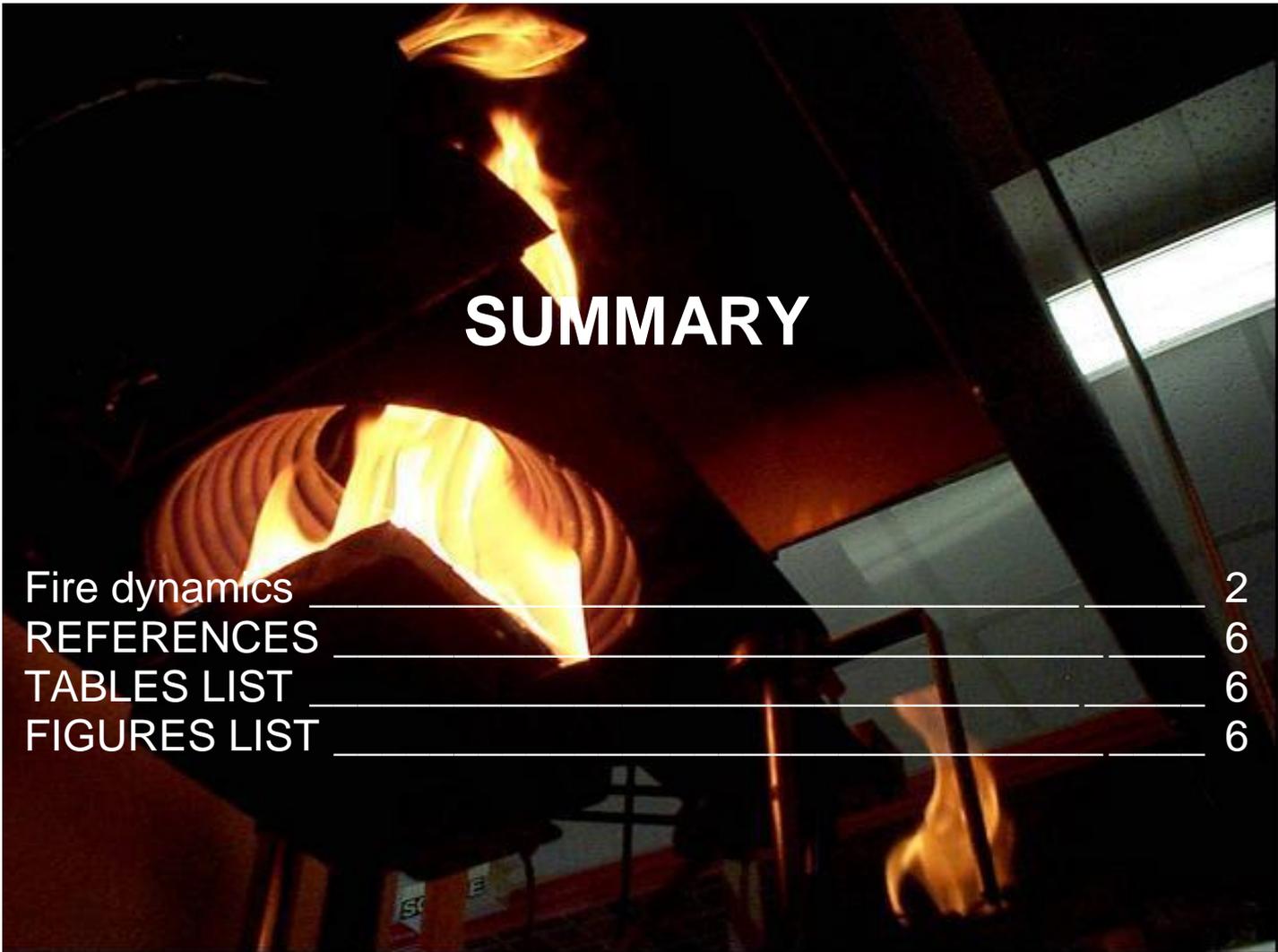




1/8

FIRE REACTION AND FIRE RESISTANCE



SUMMARY

Fire dynamics	2
REFERENCES	6
TABLES LIST	6
FIGURES LIST	6

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1/7

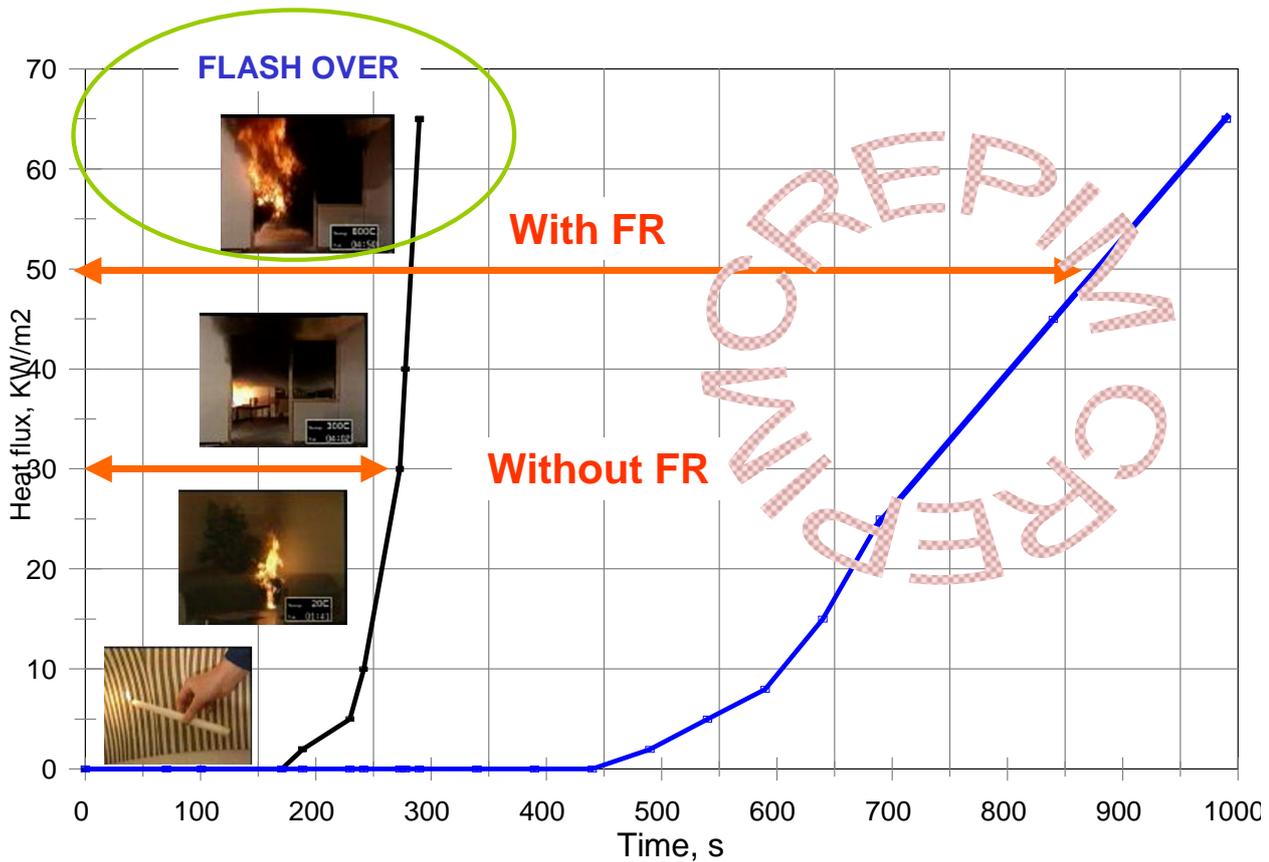
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Fire dynamics

The goals for fire retardant are universal and can be simply stated in the following items:

- 1 Prevent the fire or retard its growth and spread i.e. the flash over [1]:
 - √ Control fire properties of combustible items,
 - √ Provide for suppression of the fire.

