



# ESCSI

*Expanded Shale  
Clay & Slate  
Institute*

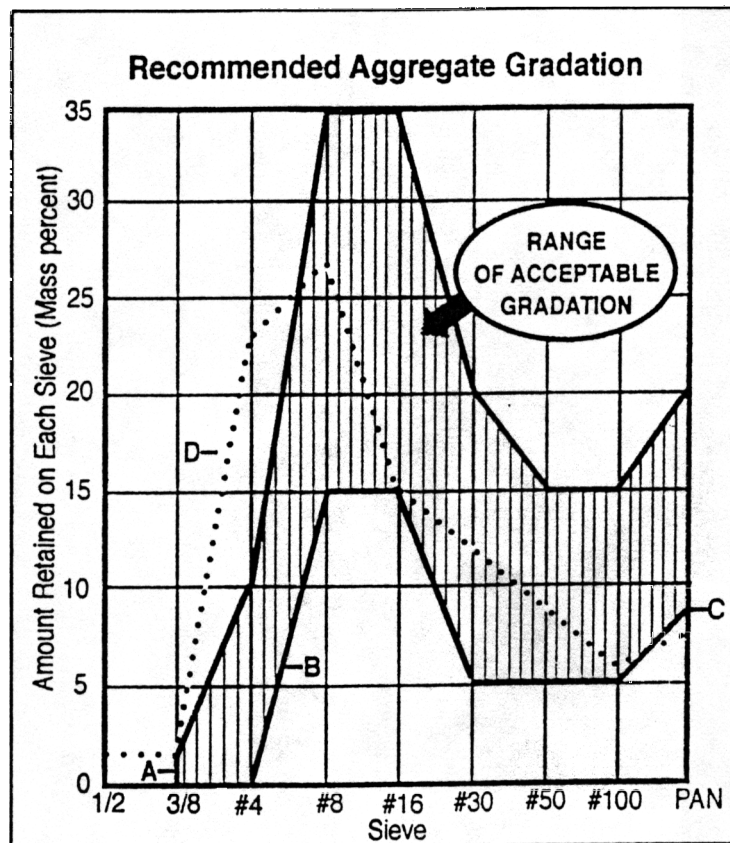
Information Sheet 3555

## Recommended Combined Aggregate Gradation For High Quality Lightweight Concrete Masonry Units\*

Proper aggregate gradation is an essential ingredient in producing high quality concrete masonry units. The aggregate gradation range shown optimizes the particle size distribution which in turn optimizes the quality of the lightweight CMU in the following ways: (1) Compactability and high strengths are obtained without excessive amounts of cementitious materials. (2) Shrinkage is reduced by maximizing aggregate contact. (3) Water absorption and penetration are reduced because of higher strengths, tighter textures and fewer interstitial voids. These three qualities also enhance the effectiveness of water repellant coatings. (4) Freezing and thawing durability is improved because of better compactability and fewer interstitial voids.

### Comments

- A.** Keep 3/8" particles to a minimum.
- B.** Uniform, tight texture surface provided by the material on #4 and #8 screens
- C.** A minimum of 8% passing the #100 screen is desirable for green strength, moldability and compactability with today's faster block machines. Less than 8% is acceptable when using rich mixes or supplementary cementitious or pozzolanic materials.
- D.** Today's high quality CMU's with high strengths, low permeability, and uniform tight textures require a finer gradation than indicated by the dotted gradation curve. This dotted curve was compiled many years ago by averaging what was being used to make a lightweight "popcorn" textured block. The dotted curve allowed excessive particle size distribution on the 3/8" and #4 sieves, and inadequate on passing the #100 sieve.



Reference: *Recommended Gradation for Structural Lightweight Aggregate Used In High Quality Masonry Units*, by Thomas A. Holm, PE, FACI 1997.

Sieve Size	Amount Retained On Each Sieve (Mass %) (see graph above)	Cumulative Retained-Amount Larger Than Each Sieve (Mass %)	Cumulative Passing-Amount Finer Than Each Sieve (Mass %)
3/8"	0-2	0-2	98-100
#4	0-10	0-10	90-100
#8	15-35	20-40	60-80
#16	15-35	45-65	35-55
#30	5-20	60-75	25-40
#50	5-15	70-85	15-30
#100	5-15	80-92	8-20
Pan	8-20	100	0

\*Aggregates Conforming To ASTM C 331 or C 33 (whichever is applicable)

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