

3.14. Clean Agent Systems

3.14.1. The requirements for Clean Agent System material, design, installation shall be as per **Table 9.16.**

Table 9.16.: Clean Agent Systems Requirements

ITEMS	REQUIREMENTS
1. DEFINITION	<ul style="list-style-type: none"> i. The Clean agents allowed in this code shall be electrically non-conducting and leave no residue upon evaporation. ii. Any agent mentioned in this section is subject to the periodic evaluation by Civil Defence and United States Environmental Protection Agency's (EPA) SNAP (Significant New Alternatives Policy). Such evaluations shall be based on the clean agents' adverse effects on Human, Marine, Animal health and environmental adverse effects. iii. Halocarbon Agents are <ul style="list-style-type: none"> a. Hydrofluorocarbons (HFCs) b. Hydrochlorofluorocarbons (HCFCs) c. Perfluorocarbons (PFCs or FCs) d. Fluoroiodocarbons (FICs) e. Fluoroketones (FKs). iv. Inert Gas Agents are <ul style="list-style-type: none"> a. IG-01 b. IG-100 c. IG-55 d. IG-541 v. Unnecessary exposure to Halocarbon clean agents OR Inert gas agents including at and below the NOAEL and halocarbon decomposition products shall be avoided.
2. SAFETY	<ul style="list-style-type: none"> i. In not normally occupied areas, where egress takes longer than 30 seconds but less than 1 minute, the halocarbon agent shall not be used in a concentration exceeding its LOAEL. See Table 9.16.A. for Halocarbon NOAEL and LOAEL. ii. Unnecessary exposure to inert gas agent systems resulting in low oxygen atmospheres shall be avoided. The maximum exposure time in any case shall not exceed 5 minutes. See Table 9.16.B. for Inert Gas NOAEL and LOAEL.

Table 9.16.A: Halocarbon Agent NOAEL and LOAEL

AGENT	NOAEL (No Observed Adverse Effect Level)	LOAEL (Low Observed Adverse Effect Level)	EXTINGUISHING CONCENTRATIONS
1. FC-3-1-10	40 %	> 40 %	5.5 %
2. FK-5-1-12	10 %	> 10 %	4.5 %
3. HCFC Blend A	10 %	> 10 %	9.9 %
4. HCFC-124	1 %	2.5 %	6.6 %
5. HFC-125	7.5 %	10 %	8.7 %
6. HFC-227ea	9 %	> 10.5 %	6.6 %
7. HFC-23	30 %	> 50 %	12.9 %
8. HFC-236fa	10 %	15 %	6.3 %

Table 9.16.B: Inert Gas Safety Levels

INERT GAS CONCENTRATION LEVELS	EXPOSURE LIMIT	EXTINGUISHING CONCENTRATIONS
1. < 43 % (12% Oxygen)	5 minutes	IG- 01 (42%)
2. 43 % -52 % (12 % -10 % Oxygen)	3 minutes	IG-100 (31%)
3. 52 % -62 % (10 % -8 % Oxygen)	Only used in normally unoccupied spaces	IG 541 (31%)
4. > 62 % (Below 8% Oxygen)	Only used in normally unoccupied spaces	IG-55 (35%)