


Conte, Richard

From: Modes, Michael 
Sent: Wednesday, July 06, 2011 4:27 PM
To: Conte, Richard
Subject: RE: Tensile Testing of Concrete

Yours came through correctly. It therefore must be webmail that insists on lowering everything.

From: Conte, Richard
Sent: Wednesday, July 06, 2011 3:28 PM
To: Modes, Michael
Subject: RE: Tensile Testing of Concrete

So I would write it " f_{st} "

From: Modes, Michael
Sent: Wednesday, July 06, 2011 3:23 PM
To: Conte, Richard
Subject: RE: Tensile Testing of Concrete

f_{st} = cohesive tensile strength which is a result of the ASTM 496 procedure. The mail system keeps turning small f subscript s and t into a subscript with a sub-sub script.

From: Conte, Richard
Sent: Wednesday, July 06, 2011 2:11 PM
To: Modes, Michael; Chaudhary, Suresh
Subject: RE: Tensile Testing of Concrete

What is the yellow highlight – Tensile strength ???

What is the symbol.

From: Modes, Michael
Sent: Friday, June 10, 2011 8:55 AM
To: Conte, Richard
Cc: Manoly, Kamal; Khanna, Meena
Subject: Tensile Testing of Concrete

Suresh, as you know, has been questioning NRR's insistence on raising the issue of concrete tensile strength. After I had a lengthy technical discussion with Suresh yesterday, coupled with the additional reading and research I have done, I agree with Suresh.

- We believe the question of tensile strength reduction in concrete is not relevant in a constrained structure after the ASR pressure load is transferred to the rebar. Prior to transfer the pressure contribution is minimal, on the order of less than 5% of the rebar yield.
- A core sample with ASR does not represent the forces contained in the structure because for this test in particular rebound is not considered and frictional influences in the test itself are not accommodated. As a matter of fact the

frictional losses are exacerbated by the standard laboratory practice of placing plywood on opposing faces of the tensile specimen to stop it from rolling off the test stand thus restraining axial expansion of the sample.

- Using the ASTM standard proposed by NRR the tensile values reported can vary from the real values by up to $\pm 40\%$ and, as one researcher said, "It can hardly be assumed to be a material property."¹

It is the last point that troubles me the most and it is supported by my personal experience with concrete testing prior to joining the agency. If the applicant relents and performs a test we may be faced with results that call into question the ability of the structure to withstand even the design static loads let alone resist an earthquake, based on numbers that can be off by $\pm 40\%$, and we believe not relevant to the discussion. We believe the question of the affect of ASR on the tensile strength should be no more than one of theoretical curiosity.

I have shared the reference below with the NRR reviewer. We believe the question of tensile strength should be dropped from the RAI.

Why am I addressing this with you? Because you are dutifully implementing headquarters guidance, as you should.

In this case I believe we should step aside and let NRR sort this out with NextEra. I therefore suggest we take the reference to tensile testing out of the TIA and if the test is performed with the expected results we should insist that 40% be added (and subtracted) to whatever value is reported before we join NRR in a feeding frenzy about operability.

1. "Review of the splitting-test standards from a fracture mechanics point of view", C. Rocco, G. V. Guinea, J. Planas, and M. Ellices²

Facultad de Ingeniería, Universidad Nacional de la Plata, La Plata, Argentina, Departamento de Ciencia de Materiales, Universidad Politécnica de Madrid, Madrid, Spain, 5 September 2000