

## Conclusion of TG-C discussion (Prepared by Tetsu Kanda)

### I. Issues discussed

- Mix proportion determination
- Mixing
- Placing
- Curing
- Quality inspection

### II. Conclusion for individual issue

#### II.1) Mix proportion determination

- Standard tensile test should be established in early stage to determine mix proportion such as to satisfy requirement for tensile strength and tensile strain capacity.
- Standard test for determining crack opening displacement should be established, which has not proposed.
- Solid procedure for determining standard deviation is to be established. This is necessary to reasonably set safety factor.

#### II.2) Fresh property

- As specified fresh properties for HPFRCC quality inspection, standard tests for segregation (e.g., wash-out test), fiber dispersion, viscosity (e.g., funnel test) are to be determined.
- The above standard tests have to be consistent and simple such as to be applied in site.
- Solid evaluation guideline for the results of the above standard tests, which may vary depending on composite system, should be established.

#### II.3) Mixing

- HPFRCC mixing procedure may partially follow specification in concrete mixing, e.g., ASTM C 94 Special consideration.
- Trial mixing is mandatory, prior to HPFRCC mixing practice.
- Ordinary concrete mixer may not be suitable depending on mix proportion of HPFRCC.
- Larger number of constitutive materials and resulting special consideration may be needed.
- Longer mixing time and complicated mixing procedure may be needed.

- Standard mix procedure is to be established for future study.

#### II.4) Placing

- Self-compacting performance appears appropriate.
- Vibration equipment is not effective.
- Pumping may not be suitable for casting, due to expecting fiber cramping in fresh composite
- Special care is mandatory for construction joint and finishing, which are very different from normal concrete.
- Standard placing specification should be established in future study, for compaction, pumping, construction joint, and finishing (resulting flatness).

#### II.5) Curing

- Basic procedure for curing can be followed the specification in concrete curing, e.g., Standard Practice for Curing Concrete by ACI 308
- In Accelerated curing, high temperature, e.g., more than 100 0C, is not allowed when polymeric fiber is used due to expected high temperature damage for fibers.

#### II.6) Quality inspection

- Tensile property inspection is mandatory in daily basis.
- Example of inspection item list

Property	Inspection	Frequency	Judgment for approval
Fresh property	-Slump flow test -Air content test -Temperature of fresh material	Once for a day or once for each 150m <sup>3</sup> placing	Within required range
Mechanical property	-Compressive strength -Tensile strength -Tensile strain capacity -Crack opening disp.	Once for a day or once for each 150m <sup>3</sup> placing	Within required range