MIXTURE DESIGNATION:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cementitious Materials** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Component*** | | | | ***Specific Gravity*** | | | | | | | | ***Volume (ft3)*** | | | | | ***Amount of CM (mass/volume) (lb/yd3)*** | | | | | | | | | | | |
| *Cement, ASTM Type* | | | |  | | | | | | | |  | | | | |  | | | |  | | | *Total Amount of cementitious materials*  ***\_\_\_\_\_\_\_*** *lb/yd3*  *c/cm ratio*  ***\_\_\_\_\_\_\_*** | | | | |
| *Cementitious Material 1* | | | |  | | | | | | | |  | | | | |  | | | |  | | |
| *Cementitious Material 2* | | | |  | | | | | | | |  | | | | |  | | | |  | | |  |
| *Cementitious Material 3* | | | |  | | | | | | | |  | | | | |  | | | |  | | |
| **Fibers** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |
| ***Component*** | | | | | ***Specific Gravity*** | | | | | | | ***Volume (ft3)*** | | | | | ***Amount of Fibers (mass/volume) (lb/yd3)*** | | | | | | | | | | | |
| *Fiber 1* | | | | |  | | | | | | |  | | | | |  | | | |  | | | | *Total Amount of Fibers*  *\_\_\_\_\_\_\_ lb/yd3* | | | |
| *Fiber 2* | | | | |  | | | | | | |  | | | | |  | | | |  | | | |
| **Aggregates** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Aggregates*** | | ***ASTM***  ***C330\**** | | | | | | ***Abs (%)*** | | | ***SGOD*** | | | | ***SGSSD*** | | | | ***Base Quantity (lb/yd3)*** | | | | | | | | ***Volume (ft3)*** | |
| ***OD*** | | | ***SSD*** | | | | |
| *Aggregate 1* | | Y / N | | | | | |  | | |  | | | |  | | | |  | | |  | | | | |  | |
| *Aggregate 2* | | Y / N | | | | | |  | | |  | | | |  | | | |  | | |  | | | | |  | |
| *Aggregate 3* | | Y / N | | | | | |  | | |  | | | |  | | | |  | | |  | | | | |  | |
| **Admixtures** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Admixture*** | ***lb/gal*** | | | | | | ***Dosage***  **(*fl. oz / cwt)*** | | | | | | | ***% Solids*** | | | | ***Amount of Water in Admixture (lb/yd3)*** | | | | | | | | | | |
| *Latex (if used)* |  | | | | | |  | | | | | | |  | | | |  | | | | | | | *Total Water from*  *Admixtures, ∑wadmx*  ***\_\_\_\_\_\_\_*** *lb/yd3* | | | |
| *Liquid Dye (if used)* |  | | | | | |  | | | | | | |  | | | |  | | | | | | |
| *Admixture* |  | | | | | |  | | | | | | |  | | | |  | | | | | | |
| *Admixture* |  | | | | | |  | | | | | | |  | | | |  | | | | | | |
| **Solids (latex, dyes and powdered admixtures only)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Component*** | | | | | | ***Specific Gravity*** | | | | | | | ***Volume (ft3)*** | | | | | ***Amount (mass/volume) (lb/yd3)*** | | | | | | | | | | |
| *Latex (if used)* | | | | | |  | | | | | | |  | | | | |  | | | | | | | *Total Solids from*  *Admixtures*  ***\_\_\_\_\_\_\_*** *lb/yd3* | | | |
| *Liquid Dye (if used)* | | | | | |  | | | | | | |  | | | | |  | | | | | | |
| *Powdered Admixture* | | | | | |  | | | | | | |  | | | | |  | | | | | | |
| **Water** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | ***Amount (mass/volume) (lb/yd3)*** | | | | | | | | | | | | | | | | | ***Volume (ft3)*** | | |
| *Water, lb/yd3* | | | | | | | | |  | | | | | | | | | *w*: | | | | | | | |  | | |
| *Total Free Water from All Aggregates, lb/yd3* | | | | | | | | | *∑wfree*: | | | | | | | |  | | |
| *Total Water from All Admixtures, lb/yd3* | | | | | | | | | *∑wadmx*: | | | | | | | |
| *Batch Water, lb/yd3* | | | | | | | | | *wbatch*: | | | | | | | |
| **Densities, Air Content, Ratios and Slump** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | ***cm*** | | | | | | | ***fibers*** | | | | | | ***aggregates*** | | | | ***solids*** | | | ***water*** | | | | | ***Total*** |
| ***Mass of Concrete, M, (lb )*** | | |  | | | | | | |  | | | | | |  | | | |  | | |  | | | | | *∑M:* |
| ***Absolute Volume of Concrete, V, (ft3)*** | | |  | | | | | | |  | | | | | |  | | | |  | | |  | | | | | *∑V:* |
| ***Theoretical Density, T,*** *(=∑M / ∑V)* | | | *lb/ft3* | | | | | | | | | | | | | ***Air Content*** *[= (T – D)/T x 100%]* | | | | | | | | | | | | *%* |
| ***Measured Density, D*** | | | *lb/ft3* | | | | | | | | | | | | | ***Slump, Slump flow*** | | | | | | | | | | | | *in.* |  |
| ***water/cement ratio, w/c:*** | | |  | | | | | | |  | | | | | | ***water/cementitious material ratio, w/cm:*** | | | | | | | | | | | |  |  |