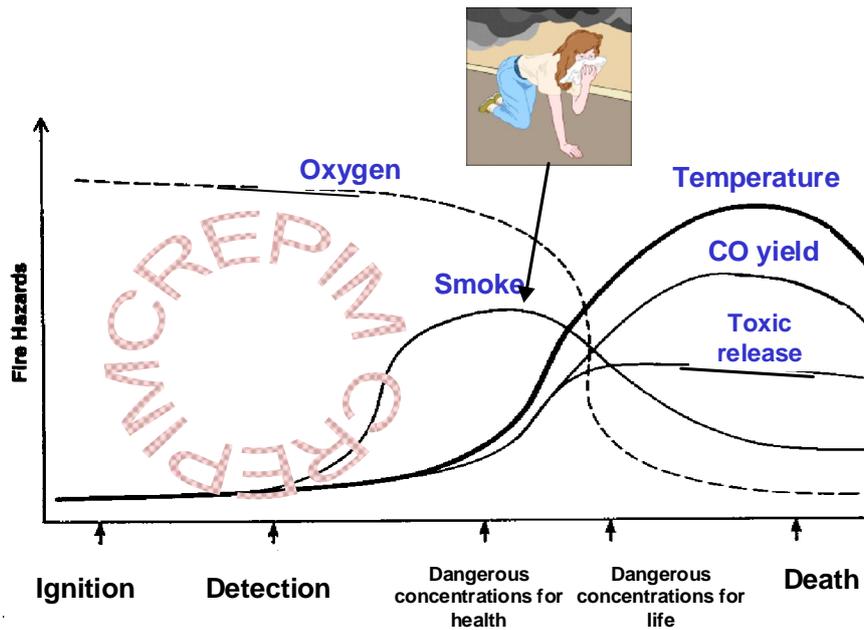
Figure 1: Flash over time vs fire retardant use [3]



Under the conditions of fire the use of the flame retardant gives a significant increase in the escape time available.

- 2 Protect occupant from the fire effects [1]:
 - √ Provide timely notification of the emergency,
 - √ Protect escape routes,
 - √ Provide areas of refuge where necessary and possible.

Figure 2: Smoke release vs fire spread [3]



The use of fire retardant reduces the flame spread and so the rate at which the smoke develops. Less smoke production gives an increase in the escape time available.

-3 Minimize the impact of fire [1]:

- √ Provide separation by tenant, occupancy, or maximum area.
- √ Maintain the structural integrity of property,
- √ Provide for continued operation of shared properties.

-4 Support fire service operations [1]:

- √ Provide for identification of fire location,
- √ Provide reliable communication with areas of refuge,
- √ Provide for fire department access, control, communication, and selection.

To prevent the fire or retard its growth and spread, material and product performance testing is used to set limits on the fire properties of items which represent the major fuels in the system.

The majority of fire safety requirements consist of material fire performance test criteria to retard its growth and spread. Based on test methods that evaluate fire properties of individual materials, the test methods are generally based on the measurement of the flame-spread speed

Figure 3: example of functionalities that have to be maintained during the steps of a fire [2]

