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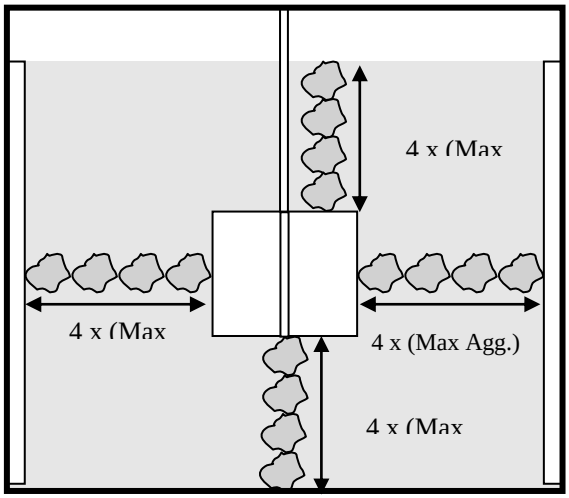
Test Smart – Build Right

Recommendation for selection of size of container and vane

To get accurate results two requirements are important to observe in dependence of the maximum aggregate size, using the ICAR:

Firstly, the **minimum distance** between vane and container has to be **4 times the maximum aggregate size**, page 5-6 in the manual, (ref.1).



Fig, 1. The rheometer gap size must be at least 4 times the maximum aggregate size.

Secondly, 32 mm aggregate is the largest aggregate size. If the largest set of bucket/vane is used for smaller aggregates, the **dead zone** (the zone where no flow occurs - see below) will be increased.

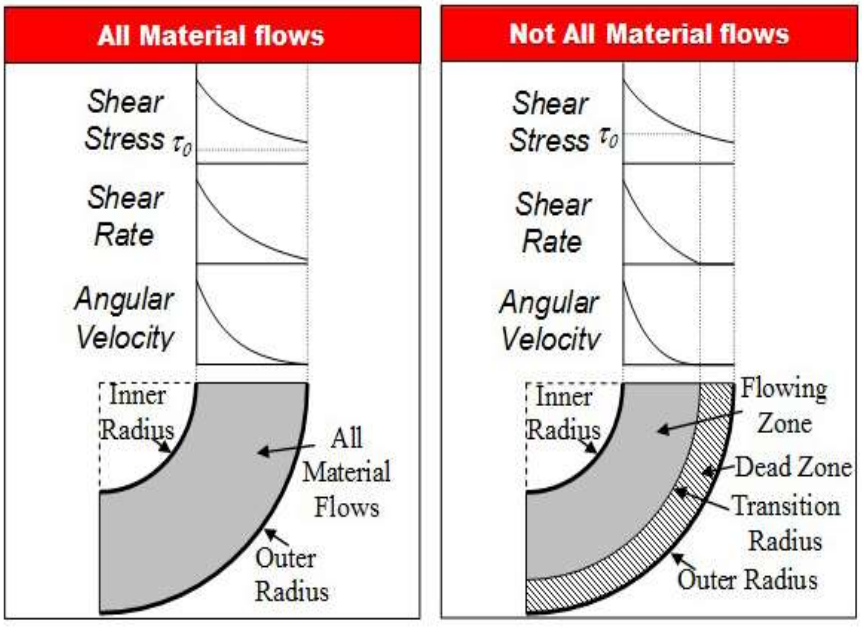


Fig.2. The flowing zone and the dead zone

For a larger dead zone, the error in the computed rheological parameters can be significant. That is why smaller buckets are used for smaller aggregates to eliminate the dead zone as much as possible. Dr. Eric Koehler discusses the size of bucket and the dead zone (page 37) in the document 105-3F (Ref. 2).

That means the various buckets and vanes should be selected as shown below, in relation to the maximum aggregate size.

Max. aggregate size (mm)	**Container diameter (mm)**	**Vane height (mm)**
26 mm - 32 mm	RHM-3007 405 mm / 460 mm	RHM-3011 330 mm
20 mm - 25 mm	RHM-3006 355 mm / 380 mm	RHM-3011 280 mm
13 mm - 19 mm	RHM-3005 305 mm / 312 mm	RHM-3009 240 mm
< 12.5 mm	RHM-3004 280 mm / 280 mm	RHM-3008 235 mm

Fig.3. The maximum aggregate size in relation to the recommended selection of the containers / vanes

So, the largest container / vane should not be used to test all SCC mixes for all sizes of aggregates, only 26 mm – 32 mm aggregate size. For smaller sizes of aggregates, the containers/vanes in Fig. 3 have to be chosen.

Refs.:

(1) Germann Instruments: “ICAR Manual, V.1, 2017”, Germann Instruments, Emdrupvej 120, DK-2400 Copenhagen, Denmark

(2) Kohler, E.P. & Fowler, D.W.: “ICAR Report 105-3F, Measuring the Workability of High Fines Concrete”, Int. Center of Aggregate Research, University of Texas, USA, August 2004.

23.7.2017
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