\* *Indicate if aggregate, other than manufactured glass microspheres and/or cenospheres, is compliant with ASTM C330.*

**Terms and Formulas for Table 3.1**

***Abs*** = absorption of an aggregate, whether taken as a whole, the coarse, or the fine aggregate, %.

***cwt***  = hundred weight of cementitious material (example 860 lb/yd3 of cm is 8.6 cwt)

***MCtotal*** = total moisture content referenced to the oven-dried condition of the aggregate, %.

***MCfree*** = free moisture content, referenced to the saturated, surface-dry condition (SSD), of the aggregate, %.

***MCstk*** = stock moisture content of the aggregate, %.

***M*** = the measured density (wet, plastic) of concrete test cylinders, per ASTM C138, lb/ft3.

***T*** = the theoretical density of concrete (zero air voids), per ASTM C138, lb/ft3.

***SGSSD*** = specific gravity, in the saturated, surface-dry condition, of aggregate, dimensionless.

***SGOD*** = specific gravity, in the oven-dried condition, of aggregate dimensionless.

***WSSD*** = mass, in the saturated, surface-dry condition, of aggregate per unit volume of concrete, lb/yd3.

***WOD*** = mass, in the oven-dried condition, of aggregate per unit volume of concrete, lb/yd3.

***Wstk*** = mass, in the stock moisture condition, of the aggregate per unit volume of concrete, lb/yd3.

***wadmx*** = the mass of water in the admixtures, per unit volume of concrete, lb/yd3.

***wbatch*** = the mass of water to be batched per unit volume of concrete when the aggregates are in a stock moisture condition, lb/yd3.

***wfree*** = free water carried into the batch by a wet per unit volume of concrete, lb/yd3.

***Each one of these formulas should be applied to each aggregate source:***











Note that *wfree* can be a negative number indicating a dry and absorptive aggregate.

*Wstk = WSSD + wfree*

Then, for the mixture as a whole: 

***The following formula should be applied to all admixtures in liquid form:***

*wadmx* *= dosage (fl oz/cwt) \* cwt of cm \* water content (%) \* 1 gal/128 fl oz \* lb/gal of admixture*

***The following formula should be applied to latex and liquid dyes, only:***

*S = dosage (fl oz/cwt) \* cwt of cm \* solid content (%) \* 1 gal/128 fl oz \* lb/gal of admixture*