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SPECIFYING CONCRETE MASONRY UNITS BULLETIN

Medium Weight vs. Normal Weight

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Please use this Bulletin as a guide when specifying concrete masonry units (CMUs).

Typically Concrete Product Producers manufacture their CMU's out of locally available aggregates. These aggregates when mixed with cement and water produce the specific block physical properties inherent to the locally available aggregates.

When it comes to block making, the State of Michigan is abundant with normal weight aggregates of sand, gravel, and limestone (ASTM C-33) throughout the state, which when utilized in the concrete block manufacturing process will result in concrete masonry units (CMU's) that ASTM classifies as normal weight (density of 125 lbs/cf and above).

For many years, expanded slag, a lightweight aggregate (ASTM C-331) has been available in the southeast Michigan area, which offered CMU manufacturers the option of blending the expanded slag with normal-weight aggregates to produce a medium-weight CMU (density of 105 lbs/cf to less than 125 lbs/cf). Compared to normal-weight units, these medium-weight units offered the mason contractor a lighter weight unit, and offered the designer potentially increased fire ratings and reduced coefficients of thermal expansion, all for a reasonably priced premium compared to normal-weight units.

Over the years, some Michigan manufacturers chose to inventory only normal-weight units, some have inventoried both normal-weight and medium-weight units, and some have chosen to inventory only medium-weight units. Typically, at least in southeast Michigan, a medium-weight unit came to be known as the "standard" unit that is inventoried in most block yards.

Recently, however, expanded slag has become virtually unavailable to southeast Michigan producers, unless trucking the aggregate in from neighboring states or even Ontario. The premium for a medium-weight block compared to normal-weight has increased approximately four times from what is was just a year ago, a premium that most manufacturers feel the market will not bear. As a result, many manufacturers have either changed or are in the process of changing their everyday inventory over to normal-weight units. Medium-weight units will still be available in the Michigan market, but on a much more limited basis than in the past and also at the higher cost premium.

To assist the designer and specifier, the following are suggested guidelines. CMUs should be specified to meet ASTM C90, the Standard Specification for Loadbearing Concrete Masonry Units. There are three density classifications for CMUs: 1) normal weight (125 pcf or more), 2) medium weight (105 pcf to less than 125 pcf) and 3) lightweight (less than 105 pcf).

1) All three density classifications have to meet a minimum net area compressive strength of 1900 psi. Depending on the mortar type, the compressive strength of the wall increases with higher density CMUs.
2) Based on the calculation procedure, the sound transmission class (STC) increases with higher density walls. Code, typically, requires STCs of not less than 50.

3) When designing for moisture management and mitigation in single wythe CMU walls, three levels of defense should be considered: surface protection (properly constructed mortar joints, surface water repellents, surface coatings), internal protection (integral water repellents), and drainage/drying (flashing, weeps, vents).
4) The coefficients of thermal expansion of CMUs depend to some degree on density and on the type of aggregate used. Normal weight units have an expansion coefficient of about 5 x 10^{-6}/F and the value for lightweight units is about 4 x 10^{-6}/F. The TMS 402-11 Building Code Requirements for Masonry Structures shows 4.5 x 10^{-6}/F.
5) As the density of the unit increases, the unit's weight increases.
6) In general, fire resistance ratings with lower density walls provide more fire resistance.
7) Thermal resistance with lower density walls provide higher R-values.
8) The heat capacity (thermal mass) increases with higher density walls.

Note, when particular features are desired such as higher compressive strength, fire resistance, thermal performance or acoustical performance, these features should be specified separately. Your local block manufacturer should be consulted as to the availability of CMUs having the desired features. If you have any questions regarding this Bulletin and/or block specifications, please feel free to contact the Masonry Institute of Michigan at 248-663-0415.

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