

Cement only Mix Design to produce 1 m³ of Cellular Concrete (CLC): SIRCONTEC PBG

Type: Foam Concrete (CLC)	SIRC	PBG 30	PBG 35	PBG 40	PBG 45	PBG 50	PBG 55
Dry density (oven dry)	[kg/m ³]	300	350	400	450	500	550
	[lb/ft ³]	19	22	25	28	31	34
Moisture							
Cement Portland CEM I – 32,5R	[kg]	0	0	0	0	0	0
Cement Portland CEM II – 32,5R	[kg]	250	275	300	340	380	420
Additive (fly-ash)	[kg]	0	0	0	0	0	0
Sand 0/2-0/4	0% [kg]	0	0	0	0	0	0
Water in slurry	[kg]	140	155	165	185	205	225
Foam	[lit]	780	757	739	706	673	640
Water in foam	[kg]	45	44	43	41	39	37
Fibre	FV1 [kg]	0	0	0	0	0	0
Wet density	[kg/m ³]	437	476	509	568	626	684
Expected density after 28 days	[kg/m ³]	330	360	390	450	500	550
Foaming agent	FN1 [kg]	1.77	1.72	1.68	1.60	1.53	1.45
Superplasticizer	FS1 [lit]	0	0	0	0	0	0
Water / Binder		0.74	0.72	0.69	0.66	0.64	0.62
Minimum compressive strength Rc	[N/mm ²] [MPa]	0.38	0.45	0.70	1.00	1.10	1.25
	[kg/cm ²]	3.9	4.6	7.1	10.2	11.2	12.7
	[psi]	55	65	102	145	160	181
Thermal conductivity - k/λ	[W/m.K]	0.079	0.085	0.090	0.100	0.110	0.110
(average, oven dry)	[Btu.in/ft ² .°F.hr]	0.548	0.589	0.624	0.693	0.763	0.763

Remarks :

Depending on purpose and conditions of exploitation, Cellular Concrete (CLC), often referred to as Foam Concrete, can have different densities.

Cellular Concrete strengths may vary depending on the used cement, additives, admixtures, as well as water quality.

Compressive and flexural strengths can significantly be increased by adding fibre and/or by a suitable curing method.

Cement only CLC is for thermal insulation products, void-fills, levelling and sloping layers of floors and roofs,

geotechnical applications – tunnel and mine fills, energy absorption or shock mitigation, for backfills in sewer, underlying layers

under foundation slabs and roads, pipe, slab and wall insulation, for granulated CLC (artificial lightweight aggregates), etc.

Sand-Cement Mix Design to produce 1 m³ of Cellular Concrete (CLC): SIRCONTEC PBG

Type: Foam Concrete (CLC)			SIRC	PBG 60	PBG 70	PBG 80	PBG 90	PBG 100	PBG 120	PBG 140	PBG 160
Dry density (oven dry)		[kg/m ³]		600	700	800	900	1 000	1 200	1 400	1 600
		[lb/ft ³]		37	44	50	56	62	75	87	100
Moisture											
Cement Portland CEM I – 32,5R		[kg]		300	310	315	330	345	355	375	400
Cement Portland CEM II – 32,5R		[kg]		0	0	0	0	0	0	0	0
Additive (fly-ash)		[kg]		0	0	0	0	0	0	0	0
Sand 0/2-0/4	0%	[kg]		220	315	410	490	627	760	945	1 110
Water in slurry		[kg]		116	117	118	126	134	145	158	169
Foam		[lit]		703	662	624	581	516	452	362	281
Water in foam		[kg]		41	38	36	34	30	26	21	16
Fibre	FV1	[kg]		0	0	0	0	0	0	0	0
Wet density		[kg/m ³]		680	783	882	983	1 139	1 289	1 502	1 698
Expected density after 28 days		[kg/m ³]		610	720	820	930	1 090	1 240	1 450	1 650
Foaming agent	FN1	[kg]		1.60	1.51	1.42	1.32	1.17	1.03	0.82	0.64
Superplasticizer	FS1	[lit]		1.2	1.4	1.6	1.7	1.8	2.0	2.1	2.3
Water / Binder				0.52	0.50	0.49	0.48	0.48	0.48	0.48	0.46
Expected Compressive Strength Rc	[N/mm ²]	[MPa]		1.4-2*	2-2.5*	2.1-3*	3-4*	3.5-5*	5.5-8*	10-12*	13-17*
		[kg/cm ²]		14.3-20.4*	20.4-25.5*	21.4-30.6*	30.6-40.8*	35.7-51*	56.1-81.5*	101.9-122.3*	132.5-173.3*
		[psi]		203-290*	290-363*	305-435*	435-580*	508-725*	798-1160*	1450-1740*	1885-2466*
Thermal conductivity - k/λ (average, oven dry)		[W/m.K]		0.170	0.190	0.200	0.260	0.310	0.410	0.455	0.540
		[Btu.in/ft ² .°F.hr]		1.179	1.317	1.387	1.803	2.149	2.843	3.155	3.744

