



Novec™

Brand

3M™ Novec™ 5110 Insulating Gas

Introduction

3M™ Novec™ 5110 Insulating Gas is a sustainable alternative to sulfur hexafluoride (SF₆) for electrical equipment insulation and arc quenching applications. It offers excellent dielectric properties, a wide range of operating temperatures and significant reductions in environmental impact compared to SF₆. Novec 5110 gas is non-flammable and has a wide safety margin for workers when used as designed in intended applications. The intended applications are as a dielectric medium for medium voltage and high voltage power generation and distribution equipment which includes gas-insulated switchgear, lines, and circuit breakers. Novec 5110 gas is mixed with inert gases for use in the intended applications.

As shown in the Environmental Properties table, gas mixtures containing Novec 5110 gas enable a significant and meaningful reduction in greenhouse gas (GHG) emissions from gas-insulated equipment compared to using SF₆. Novec 5110 gas has the following advantages:

- Ultra-low global warming potential (GWP) alternative to SF₆ virtually eliminating GHG emissions from gas-insulated equipment
- Potential to reduce GHG emissions by up to 99.99% in gas mixtures
- Dielectric breakdown voltage approximately 1.4 times that of SF₆ at a given pressure (in pure form)
- Wide margin of safety for workers when used as designed for intended applications
- Non-flammable
- Compatibility with a wide range of equipment components

Product Description

Not for specification purposes. All values @ 25°C/77°F unless otherwise specified.

Novec 5110 gas consists of CF₃C(O)CF(CF₃)₂ (CAS No. 756-12-7).

3M™ Novec™ 5110 Insulating Gas

Typical Physical Properties

Not for specification purposes. All values @ 25°C/77°F unless otherwise specified. Final product specifications and testing methods will be outlined in the product's Certificate of Analysis (COA) that is shipped with the product.

Property	SI Units	Imperial Units
Molecular Weight	266 g/mol	266 lb/lb mol
Flammability in air	non-flammable	non-flammable
Boiling Point	26.9°C	80.4°F
Freezing Point	-74°C	-166°F
Critical Temperature	146°C	295°F
Critical Pressure	2.14 MPa	311 psia
Ideal Gas Density	10.7 kg/m ³ (at 1 bar)	0.67 lb/ft ³ (at 14.5 psia)
Vapor Pressure	93.8 kPa	13.6 psia
Dielectric Breakdown Voltage (kV, parallel disk electrodes)	18.4 at 1 bar over 2.5 mm gap	18.4 at 14.5 psia over 0.1 inch gap

Environmental Properties	3M™ Novec™ 5110 Insulating Gas	SF ₆
Atmospheric Lifetime (years)	0.04	3,200
Global Warming Potential (100-yr ITH, IPCC 2013 method)	<1	23,500
Ozone Depletion Potential (CFC-11 = 1)	0	0

As the Novec Insulating Gases are mixed with an inert gas (or gases) the reduction in GHG emissions is significant compared to installations using SF₆.

Gas formulation	Novec 5110 Gas (5.0 mole %) in Air	100% SF ₆
Gas pressure (bar)	6.5	4
Gas density at 25°C (kg/m ³)	10.7	23.6
Composite GWP of gas mixture	<1*	23,500
GWP reduction compared to SF ₆	99.99%	-
GHG emissions (MT CO ₂ e/m ³)	0.003**	554
GHG emissions reduction (i.e. CO ₂ e reduction)	99.99%	-

* GHG emission reduction takes into account the GWP and reduced density of the gas mixtures