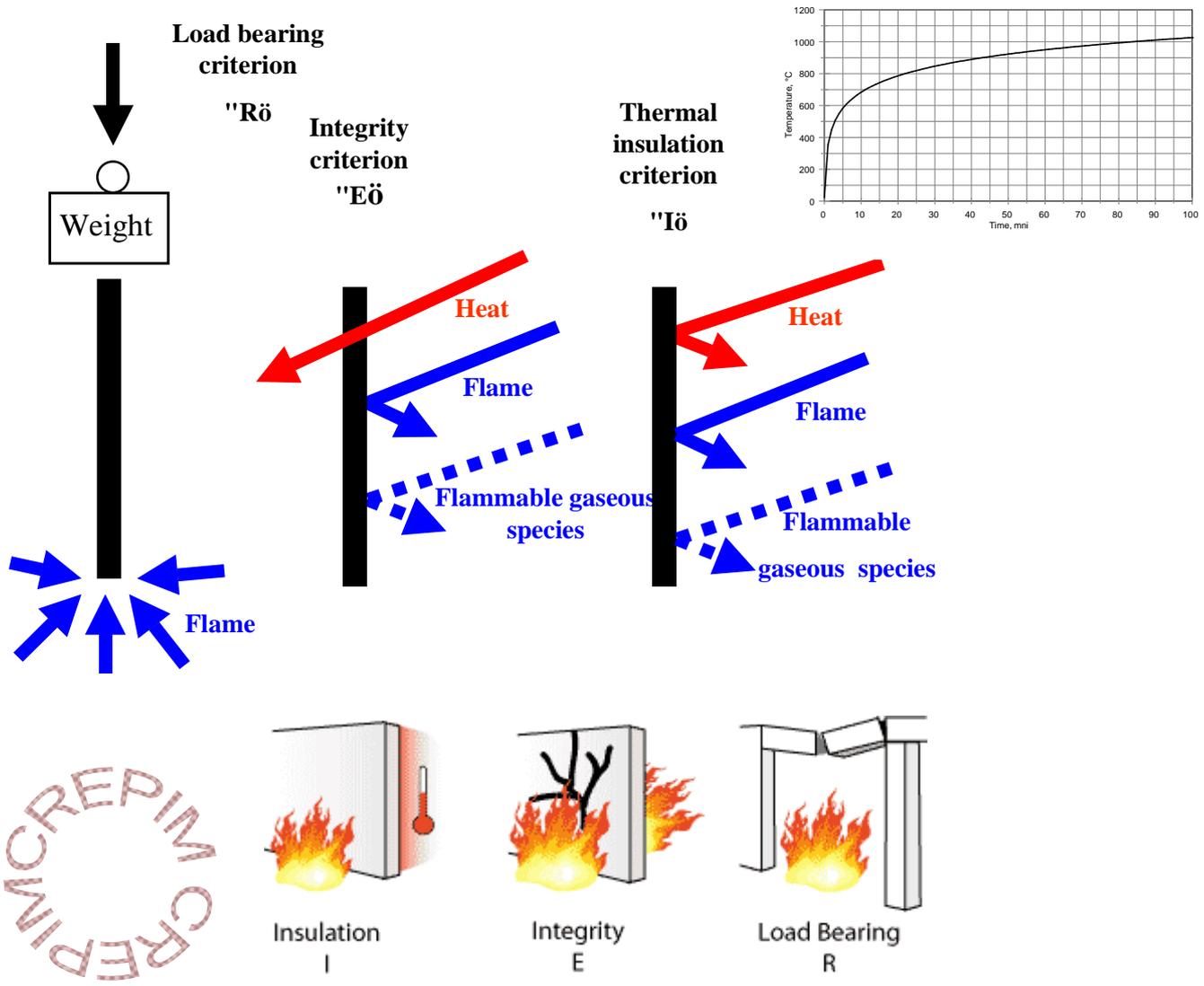


Table 1: brief overview of the fire retardant and fire resistant characteristics.

	WHY	HOW	MEANS	WHEN	What is assessed	Test scenario	Key parameters
FR	To save lives	Delaying the fire growth	Decreasing the fire kinetic	At the early stage of fire delaying the flash over phenomenon.	The reaction to fire in term of contribution to fire: -nil, -low -medium -high	-To submit a sample to a heat flux -To ignite the gaseous decomposition products -To follow the fire development	Heat release Dripping Flame spread Smoke opacity Smoke Toxicity
FRT		Limiting the physic progression of fire from one to another area	Using fireproof barriers to compartment the fire areas	During fire from the early to the post flashover periods	The resistance to fire in term of maintaining certain functionalities: -Smoke and heat Insulation -Integrity -Load bearing - δ ..	-To submit the sample to an increasing heat flux -To follow the functionality evolution during the exposure time	Time failure of functionality studied: -Smoke Insulation -Heat Insulation -Integrity -Load bearing - δ