Remarks :

Achieved Cellular Concrete strength may vary depending on the used cement, sand, additives, admixtures, fibres and the method of curing, as well as water quality.

* the maximum compressive strength was achieved by using selected cement, sand and superplasticizer (water reducing admixture)

Depending on purpose and conditions of exploitation (required strength and thermal conductivity), CLC (Foam Concrete) can have different densities:

up to 800 kg/m³ for thermal insulation products, void-fills, geotechnical applications, levelling and sloping layers, and for granulated CLC (lightweight aggregates)

600-1200 kg/m³ for thermal insulating – construction products (bricks, panels, blocks, slabs, partitions, etc.)

1000-1600 kg/m³ for structural construction products, cast in situ, etc.

Mix Design to produce 1 m³ of EPS-Cellular Concrete: SIRCONTEC PBG-S

Type: EPS-Foam Concrete (EPS-CLC)	SIRC	PBG-S V25	PBG-S V30	PBG-S V35	PBG-S V40	PBG-S 25	PBG-S 30	PBG-S 35	PBG-S 40
Dry density (oven dry)	[kg/m ³]	270	300	350	400	270	300	350	400
	[lb/ft ³]	17	19	22	25	17	19	22	25
Cement Portland CEM I – 32,5R	[kg]	220	250	290	330	0	0	0	0
Cement Portland CEM II – 32,5R	[kg]	0	0	0	0	220	250	290	330
Sand 0/2-0/4	[kg]	0	0	0	0	0	0	0	0
Recycled EPS, crushed *	[lit]	0	0	0	0	500	500	500	500
EPS V - Virgin pearls / beads *	[lit]	500	500	500	500	0	0	0	0
Water in slurry	[kg]	110	120	140	160	110	125	145	165
Foam **	[lit]	461	441	408	375	501	476	443	410
Water in foam	[kg]	27	26	24	22	29	28	26	24
Wet density	[kg/m ³]	363	402	460	518	367	410	468	526
Expected density after 28 days	[kg/m ³]	300	340	390	440	300	340	390	440
Foaming agent	FN1 [kg]	1.05	1.00	0.93	0.85	1.14	1.08	1.01	0.93
Air Entraining Admixture	FP1 [lit]	0	0	0	0	0	0	0	0
Water / Binder		0.62	0.58	0.56	0.55	0.63	0.61	0.59	0.57
Compressive strength Rc	[N/mm ²] [MPa]	0.88	1.08	1.47	1.86	0.25***	0.30***	0.36***	0.40***
	[kg/cm ²]	9.0	11.0	15.0	19.0	2.5***	3.1***	3.7***	41***
	[psi]	128	157	213	270	36***	44***	52***	58***
Thermal conductivity - k/λ (average, oven dry)	[W/m.K]	0.076	0.080	0.087	0.099	0.083	0.087	0.096	0.106
	[Btu.in/ft ² .°F.hr]	0.527	0.555	0.603	0.686	0.575	0.603	0.666	0.735

Remarks:

Strengths and other characteristics are achieved with optimum cement, polystyrene granules and technical foam.

