

COST Action TU 904

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**EXAMINATION, ASSESSMENT AND REPAIR
OF RC STRUCTURE OF BUILDING
DAMAGED IN FIRE**

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**Characteristic damages of RC elements
recorded in situ**

Change of color of the concrete.
Red color indicate temperatures round 600°C

Change of color and structure of the concrete.
Flexy color indicate temperatures round 900°C



Change of concrete colour and
cracks in the RC slab over the 7th floor

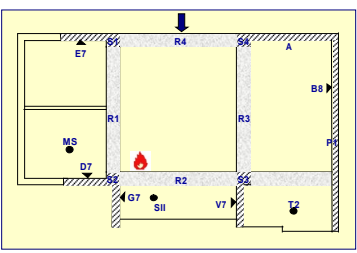


Change of color and
cracks in the RC slab over the 7th floor

crushing of concrete and falling off of concrete parts along the edges of linear elements up to the reinforcement and cracks along the reinforcement and

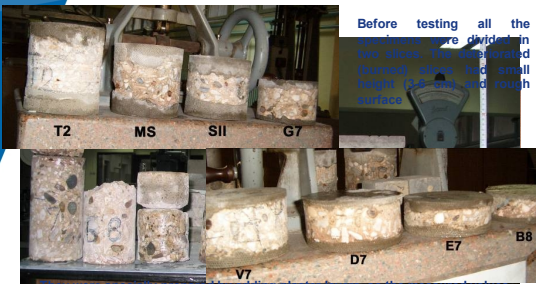
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**Experimental determination of the residual
concrete strength**



**Position of the test specimens, taken from
RC walls and RC slabs on 7th and 8th floor**

**Experimental determination of the residual
concrete strength**



Before testing all the specimens were divided in two slices. The deteriorated (burned) slices had small height (30 cm) and rough surface

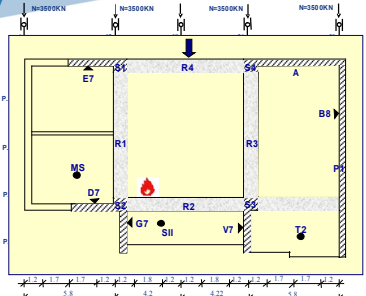
They were specimen prepared by adding plaster layers on the damaged places for the compressive strength were reduced with decreasing depending on the shape and height (h) of the deteriorated concrete specimens

