

NOTES ON CONDITIONS FOR SUPPLY OF AGGREGATE BY WEIGHT

These notes are for the guidance of supervising officers and must not be included in the Contract Documents.

TNZ G/2 should be included in the documents for all contracts involving the supply of aggregate as a separate contract item when:

- (a) the quantity for payment purposes is specified as the loose volume in delivery trucks, and
- (b) one or more potential tenderers have the capability to supply by weight i.e. have available a suitable weighbridge.

It is not appropriate when the payment quantity is to be obtained by measuring a stockpile or compacted layer.

The conditions allow the loose volume for payment purposes to be arrived at by weighing, after an appropriate mass to volume conversion factor has been established. Volume remains the basic measure because not all suppliers have weighing facilities. In fact, truck volume and truck weight are both remote measures because what a purchaser really requires is a given quantity of solid particles (compacted volume).

The procedure given in TNZ G/2 does not provide a factor for conversion to compacted volume for ordering. The purpose of the conditions is to provide equity between measurement by weight and measurement by volume for payment.

In preparing TNZ G/2, it was noted that volume measurement is usually specified at point of delivery and hence different amounts of solid particles are obtained depending on the transport conditions. Variation in quantity due to this factor is rarely measured in practice and because it produces inequity in supply has been excluded in setting the procedures in TNZ G/2. Instead the requirement that the truck must travel 500 m before screeding together with the compaction from screeding and the other handling requirements effectively produce a standard handling compaction. No further adjustment should be made because of handling compaction. The principle adopted is that the conversion factor obtained in accordance with TNZ G/2 shall be deemed to give quantity at point of delivery.

The requirements for number of loads to establish the conversion factor have been set to give 90% confidence that the calculated mean is within $\pm 1\%$ of the true mean of the material being supplied.

Water content changes affect both measurement by weight and measurement by volume. They produce changes in the handling characteristics of aggregates and therefore in the amount of aggregate (solid particles) in a given volume of material. High water contents (near saturation) tend to result in more aggregate for a given volume because the material compacts more during handling (is denser in the truck). On the other hand, when measurement is by weight, high water contents mean that there is less aggregate because more of the weight is water. For sands, small increases in water content can cause either bulking or densification depending on the degree of saturation. The corresponding weight change is much less significant so there are distinct advantages in equity in purchase of this material by weight.

Water content changes are therefore of major importance in maintaining equity between supply by weight and supply by volume. TNZ G/2 requires that the mass to volume conversion factor be established at a water content representative of the delivered condition and makes provision for re-establishment if the water content changes significantly. In practice, some less rigorous adjustment to the conversion factor would probably be agreed between supplier and purchaser if the water content changes were only temporary.