Polystyrene - Foam Concrete may have various densities, characteristics and composition – depending on the purpose and the application structure:

PBG-S V25-V40 is a lightweight Cellular Concrete, which is obtained by mixing of round polystyrene granules – “virgin” beads – with cement/mortar slurry and foam.

The result is an easy-to-process light material with excellent mechanical and thermal insulation properties.

PBG-S 25-40 is a lightweight Cellular Concrete, which is obtained by mixing of recycled polystyrene chips with cement/mortar slurry and foam.

The result is an easy-to-process light material with good thermal insulation properties.

* Volume of EPS packaging, bulk / apparent volume; ** The required amount of foam depends on the working / useful volume created by the polystyrene chips / beads

*** Minimum compressive strength achieved

Mix Design to produce 1 m³ of EPS-Concrete: SIRCONTEC PsB

Type: EPS-Concrete	SIRC	PsB V20	PsB V25	PsB V30	PsB V35	PsB V40	PsB V50	PsB 40	PsB 50	PsB 60
Dry density (oven dry)	[kg/m ³]	200	250	300	350	400	500	400	450	500
	[lb/ft ³]	12	16	19	22	25	31	25	28	31
Cement Portland CEM I – 32,5R	[kg]	180	220	250	280	300	380	0	0	0
Cement Portland CEM II – 32,5R	[kg]	0	0	0	0	0	0	300	350	390
Sand 0/2-0/4	[kg]	0	0	0	0	0	0	0	0	0
Recycled EPS, crushed *	[lit]	0	0	0	0	0	0	1057	1017	981
EPS V - Virgin pearls / beads *	[lit]	1093	1047	1019	991	954	876	0	0	0
Water in slurry	[kg]	90	110	120	130	150	180	150	160	170
Air quantity	[lit]	72	65	71	77	70	59	82	81	82
Water in foam	[kg]	0	0	0	0	0	0	0	0	0
Wet density	[kg/m ³]	283	342	382	422	461	571	464	524	573
Expected density after 28 days	[kg/m ³]	250	300	340	380	410	510	410	470	520
Foaming agent	FN1 [kg]	0	0	0	0	0	0	0	0	0
Air Entraining Admixture	FP1 [l]	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7
Water / Binder		0.50	0.50	0.48	0.46	0.50	0.47	0.50	0.46	0.44
Compressive strength Rc	[N/mm ²]	0.78	0.98	1.47	1.86	1.98	2.50	0.50**	0.80**	1.10**
	[MPa]									
	[kg/cm ²]	8.0	10.0	15.0	19.0	20.2	25.5	5.1**	8.2**	11.2**
	[psi]	113	142	213	270	287	363	73**	116**	160**
Thermal conductivity - k/λ (average, oven dry)	[W/m.K]	0.061	0.088	0.097	0.101	0.102	0.107	0.104	0.120	0.140
	[Btu.in/ft ² .°F.hr]	0.423	0.610	0.673	0.700	0.707	0.742	0.721	0.832	0.971

Remarks:

Strengths and other characteristics are achieved with optimum cement and polystyrene granules.

Polystyrene - Concrete may have various densities, characteristics and composition – depending on the purpose and the application structure:

PsB V20-V50 is a lightweight concrete, which is obtained by mixing of round polystyrene granules – “virgin” beads with cement/mortar slurry and Air Entraining Admixture.

The result is an easy-to-process light material with excellent mechanical and thermal insulation properties.

PsB 40-60 is a lightweight concrete, which is obtained by mixing of recycled polystyrene chips with cement/mortar slurry and Air Entraining Admixture.

The result is light material with good thermal insulation properties.

* Volume of EPS packaging, bulk / apparent volume; the required amount depends on the working / useful volume created by the polystyrene chips / beads.

** Minimum compressive strength achieved