



# ZEEMAIL



## Zeeospheres® Ceramics, LLC

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### Technique for Determining the Approximate Level of Zeeospheres® Needed for Optimum Properties

Since Zeeospheres® cost more than many other aggregates, they are normally most cost effective when they are used to fill the voids between other, imperfectly packed aggregate particles and thus primarily displace resin. A simple technique to determine the approximate quantity of Zeeospheres® that just fills these voids with minimum displacement of aggregate is as follows:

1. Fill a graduated cylinder approximately 75% full with the present aggregate. Tap the cylinder on the bench top several times to allow the aggregate to settle and pack as best it can. Record the volume occupied.
2. Port the contents out of the cylinder and weigh the aggregate
3. Add a small, weighted amount of Zeeospheres® (probably 1 to 2% initially) to this aggregate and blend thoroughly.
4. Pour this blend of Zeeospheres® ad aggregate back into the graduated cylinder. Tap as before to allow it to settle and pack. Record the volume now occupied.
5. Pour contents out again; add another weighted amount of Zeeospheres®, blend, and re-measure volume occupied.
6. Continue this procedure until the addition of more Zeeospheres® produces a considerable increase in the total volume occupied.
7. By graphing total volume occupied vs. the percent Zeeospheres® added, it should be possible to identify a range in which the addition of Zeeospheres® produces little or no increase in total volume occupied by the aggregate plus another range in which the addition of more Zeeospheres® produces a continuous increase in total volume occupied. The initial additions of Zeeospheres® may produce a decrease in the volume occupied by the aggregate as the ball bearing effect of the Zeeospheres® unlocks the irregularly shaped particles and allows them to pack more efficiently.

Normally, the best combination of cost-effectiveness and physical properties is produced by using the percentage of Zeeospheres® at which the addition of more Zeeospheres® just begins to produce a noticeable trend toward increasing total volume occupied.

This technique will provide a reasonable approximation of the optimum level of Zeeospheres®. As in any formulating work, however, a series of finished products should be made u representing several levels of addition of Zeeospheres® around this theoretical optimum. These should then be individually tested to confirm that the desired balance of properties is achieved.