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/m³]	**300**	**350**	**400**	**450**	**500**	**550**
		[lb/ft³]	**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/m³]**	**437**	**476**	**509**	**568**	**626**	**684**
Expected density after 28 days		**[kg/m³]**	**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/mm²]	[MPa]	**0.38**	**0.45**	**0.70**	**1.00**	**1.10**	**1.25**
		[kg/cm²]	**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/ft².°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/m³]	**600**	**700**	**800**	**900**	**1 000**	**1 200**	**1 400**	**1 600**
		[lb/ft³]	**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/m³]**	**680**	**783**	**882**	**983**	**1 139**	**1 289**	**1 502**	**1 698**
Expected density after 28 days		**[kg/m³]**	**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/mm²]	[MPa]	**1.4-2***	**2-2.5***	**2.1-3***	**3-4***	**3.5-5***	**5.5-8***	**10-12***	**13-17***
		[kg/cm²]	**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		[W/m.K]	**0.170**	**0.190**	**0.200**	**0.260**	**0.310**	**0.410**	**0.455**	**0.540**
(average, oven dry)		[Btu.in/ft².°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/m^3 for thermal insulation products, void-fills, geotechnical applications, levelling and sloping layers, and for granulated CLC (lightweight aggregates)

600-1200 kg/m^3 for thermal insulating – construction products (bricks, panels, blocks, slabs, partitions, etc.)

1000-1600 kg/m^3 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/m³]	**270**	**300**	**350**	**400**	**270**	**300**	**350**	**400**
		[lb/ft³]	**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/m³]**	**363**	**402**	**460**	**518**	**367**	**410**	**468**	**526**
Expected density after 28 days		**[kg/m³]**	**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/mm²]	[MPa]	**0.88**	**1.08**	**1.47**	**1.86**	**0.25*****	**0.30*****	**0.36*****	**0.40*****
		[kg/cm²]	**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		[W/m.K]	**0.076**	**0.080**	**0.087**	**0.099**	**0.083**	**0.087**	**0.096**	**0.106**
(average, oven dry)		[Btu.in/ft².°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