Concrete mix ratio calculation pdf

Sign up for the Builder to ask questions, answer questions, write articles and communicate with others. VIP members receive additional benefits. Do you have an account? The estimation of sign in quantity of materials is essentially required in all construction work and the quantity of materials depends on the mixing proportions of the concrete. In our previous article, we have already discussed how to calculate bricks in a wall. Today, we will discuss how to calculate the quantities of materials for different ratios of concrete mixing. (Dry mixing method) We will calculate the amount of material for 1 m3 of concrete (by volume). Suppose the mixing ratio is 1:2: 4 (cement:sand:stone -a:b:c) Volume of wet concrete - 1 m3 Volume of dry concrete - 1 × 1.54 - 1.54 m3 What is 1.54 given below: CALCUL FOR CEMENT: Cement, Cement × a - (1.54/a-b-c) × a - [1.54/1-2-2-4)] × 1 - 0.22 cum Now cement density - 1440 kg/cum ∴ Cement volume - 0.22 × 1440 -316.8 kg. As we know, 1 bag of cement contains 50 kg of cement. ∴ bags of cement required - 316.8/50 - 6.33 bags. CALCUL FOR THE SABLE: Formula, Sand - (Dry Concrete Volume/a-b-c) × b - (1.54/a-b-c) × b - (1.54/1-2-4) × 2 - 0.44 cum. PIERRE COPEAL CALCULUS: Formula, stone shavings - (Volume of dry concrete/a-b-c) × c - (1.54/a-b-c) ×c - (1.54/1-2-4) × 4 - 0.88 c. WATER TENEUR CALCUL: Suppose the water-to-cement ratio of the concrete is 0.45. w/c - 0.45 water required for 1 bag of cement - 0.45 × 0.0353 - 0.0159 cum. When the volume of 50 kg of cement - 0.0353 cum 1 m3 of water - 1000 liters of water needed for 1 bag of cement -0.0159 × 1000 - 15.9 liters. ∴ water needed for 6.33 bags of cement - 6.33 × 15.9 - 101 liters. SUMMARY: Cement - 6.33 bags. Sand - 0.44 cum Stone shavings - 0.88 cum Water - 101 liters. Note: Concrete efficiency is considered 67% and material wastes - 2% You can use the same formula for different mixing proportions like 1:1.5:3, etc. Here we used unit of cubic meters, but you can also calculate in unit of cubic feet. I hope it helps. Note :P ost questions/requests in our forum How to calculate the amounts of cement, sand and aggregates for the nominal concrete mixture (1:2:4)? - Technical feeding The proper calculation and relative proportion of materials are very important to produce a good and cost-effective quality of concrete. This article will explain the simple techniques used by engineers to calculate cement, sand, coarse aggregate (gravel or Jalli) and the water needed to prepare different categories of concrete such as M5, M7.5, M10, M15 and M20. If you don't want to learn the calculations, you can use the quantities in the table at the end of each subject to produce different categories of concrete. The calculations and results given in this article are verified with different standards and reliable sources such as IS456, IS10262 and the government's analysis rate. Understanding concrete grades Depending on the strength, concrete is categorized into different categories M5, M7.5, M10, M15, M20 etc. In concrete categories, the letter M means mix and the following number represents the characteristic compressive force of the concrete in 28 days in the direct compression test. For example, if the concrete is M20 grade, this means that the concrete will reach the characteristic compressive force of 20 Newton per square millimeter in 28 days after drying. The ratio of concrete mixing versus volume concrete mixture are prescribed cement, sand and aggregate ratio to get the desired strength in the concrete. The volumetric mixing ratio of M20 concrete is 1:1.5:3, hence 1 part cement, 1.5 parts sand and 3 parts of aggregates by volume is needed to prepare the M20 quality concrete. Concrete quality mix ratio (Ciment: Sand: Aggregate) Compressive resistance M5 1:5:10 5 N/mm2 M7.5 1:4:8 7.5 N/mm2 M10 1:3:6 10 N/mm2 M15 1:2:4 15 N/mm2 M20 1:1.5:3 20 N/mm2 However, mixing ratios over concrete may not be accurately tracked on site. This may be due to a few reasons such as increased manoeuvrability (increasing the fine aggregate - river sand and M sand) or reducing costs (reducing cement content) etc., excessive reduction in cement content or increased sand content will have a negative impact on concrete strength. Therefore, it is advisable not to increase the fine aggregate content (river sand and M sand) more than 30% higher than the prescribed ratio anyway. Before diving into the calculation, it is very important to understand the difference between concrete mix nominal and concrete mix design and their pros and cons. Method 1: Calculating cement sand and coarse aggregate by volume and weight using the nominal method of concrete mixing ratio 2: Calculating the weight of sand and aggregate required by cement bag (50 kg bag) using the total weight of the overall value given in the IS codebook method:1 Cement calculation, sand and aggregate from the nominal mix ratio While the mixture of ingredients, cement and sand (fine aggregate) must fill the