Users Guide for the program Damage.exe

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Notice! You must click on a material in the box to choose it.
Do not press Enter after changing a value. This will stop the program.

Preface
We hereby present the program Damage designed to calculate weakening of steel, reinforcement and concrete during and after exposure to high temperatures.

Responsibility
The user has the total responsibility for the application of the program and neither programmer nor distributing organisations can be held responsible for use or installation of the program.

Version
The present version of 2006-11-16 has a slightly different layout than the first version of 2006-09-25, but calculates the same.

What does the program do?
The program calculates the reduction of the compressive strength of concrete or the 0.2% strength, which for many steels is the yield strength or optional the ultimate strength at 2.0% may be chosen in stead. However, this strength can only be applied, if it can be proved, that the steel will have a strain of at least 2.0%.
The reduction is given as the HOT value, which should be used during a fire, where the reinforcement is the hottest, and a COLD value, which should be applied after the fire, where the concrete is the weakest.
The reductions are calculated by means of the formula

$$\xi(T) \quad = \quad k + \frac{1-k}{1+\dfrac{T}{T_1}+\left(\dfrac{T}{T_2}\right)^2+\left(\dfrac{T}{T_8}\right)^8+\left(\dfrac{T}{T_{64}}\right)^{64}}$$

and the data presented and discussed in the papers Hertz [1] –[3].
The program is supposed to be used directly from the user interface.
Two additional files are given presenting the results for the HOT and the COLD condition and showing the data applied by the general formula for the case.

The additional data files are:
DAMAGE_HOT.RES
DAMAGE_COLD.RES

References

[1]   Hertz, K.: Concrete Strength for Fire Safety Design.
            Magazine of Concrete Research. Vol.57 No.8. pp.445-453
            Thomas Telford. October 2005.

[2]   Hertz, K.: Reinforcement Data for Fire Safety Design.
            Magazine of Concrete Research. Vol.56, No.8,
            October 2004, pp. 453-459.

[3]   Hertz, K.: Quenched Reinforcement Exposed to Fire.
            Magazine of Concrete Research. March 2005, 10p.