



TECHNICAL BULLETIN

DESIGN GUIDANCE FOR PROTECTION OF AREAS WITH UNCLOSEABLE OPENINGS

1. INTENDED USE

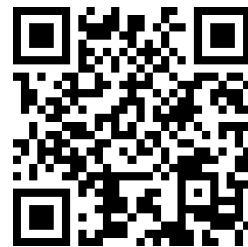
This document provides design guidance for protection of areas with uncloseable openings when using nitrogen (IG-100).

2. DATA SPECIFICATIONS

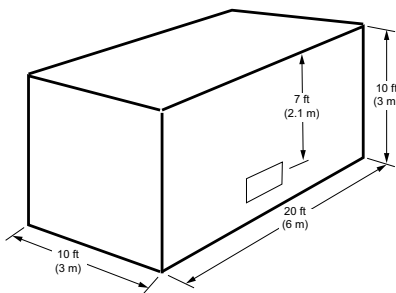
2.1 Oxeo System Testing with Nitrogen

The 2024/2025 Viking Oxeo Inert Gas Extinguishing System testing included discharging nitrogen (IG-100) in a room with an opening to determine if additional nitrogen was required to maintain 85% of the design concentration for the required 10-minute hold time^{1, 2}. The testing found that, regardless of the Oxeo system's geographic location, no additional nitrogen was needed for up to 50% of the design concentration in a room with 0.5% openings of total enclosed boundaries (including walls and floors). Testing was performed in Caledonia, MI (approximately 810 ft/247 m elevation) and Aurora, Colorado (approximately 6,229 ft/1,899 m elevation).

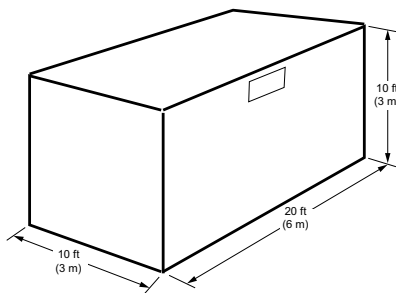
The following tables summarize the nitrogen testing results:



UL REPORT



SETUP A



SETUP B

Table 1: 30% Concentration Target

Location	Setup	End Discharge Concentration IG-100	85% of Concentration	10-Minute Concentration Measured	Over/Under 85%
Michigan	A	34.9	29.7	33.4	3.7
	B	31.6	26.9	28.9	2.0
Colorado	A	39.4	33.5	34.0	0.5
	B	37.6	32.0	34.2	2.2

Table 2: 50% Concentration Target

Location	Setup	End Discharge Concentration IG-100	85% of Concentration	10-Minute Concentration Measured	Over/Under 85%
Michigan	A	51.3	43.6	45.2	1.6
	B	51.0	43.3	44.5	1.2
Colorado	A	59.9	50.9	50.9	0.0
	B	57.7	49.0	50.2	1.2

¹ International Organization of Standardization. (2023). *Duration of protection*, section 7.9.2 (ISO 14520-1:2023). ISO.

² National Fire Protection Association 2001. (2025). *Duration of protection*, section 7.4.1 (NFPA 2001:2025). NFPA.