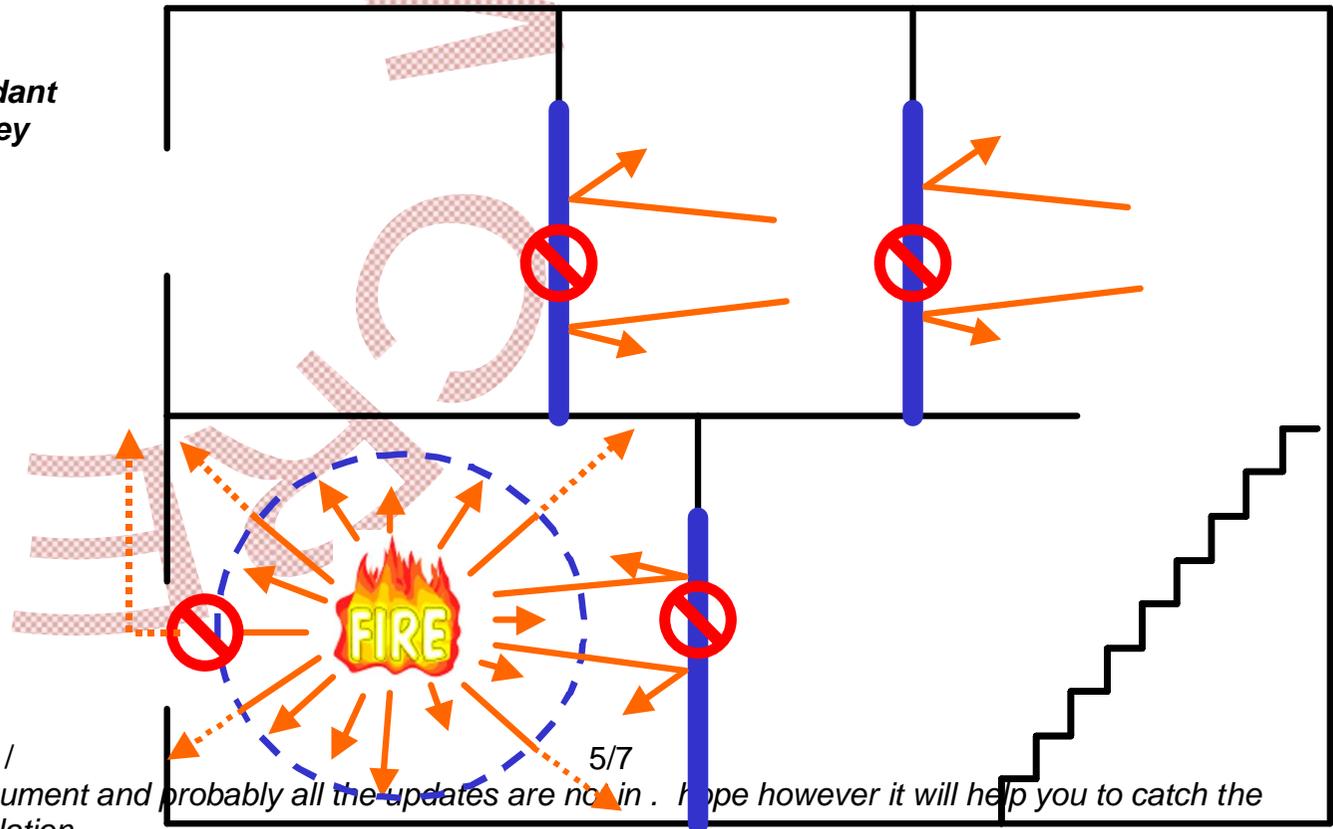
FR Fire retardant, FRT Fire resistant

Figure 4: complementarities of the fire retardant and fire resistant agents during a one storey building fire

Fire retardant action



Fire resistant action



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- [1] Richard D. Peacock, Paul .A. Reneke, Walter W. Jones, Richard W. Bukowski, Building and Fire Research Laboratory, NIST. Gaithersburg MD 20899, USA, Vytenis Babrauskas, Fire Science and Technology, Inc USA, Concepts for Fire Protection of Passenger Rail, Transportation Vehicles Past, Present, and Future, Fire and materials, VOL 19,71-87 (1995)
- [2] **HIFI, High Fire Performance Wood Products**, <http://www.fireretard.com/>
- [3] CREPIM, Parc de La Porte Nord, Rue Christophe Colomb, 62700, Bruay La Buisnière, France, Tel : 00 33 3 21 61 64 00, Fax: 00 33 3 21 61 64 01, crepim@wanadoo.fr
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TABLES LIST

Table 1: brief overview of the fire retardant and fire resistant characteristics.....	5
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FIGURES LIST

Figure 1: Flash over time vs fire retardant use [3].....	2
Figure 2: Smoke release vs fire spread [3].....	3
Figure 3: example of functionalities that have to be maintained during the steps of a fire [2]	4
Figure 4: complementarities of the fire retardant and fire resistant agents during a one storey building fire	5

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