

Uniclass L331:P224	EPIC C311:X223
CI/SfB (-A) Eq7	



Technical Manual – Section 18 Lytag Bagged Aggregate

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Introduction

Lytag supplies bagged lightweight aggregate in nominal 15kg bags, which is equivalent to approximately 25kg of normal weight aggregate. Bags are supplied on pallets containing 60 bags and shrink wrapped. Normally the aggregate size supplied is 4/8mm, however other sizes can be supplied on request.

Physical Properties of Lightweight Aggregate

- **Weight** - The weight of Lytag lightweight coarse aggregate is typically in the range of 700 to 800kg/m₃. Particle densities range from 1,350 to 1,650kg/m₃. Normal weight aggregates have typical weights of 1,550kg/m₃ and particle densities of 2,600kg/m₃. Therefore, the use of lightweight aggregate can reduce the dead weight by up to 50% with no loss in strength. This also assists in manual handling as the material is significantly lighter than normal aggregate.
- **Fire Resistance** – Lytag lightweight aggregate has a Class 1 fire resistance because the aggregate has been produced by a refractory process. In addition, the cellular structure of the aggregate particles relieves any pressures from expanding gases. The result is a material that is highly stable at elevated temperatures.
- **Freeze Thaw** - The high void ratio, typically 40%, gives Lytag lightweight aggregate excellent freeze thaw properties.
- **Shape** – Lytag lightweight aggregate generally has a spherical shape resulting from the pelletising technique used. This leads to minimal settlement after placing.



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Applications

Lytag lightweight aggregate has a wide number of applications:

- **Structural Lightweight Concrete** – Lytag lightweight aggregate has been used in light weight concretes since the early 1960's. The reductions in concrete density have a significant effect on the dead load of the structure. Lytag lightweight aggregate can be used in precast units with an associated reduction in handling weight. As well as weight reductions, Lytag also imparts improved durability benefits to concrete. Batching information can be found in tables 18.1 to 18.6.
- **Floor and roof screeds** – Lytag lightweight aggregate is widely used throughout the UK in floor and roof screeds giving lower densities, improved thermal insulation and can use less cement than traditional screeds. Batching information can be found in table 18.7.
- **Drainage media** - The particles size and shape of Lytag lightweight aggregates give them excellent hydraulic conductivity properties. It can be shown that up to six times more water will pass through Lytag aggregates than standard gravel aggregates, reducing the risk of silt blockages in trench systems. Finely graded lightweight aggregate can be used allowing grass to grow and 'knit' over the trench in a few days.
- **Filter media** - Lytag aggregate is an excellent medium for biological filtration. The particle shape and structure are ideal for bacterial films to anchor and develop. The aggregates are resistant to acids and therefore the filter media has a long life.
- **Horticultural uses** - Lytag aggregates can be used as a growing medium for plants. The moisture retention, up to 15%, of Lytag provides a controlled water release to the plants. In addition, seedlings are not bound into the growing medium but grow between the aggregate particles. This allows for easier transplanting with minimal root damage. It is ideal for roof gardens as it provides an improved medium with significant weight reductions over normal soil or aggregate.



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Structural Lightweight Concrete

The information given in the following tables are for guidance only, and it is recommended that trial mixes should be undertaken, and under no circumstances should it be assumed that the mix designs are prescriptive.

The compressive strength classes detailed in the tables are only a selection of mixes and other strength classes can be specified. It is accepted that the cylinder strength (shown first) should be 90% of the cube strength. Cement contents for strength mixes between those shown can be interpolated from those shown. e.g. for a cube strength of 30N/mm₂ the cylinder strength would be 27N/mm₂. Therefore the designation would be LC27/30 with a cement content of 350kg/m₃.