gaps between the coarse aggregate before taking their own space. Thus, in order to prepare 1 cubic meter of concrete M20, M15 and M10, you need 1.57 cubic meters of total dry volume: cement, sand and aggregates and concrete incase M7.5 and M5 you need 1.52 cubic meters of total dry volume of cement sand and aggregates. Many websites give a different value for total dry volume, but the values mentioned above have been checked personally, repeatedly, and are comparable to the government's different analysis rates. Cement, sand and coarse aggregates required for M20 quality concrete The prescribed concrete mix ratio of quality concrete 1:1.5:3 depending on the codebook. Cement - 1 PartSand - 1.5 PartAggregate - 3 Dry Volume PartTotal of Material Required - 1.57 cu.m Volume of Cement Needed - Cement Report x 1.5 7 / (1-1.5-3) - 1 x 1.57/5.5 - 0.285 cu.m Volume of sand needed - Sand ratio x 1,,57/(1-1.5-3) - 1.5 x 1.57/5.5 - 0.427 cu.m Volume of aggregates needed Agg ratio x 1.57/(1-1.5-3) - 0.427 x 32 - 0.854 cu.m weight required for 1 cubic metre of M20 quality concrete The weight of the necessary cement can be calculated by multiplying the volume of cement with the bulk density of the cement. The bulk density of the frequently used cement varieties (PPC and OPC) is 1440 kg/cu.m. Cement weight required - cement volume x bulk cement density - 0.285 cu.m x 1440 kg/cu.m Weight of the cement required - 410 kg No cement bag required 410/50 - 8.2 bags So 8 bags of cement needed to prepare a cubic metre of quality concrete M20. Alternative method: - 1 cu.m of cement is about 28.8 bags. Weight of cement required - cement volume x 28.8 - 8.2 bags Volume of sand and aggregates required for 1 cubic metre of M20 quality concrete Suppliers sell sand and coarse aggregates to the extent of cubic feet (FTC), units and in loads of trucks or dumpsters. A UNIT measure is equivalent to 100 cubic feet. One cubic meter is 35.32 cubic feet. Sand Volume Required - Sand Volume x 35.32 -0.427 x 35.32 - 15.08 cft Aggregate Volume Required - Volume of agg x 35.05. 32 - 30.16 cft Hence 15.08 cft of sand and 30.16 cft of aggregate is required to prepare a cubic meter of quality concrete M20. Cement, sand and aggregate required for different categories of concrete in the cubic meter GRADECEMENTSANDAGGM200.2850.4270.854M150.2240.4480.896M100.. 1570.4710.942M7.5* 0.117 0.4710.942M5*0.094 0.4710.942 Ciment, Sable et agrégat requis pour différentes teneurs en béton en kilogrammes et pieds cubes CFT GRADECEMENTSANDAGGM20 410kg 15.01cft 30.16 cft M15 322kg15.82cft31.65cftM10 226kg16.64cft33.27cftM7.5*169kg16.64cft33.27cftM5* 135 kg16.64cft33.27cft *Comme je l'ai expliqué ci-dessus, lors du calcul du béton de qualité M7.5 et M5, le matériau sec total requis pour le béton est pris comme 1,52 au lieu de 1,55 et la quantité de sable et d'agrégats est ajustée pour M10 et M5 en fonction de l'expérience. Number of cement, sand and aggregate bags required for different categories of concrete GRADECEMENTSANDAGGM20 8.2 bags 15.01cft 30.16 cmft M15 6.4 bags15.82cft31.65cftM10 4.5 bags16,64cft33.27cft M7.5-3.38 bags16.64cft33.27cftM5 2.7 bags16.64cft33.27cft Method:2 Sand weight calculation and coarse aggregate required by cement bag IS456 Codebook recommends the following amounts of total aggregate per cement bag of 50 kg to produce nominal mixing concrete. AGGREGATE GRADETOTAL IN BÉTON (FIN - GROSSIER)M 5800 kgM 7.5625 kgM 10480 kgM 15330 kgM 20250 kg Sand and aggregate weight required by 50 kg cement bag for M20 quality concrete Discover the amount required to prepare the M20 category by the procedure. The sand is confirmed in Zone II - average ranking. The ratio between the fine aggregate and the coarse aggregate is chosen as usual as 1:2. From the table above, we know that we need 250 kg of total dry aggregates for our concrete. The general relationship between the aggregate and the coarse aggregate is 1:2, but it can be adjusted between 1:1.5 and 1:2.5 depending on the ranking of the fine aggregate and the size of the coarse aggregate. Sand - 1 PartAggregate - 2 Aggregate partTotal required - 250 kg required per cement bag - Sand ratio x 250 /(1)2 - 1 x 250 /(1)2 - 83 kg - 85 kg Aggregate required per bag of cement - Ratio of ungg x 25 170 kg Sand and aggregate weight required per 50 kg cement bag for different grades of concrete GRADECEMENTSANDAGGGGM201 bag 85 kg 170 kg SacM151 110 kg220 kgM101 bag 160 kg320 kgM7.51 bag 210 kg415 kgM51 bag 265 kg535 kg Read also: Volume of sand and aggregate Rough mores needed per cement bag in the cubic feet CFT EXIGENCE OF WATER FOR DIFFERENT GRADES OFTONMENT COMME BY IS456 CODE For the design mix the concrete water content is calculated from Wate / Cement ratio that depends on various factors like the weight of cement handling, etc. But for the nominal mixing concrete IS456 codebook suggests the following amounts per bag of cement. QUALITY IN BÉTON BY SAC OF 50 KG CEMENT M560 LitersM7.545 liters M1034 literSM1532 LitresM2030 Litres References