

Summary of Selected Characteristics of Fire Extinguishing Clean Agents  
Based on information provided by Roif Jensen & Associates, Inc. 3/2014

Min	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	B	C
Agents in Yellow Recommended by RJA	Agent	Trade Name	Type	Min Design Concentration for Class A Fire (MDCA) MDCA vs. NOAEL MDCA vs. LOAEL (See Notes 1 and 2)	MDCA < NOAEL	MDCA > NOAEL	MDCA < LOAEL	MDCA > LOAEL	MDCO < NOAEL	MDCO > NOAEL	MDCO < LOAEL	MDCO > LOAEL	NOAEL (%)	LOAEL (%)	(See NFPA 2001, sections 1.5.1.2 and 1.5.1.3, per RJA summary)	GWP (CO <sub>2</sub> = 1)	ODP	Environmental Regulation (See Note 7)	Number Cylinders Req'd	Combined Cost of Agent, Equip. Misc (Note 15)	Chemical Reactivity (High, Low, Inert)	Corrosive (Yes/No)	Recommended by RJA? (Yes/No)	Reasons by RJA for not recommending agent (See Note 20)	Agent	Trade Name		
	1	CBF3	Halon 1301	Halon	N/A								N/A	N/A	N/A	7140	10	No New	Not sold (Note 8)	Not sold (Note 8)	High (Note 17)	No	No		CBF3	Halon 1301		
	2	FIC-1311	CF3I	iodofluorocarbons (IFC)	3.8	X	X		4.3	X	X		0.2	0.4	Not suitable for occupied areas	0.4	0	O3 Depleting (See Note 4)	5	59,350	High (Note 18)	No	Yes	A3: Not avail for total flooding sys. A4: Used mainly for aircraft sys E1: Ozone Depletion Potential. H1: Not suitable for occupied areas	FIC-1311	CF3I		
	3	FK-S-1-12	Novoc 1230	Perfluorinated ketones (F-ketone)	5.4	X	X		6.1	X	X		10.0	>10.0	Permissible for normally occupied areas	1	0	Not Regulated	5	Not sold (Note 8)	Low (Note 13)	No	No		FK-S-1-12	Novoc 1230		
	4	HCFC-124	HCFC-124	Hydrochlorofluorocarbon (HCFC)	7.9	X	X		8.9	X	X		1.0	2.5	Not suitable for occupied areas	0.09	0.022	O3 Depleting (No New 2015)	Not sold (Note 8)	Not sold (Note 8)	Low (Note 13)	No	No	A1: Not available. E1: Ozone Depletion Potential H1: Not suitable for occupied areas	HCFC-124	HCFC-124		
	5	HCFC Blend A	NAF S-III	Hydrochlorofluorocarbon (HCFC)	11.9	X	X		13.4	X	X		10.0	>10.0	Not suitable for occupied areas	1550	0.046	O3 Depleting (No New 2015)	Not sold (Note 8)	Not sold (Note 8)	Low (Note 13)	No	No	A1: Not available. H4: Design concentration greater than NOAEL E1: Ozone Depletion Potential. H1: Not suitable for occupied areas	HCFC Blend A	NAF S-III		
	6	HFC Blend B	Halotron 2	Hydrofluorocarbon (HFC)	13.6	X	X		15.3	X	X		5.0	7.5	Not suitable for occupied areas	1540	0	Not Regulated	(Note 9)	(Note 9)	Low	No	No	A2: Not readily available. H1: Not suitable for occupied areas N2: Sold primarily in Sweden and Finland	HFC Blend B	Halotron 2		
	7	HFC-125	FE-25	Hydrofluorocarbon (HFC)	10.4	X	X		11.7	X	X		7.5	10.0	Not suitable for occupied areas	3500	0	Not Regulated	5	46,850	Low	No	No	H1: Not suitable for occupied areas. H4: Design concentration greater than NOAEL	HFC-125	FE-25		
	8	HFC-227ea	FM-200	Hydrofluorocarbon (HFC)	8.0	X	X		9.0	X	X		9.0	10.5	Permissible for normally occupied areas	3220	0	Not Regulated	4	53,625	Low	No	Yes		HFC-227ea	FM-200		
	9	HFC-23	FE-13	Hydrofluorocarbon (HFC)	15.5	X	X		17.4	X	X		30	>30	Permissible for normally occupied areas	14800	0	Not Regulated	11	(Note 14)	Low	No	No	A2: Not readily available. E2: High Global Warming Potential	HFC-23	FE-13		
	10	HFC-236fa	FE-36	Hydrofluorocarbon (HFC)	7.7	X	X		8.6	X	X		10	15	Permissible for normally occupied areas	9810	0	Not Regulated	(Note 10)	(Note 10)	Low	No	No	A5: Typically for fire extinguishers or local application systems E2: High Global Warming Potential	HFC-236fa	FE-36		
	11	IG-01	Argon, Argonite, Argotec	Inert Gas	50.4	X	X		56.7	X	X		43	52	Not suitable for occupied areas	0	0	Not Regulated	(Note 9)	(Note 9)	Chemically inert	No	No	H2: Not suitable for occupied areas. H5: Design concentration greater than 52% N1: Non-US product	IG-01	Argon, Argonite, Argotec		
	12	IG-100	NN100	Inert Gas	37.2	X	X		41.9	X	X		43	52	Permissible for normally occupied areas	0	0	Not Regulated	31	(Note 11)	Chemically inert	No	No	N1: Non-US product	IG-100	NN100		
	13	IG-541	Inergen	Inert Gas	37.2	X	X		41.9	X	X		43	52	Permissible for normally occupied areas	0	0	Not Regulated	27	45,800	Chemically inert	No	Yes		IG-541	Inergen		
	14	IG-55	Argonite, Pro Inert	Inert Gas	42.0	X	X		47.3	X	X		43	52	Permissible for normally occupied areas	0	0	Not Regulated	50	(Note 11)	Chemically inert	No	No	A2: Not readily available. H3: Exposure time limited to 3 minutes H4: Design concentration greater than NOAEL	IG-55	Argonite, Pro Inert		