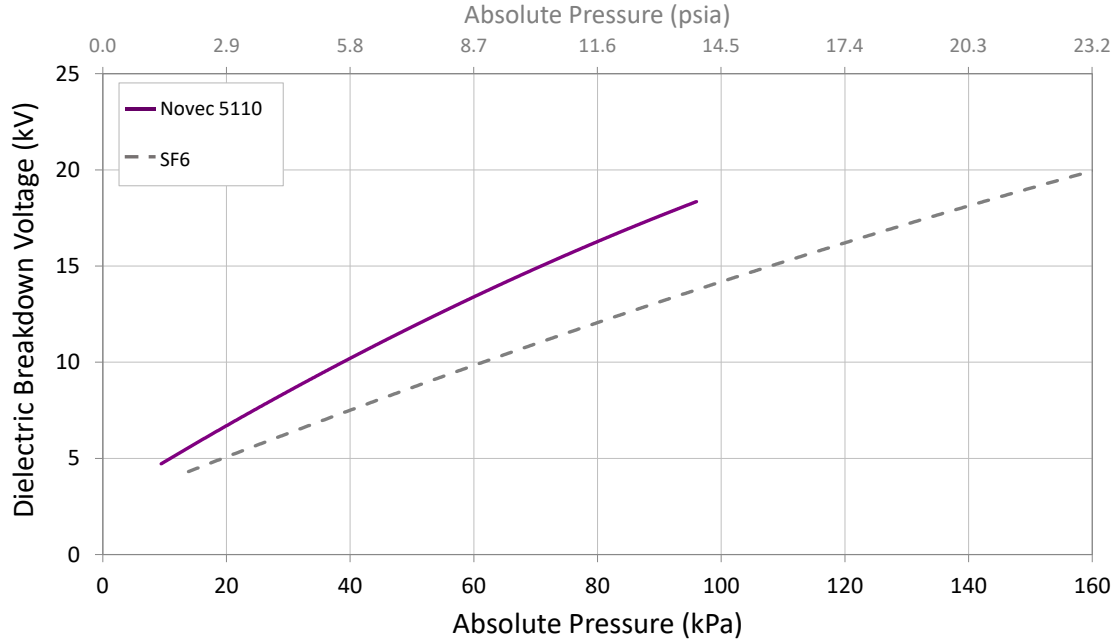
** $GWP_{mixture} = \sum_i X_i GWP_i$

3M™ Novec™ 5110 Insulating Gas

Dielectric Breakdown Voltage of 3M™ Novec™ 5110 Insulating Gas compared to SF₆

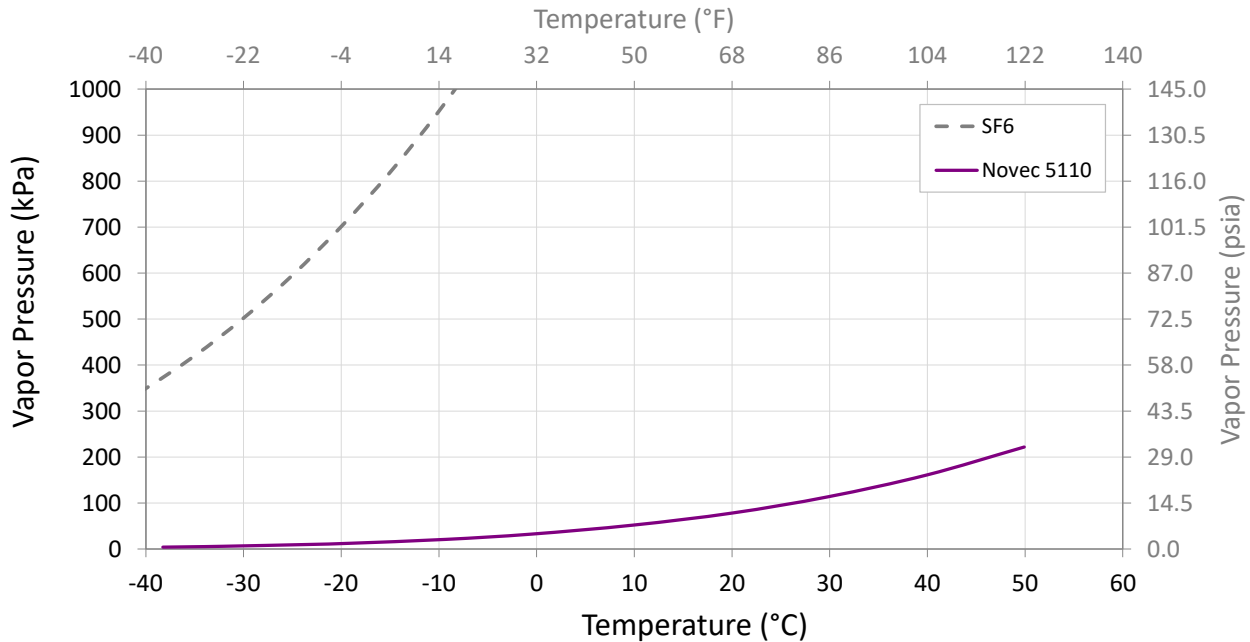
(Uniform field using parallel disk electrodes with 2.5 mm/0.1 inch gap)

