, trough walls and floor; filler expansion gaps high T			
8		External Insulation rad coils, crossovers			
9	Exposed / Non-exposed	#1)	Exposed		
10	Maximum calculated operating temperature	°C	950		
11	Method of application	push over anchors/ fix with Cuplocks; stuff gaps			
12	PROPERTIES				
13		LHT Requirements			Manufacturer's Data
14	Material description	Cetramic Fiber Blanket			X
15	Classification temperature	°C	1260		
16	Material required per m² of construction	kg	128		
17	Estimated water required per 100 kg dry material	kg	NA		
18			maximum	normal	minimum
19	Density				tolerance
20	as placed	kg/m³	145	128	110
21	after 5 hours drying at 110 °C	kg/m³			
22	after 5 hours heating at 800 °C	kg/m³			
23					
24	Cold crushing strength (at 10 % compression)				
25	110 °C	N/mm²			
26	500 °C	N/mm²			
27	800 °C	N/mm²			
28					
29	Permanent linear change (after 24 hours heating at)				
30	1100 °C	%		2	
31					
32					
33	Reversible thermal expansion				
34	°C	%			
35					
36	Maximum grain size	mm			
37					
38	Thermal conductivity				
39	200 °C	W/m.K	0.07	0.06	
40	400 °C	W/m.K	0.12	0.1	
41	600 °C	W/m.K	0.17	0.15	
42	800 °C	W/m.K	0.23	0.20	
43	1000 °C	W/m.K	0.31	0.27	
44					
45	Chemical analysis				
46	Al ₂ O ₃	wt%		47	
47	SiO ₂	wt%		53	
48	Fe ₂ O ₃	wt%		0.02	
49	TiO ₂	wt%		0.01	
50	CaO	wt%		0.05	
51	MgO + K ₂ O + Na ₂ O	wt%		0.17	
52	Balance	wt%			
53					
54	Apparent porosity	%			
55					
56	Notes	X means data by manufacturer			
57	#1) : refers to hot face layer being exposed to full direct radiation				
58					
59					
60					
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