Note 1: Halocarbon systems for spaces that are normally occupied and designed to concentrations up to the NOAEL (see Table 1.5.1.2.1(a)) shall be permitted. The maximum exposure in any case shall not exceed 5 minutes. Ref: NFPA 2001-2012, 1.5.1.2.1(f)

Note 2: Inert gas systems designed to concentrations below 43 percent (corresponding to an oxygen concentration of 12 percent, sea level equivalent of oxygen) shall be permitted where means are provided to limit exposure to no longer than 5 minutes. Ref: NFPA 2001-2012, 1.5.1.3(1)

Note 3: The impact of HFC emissions from fire protection applications represents less than 0.01 percent of the impact of all greenhouse gas emissions. Ref: NFPA 2001-2012, A.1.6

Note 4: Ozone Depletion Potential for FIC-1311 might be non-zero if agent is released at altitude high above ground level. Ref: NFPA 2001-2012, Table A.1.6(a) (RJA Note 5)

Note 5: Text in orange is additional information from 10M&S

Note 6: GWP depends on infrared radiation absorption, spectral location of absorbing wavelengths, and atmospheric lifetime (ref: NFPA 2001, A.1.6)

Note 7: No New: No new systems permitted. No New 2015: Cannot be used in new systems beginning in 2015. O3 Depleting: Classified as an ozone depleting substance.

Note 8: Not sold due to non-zero ODP (RJA Note 13)

Note 9: Not suitable for occupied spaces (RJA Notes 14, 16)

Note 10: Only distributed as fire extinguishers or local application systems (RJA Note 15)

Note 11: RJA could not obtain vendor pricing (RJA Note 17)

Note 12: Non-corrosive for typical data center fires.

Note 13: Information not provided in RJA summary matrix.

Note 14: High GWP and not readily available (per RJA notes)

Note 15: Costs include installation, testing, engineering, do not include controls (RJA Notes 8, 10)

Note 16: Costs do not include additional infrastructure necessary, such as additional space for cylinders or pressure relief dampers, if necessary (RJA Note 9)

Note 17: Higher reactivity for FIC-1311 is a result of its reaction with active metals (RJA Note 18)

Note 18: Higher reactivity for NOVEC 1230 is a result of its reaction with strong bases (RJA Note 7)

Note 19: For HFC-227ea (FM-200), the Minimum Design Concentration for Class C fires is equal to, but does not exceed, the NOAEL

Note 20: RJA reasons for not recommending agents:

- Availability or Use
  - A1: Not available
  - A2: Not readily available
  - A3: Not suitable for total flooding systems
  - A4: Used mainly on aircraft systems
  - A5: Typically available only for fire extinguishers or local application systems
- Environment
  - E1: Ozone Depletion Potential
  - E2: High Global Warming Potential
- Hazard
  - H1: Not suitable for occupied areas per NFPA 2001 Section 1.5.1.2
  - H2: Not suitable for occupied areas per NFPA 2001 Section 1.5.1.3
  - H3: Exposure limited to 3 minutes per NFPA 2001 Section 1.5.1.3
  - H4: Design Concentration greater than NOAEL
  - H5: Design Concentration exceeds 52%
- Not Domestic
  - N1: Non-US product
  - N2: Sold primarily in Sweden and Finland

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