Concrete containing Lytag granular and Lytag fines is used generally where there is the requirement for a very low concrete density

Skip Mix (Lytag Granular / Natural Sand)

TABLE 18.1. TYPICAL MIX DESIGN PER M₃ OF COMPACTED CONCRETE

Compressive Strength Class	Cement to BS EN 197-CEM 1 (kg)	Suitable Sand to BS EN 12620 (kg)	Lytag to BS EN 13055 4/14mm(Oven dry) (m ₃)	Recommended Consistence (Slump mm)
LC20/22	280	670	0.88	70
LC25/28	320	638	0.88	70
LC30/33	370	592	0.88	70
LC35/38	420	546	0.88	70

TABLE 18.2. TYPICAL CONCRETE DENSITIES

Strength Class	Fresh Wet (kg/m ₃)	Oven Dry (kg/m ₃) / Density Class
LC20/22 – LC45/50	1910 - 2000	1600 – 1800 D1.8



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TABLE 18.3. TYPICAL MIX DESIGN FOR VOLUME BATCHING OF CONCRETE

Compressive Strength Class	Cement to BS EN 197-CEM 1 (Vol)	Suitable Sand to BS EN 12620 (Vol)	Lyttag to BS EN 13055 4/14mm (Vol)	Recommended Consistence (Slump mm)
LC20/22	1	2	4	70
LC27/30	1	1.5	3	70

Skip Mix (Lyttag Granular / Lyttag Fines)

TABLE 18.4. TYPICAL MIX DESIGN PER M3 OF COMPACTED CONCRETE

Compressive Strength Class	Cement to BS EN197 – CEM 1 (kg)	Lyttag BS EN 13055 4/14mm (Oven dry) (m3)	Lyttag BS EN 13055 0/4mm (Oven dry) (m3)	Recommended Consistence (Slump mm)
LC20/22	280	0.75	0.51	70
LC25/28	320	0.75	0.48	70
LC30/33	360	0.75	0.45	70
LC35/38	400	0.75	0.42	70

TABLE 18.5. TYPICAL CONCRETE DENSITY OF LYTAG / LYTAG FINES MIXES

Strength Class (N/mm ²)	Fresh Wet (kg/m ³)	Oven Dry (kg/m ³) / Density Class
LC20/22 – LC40/44	1800-1850	1400 – 1600 D1.6

TABLE 18.6. TYPICAL MIX DESIGN FOR VOLUME BATCHING OF CONCRETE

Compressive Strength Class	Cement to BS EN197 – CEM 1 (Vol)	Lyttag BS EN 13055 0/4mm (Vol)	Lyttag BS EN 13055 4/14mm (Vol)	Recommended Consistence (Slump mm)
LC20/22	1	2	4	70
LC27/30	1	1.5	3	70

For further advice on Lyttag concrete see Section 3 of the Lyttag Technical Manual.



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Floor and roof screeds

A Lytag screed is a cement-bonded Lytag lightweight aggregate no-fines base coat with a 4:1 by weight sand: cement topping. The no-fines base coat of 10:1, 8:1, or 6:1 by volume, normally using 4/8mm

Lytag, can be bonded to the sub-base, unbonded, or floating over an insulating layer. This specification is applicable to both floor and roof screeds.

Mix Proportions for the Lytag Basecoat

The no fines base coat should be specified as 6:1, 8:1 or 10:1 (by volume) depending on the application. The minimum thickness of base coat for a bonded screed is 25mm and for an un-bonded screed 50mm. To prevent edge restraint, floating screeds should be isolated from walls or up stands with a separating membrane. Where weigh batching is used Table 18.7. can be used as a guide. Where a no-fines fill is required with a minimum depth of 100mm then 4- 14mm Lytag may be used in lieu of 4-8mm.

Table 18.7. TYPICAL MIX DESIGN PER M3 OF COMPACTED CONCRETE

Material	\	Mix	10:1	8:1	6:1
Cement	150	200	250	70	
4/8mm Lytag	820	820	820	70	
Added Water	80	80	80	70	

The Lytag and water figures indicated above are only a guide, and will vary depending on moisture condition of the aggregate and ambient weather conditions.

For further guidance on Lytag roof and floor screeds see section 7 of the Lytag Technical Manual and guidance notes for batching no-fines screeds.



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