Concrete strength testing results

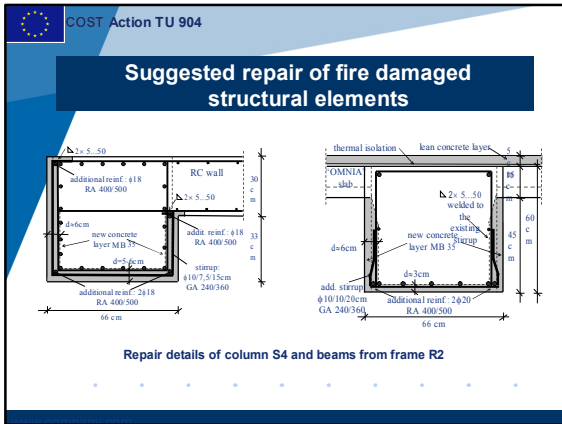
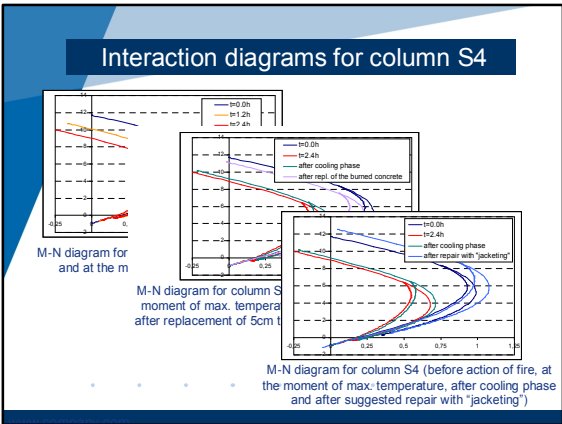
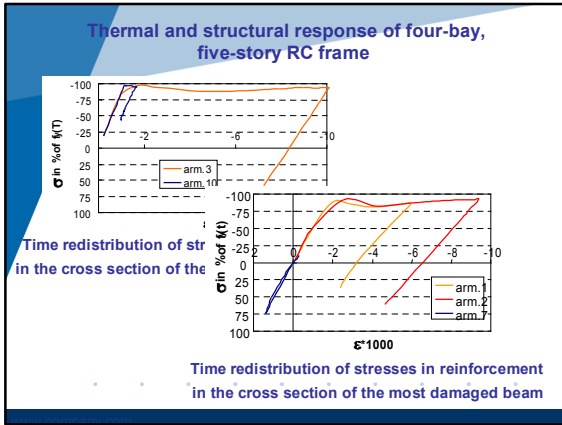
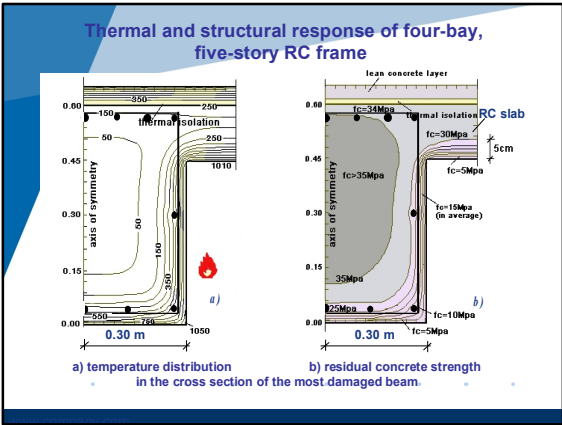
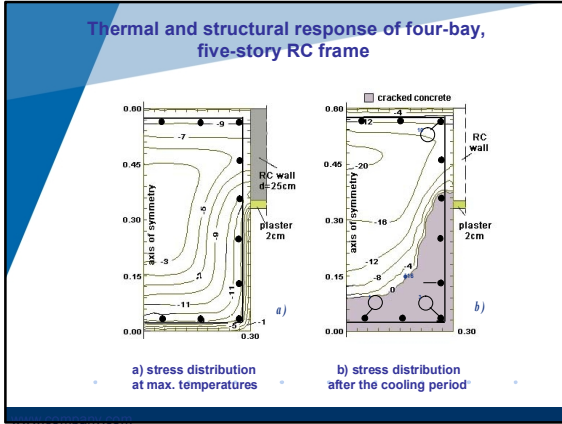
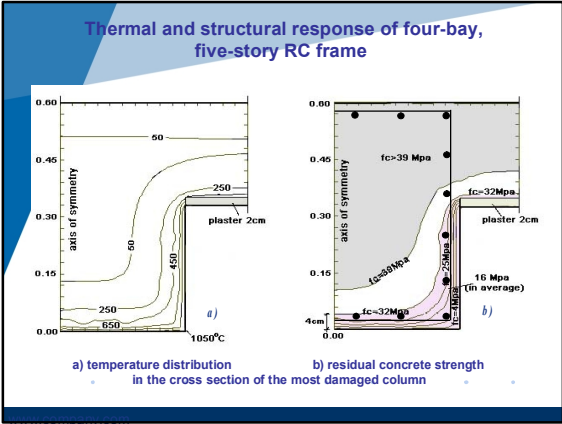
No.	Position	Dimensions of kern (cm)			density (kg/m³)	Test load (kN)	Concrete compressive strength (MPa)		Age of Concrete (years)	Design concrete strength according to MKS
		test h	h (Testing)	D			cylinder	subjected to cube 20/20/20		
1	RC wall (B8) (after fire exposure)	15	9.9	9.9	2214	200	26.0	26.5	22	20.0
			3.5		2150	390	15.8*	16.1		12.0
2	RC slab (T2) (after fire exposure)	10	10	9.9	2300	215	28.0	28.6	22	21.4
			+7cm plaster		/	/	/	/		/
3	RC slab (MS) (after fire exposure)	18	10.3	9.9	2340	260	33.8	34.5	22	26.0
			6.5		2310	145	12.5*	12.8		9.5
4	RC slab (SII) (after fire exposure)	18	9.6	9.9	2315	295	38.4	39.1	22	29.4
			4		2269	160	13.0*	13.3		10.0
5	RC wall (V7) (after fire exposure)	25	9.9	9.9	2117	272	35.4	36.1	22	27.0
			5		2138	265	14.5*	14.8		11.0
6	RC wall (G7) (after fire exposure)	19.4	10	9.9	2179	195	25.4	25.9	22	20.0
			3.5		2168	290	14.5*	14.5		11.0
7	RC wall (D7) (after fire exposure)	18	10	9.9	2212	236	30.7	31.3	22	24.0
			3.5		2168	290	14.5*	14.8		11.0
8	RC wall (E7) (after fire exposure)	16	10	9.9	2259	246	31.9	32.6	22	25.0
			3		2225	380	14.1	14.4		10.5

* Values are reduced with coefficients depending on the shape and height (h) of the deteriorated concrete specimens.

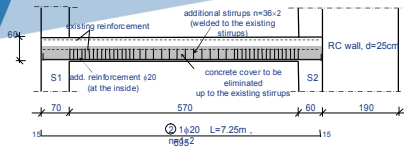
**Thermal and structural response of four-bay,
five-story RC frame**



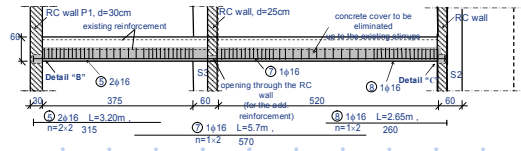
**Schematic presentation of fired frame R2
(elements discretization and details of reinforcing)**



Suggested repair of fire damaged structural elements



Detail of additional reinforcing with $\phi 20$ (RA 400/500-2) along the beam of the frame R1



Detail of additional reinforcing with $\phi 16$ (RA 400/500-2) along the beam of the frame R2

**THANK YOU FOR THE
ATTENTION**