

WHITE PAPER: Why Halogen Free?

Fire consumes oxygen and the burning of certain materials creates toxic gas. One such material is polyvinyl chloride (PVC or vinyl). When PVC burns, halogens (elements like chlorine in Group 17 (VIIA) of the periodic table of elements) are released. In enclosed spaces, halogen gas can be immediately fatal. ANAMET Electrical, Inc. supports halogen safety regulations with Halogen Free (or Zero Halogen) conduit and fittings.



1931 brought the invention of flexible PVC. After 1942, liquid tight, electrical conduit jackets used PVC. Electrical fires in Chicago, New York City and Brooklyn prompted regulation of PVC in electrical installations.

Under a tornado watch on Mother's Day, Sunday, May 8, 1988, a fire started in the switch room of Chicago's Hinsdale Central Office for Illinois Bell. There was electrical arcing, fire and dense smoke among telephone and power cables. Over 38,000 customers lost telephone service, including the switch building, hospitals, first responders and Chicago's O'Hare and Midway Airports. Without telephone service, a technician flagged down a passing car to alert a fire station. Firefighters wearing oxygen canisters fought the fire for over six hours, until specialists cut electrical power to stop the fire. Homeowners fled the heavy smoke in a five-block radius of the fire. Workers restored telephone service after four days. The nearby international airports

could not operate for two days. The economic cost is estimated at over 60 million dollars, due to lost business (*Fire Investigation Report, Telephone Central Office, Hinsdale, Illinois, May 8, 1988, Fire Investigations, National Fire Protection Association (NFPA)*).

Investigation improved standards for fighting electrical fires. Risk of electrical fire justified use of halogen free materials, unable to generate toxic gas. Vehicles, such as aircraft, require halogen free, fire resistant and low smoke jackets around conduit.

Regulations expanded to protect air supply and access in confined spaces. Mass transit (subways, trains, buses and ferries), shipping, tunnel, mining and offshore platform regulations require halogen free conduit.

Air supply is also important in air channels in buildings (called plenums). Plenums are the part of the building which provides a path for heating/air conditioning, return air or fresh air flow. In most homes, ductwork does this. That ductwork cannot contain electrical devices or connections. Plenums include space above suspended or "drop" ceilings in buildings. Lights, cables and wires are put above ceilings, but no jacketed conduit may be installed. Fire could generate toxic

F
Fluorine
19.00

Cl
Chlorine
35.45

Br
Bromine
79.90

I
Iodine
126.90

At
Astatine
209.98

Ts
Tennesine
approx. 297

Features	PVC	Limitations
<ul style="list-style-type: none"> Recyclable Workable Electrical insulator Tough and flexible Heat and cold resistant Moisture resistant Chemical resistant 		<ul style="list-style-type: none"> Decomposes between 203 and 572°F Generates Hydrogen Chloride Generates Carbon Monoxide Generates Ethylene Generates Benzene Generates Naphthalene Ignites at 735°F



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gas that spreads through the plenum, exposing people to invisible, airborne toxins.

The NFPA and National Electrical Code (NEC) publish a standard for safe electrical installation. NFPA 70 (NEC) allows listed, liquid tight (PVC jacket), flexible metal conduit under raised floors for information technology equipment (NEC Articles 300.22 (D) and 645.5 (E)(1)). However, halogen free conduit is recommended to avoid generating toxic halogen gas in a fire.

Safety Standards

ANAMET Electrical, Inc. participated in the development of safety standards, supporting and sustaining manufacturing and testing of halogen free conduit and fittings. Contact ANAMET Electrical, Inc. for assistance with conduit and fittings that meet or exceed US and international safety standards for your applications, such as:

- IEC 61386-1 is an international standard for conduit installation and flame resistance or product ability (or inability) to sustain combustion when a heat source is removed
- Naval Engineering Standard (NES) 713 (1.0) dictates maximum measures of toxicology, as a toxicity index
- NES 711 set standards for smoke emitted
- Boeing Safety Standard (BSS) 7239 is a standard for gas generation applicable to aircraft, railroads and other mass transit applications
- ASTM-E162 set standards for flame spread
- ASTM-E662 set standards for smoke density
- Bombardier SMP-800C set standards for toxic gas generation

Available Products

ANAMET offers liquid tight, halogen free, conduit Types. See www.anacondasealtite.com for more information about Type XTHF, SHIELDTITE® Z1, HCX, HFSS and ZHUA.



ANAMET offers FIRETECH™ fire protection materials. Silicon-coated fiberglass sleeve, wrap, blanket and tape are halogen free, protecting conduit and fittings from extreme heat.

ANAMET offers metal conduit that is UL approved or UL recognized for dry, indoor use. Our metal core conduit without a jacket is halogen free, fire resistant and corrosion resistant.

Research and development for new products and safety standards is ongoing.

Disclaimer: The information contained in this white paper is intended for use as a guide by persons who have technical skill at their discretion. ANAMET Electrical, Inc. disclaims any liability from any information contained or absent from this document. December 7, 2021. Some material is edited from material created after 1988 by Frank Hurt Frank Hurtt – River Heights Consulting.