

SMOKE READING SHORTCUTS

What You See	What It Can Mean
Turbulent smoke that fills a box	Impending flashover
Thick, Black, Fast	Close to seat of fire, super hot smoke capable of instant ignition, maybe a vent-limited fire that needs air.
Thin, Black, Fast	Flame-pushed smoke, fire nearby that is well ventilated
Dirty white smoke with velocity	Heat-pushed smoke that has traveled a distance or has had the carbon/hydrocarbon filtered (like smoke through a crack)
Same color and same velocity from multiple openings	Deep seated fire, possible located well within a building or in combustible voids and concealed spaces
Low volume white smoke from more than one location on a large box	serious fire deep within
Brown smoke	Unfinished wood reaching late heating (can support flame; usually a sign that a contents fire is transitioning into a structural fire; when coming from structural spaces of lightweight wood structures, a warning sign of collapse
Yellowish-gray smoke from cracks or seams	Impending backdraft
Clean pristine dissipating white	Steam
Fastest, darkest smoke from most restrictive opening	Closest to seat of fire

WEATHER EFFECTS ON SMOKE

Hot/Humid	Narrow, defined column
Hot/Dry	Cone shaped column
Cold/Humid	Smoke crashes, lingers
Cold/Dry	Smoke crashes, disperses
Temp below freezing	Smoke turns white within a few feet of opening

PROPERTIES OF GASES TYPICALLY FOUND IN SMOKE

Gas	Flashpoint*	Self-Ignition Temp**	Flammable Range in Air	Notes
Carbon Monoxide	None	1128	12-74%	Always a gas, therefore no flashpoint
Hydrogen Cyanide	0	1000	5-40%	produced when high temperatures break down nitrogen containing products.
Benzene	12	928	1-8%	Most plastics release benzene while burning. Also product of burning fuel oil.
Acrolein	-15	450	3-31%	Byproduct from incomplete combustion of wood, wood products and cellulosic materials. Poly -plastics also render acrolein.
<i>Propane</i>	<i>-104</i>	<i>450</i>	<i>2-10</i>	<i>Not found in smoke, included for comparative purposes.</i>

*Flashpoint: The lowest temperature a fuel will off-gas an ignitable mixture that will simply flash-but not sustain, given a spark or flame.

**Self-Ignition Temperature: The lowest temperature a fuel will off gas an ignitable mixture that can self ignite.

RESOURCES

www.firefighterclosecalls.com Lots of resources and information including a free download of Dave Dodson's The Art of Reading Smoke Powerpoint presentation.

Fire Videos: www.firevideo.com, www.firelinevideo.com, www.firestormvideos.com, www.youtube.com

www.fireengineeringbooks.com an e-commerce site specializing in books for the fire service including Dave Dodson's 3 volume DVD The Art of Reading Smoke.

Other general resources: www.fireengineering.com, www.firehouse.com

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