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Vapor Pressure of Novec 5110 gas compared to SF₆

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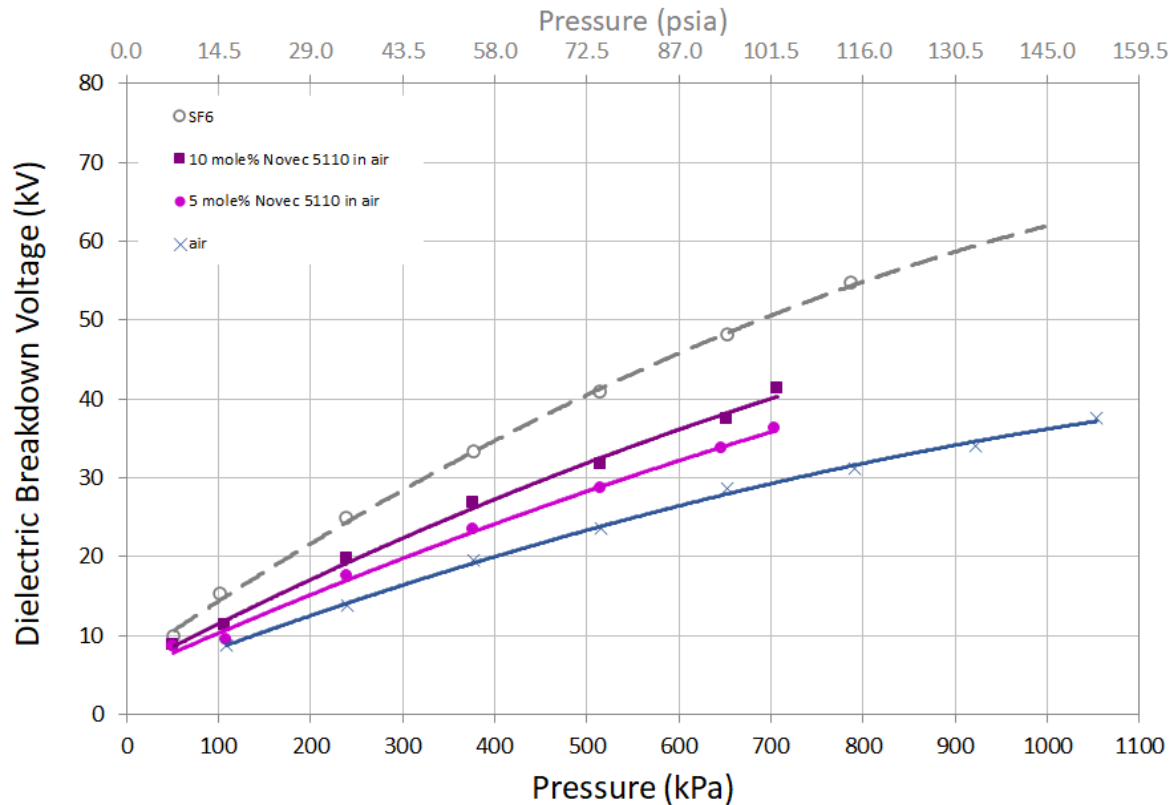


3M™ Novec™ 5110 Insulating Gas

Dielectric Breakdown Voltage: Mixtures of 3M™ Novec™ 5110 Insulating Gas in Air compared to SF₆ and pure air

(Uniform field using parallel disk electrodes with 2.5 mm/0.1 inch gap)

Not for specification purposes. All values @ 25°C/77°F unless otherwise specified



Materials Compatibility

In practice, 3M™ Novec™ 5110 Insulating Gas differs somewhat in materials compatibility compared to SF₆. While the product is compatible with most common metals, it can be affected by some of the components found in lubricating greases and the elastomers used in gaskets and O-rings.

Many materials have been found to be compatible with the product. However, material compatibility is best evaluated using the specific materials of construction being considered for contact with the Novec 5110 gas, and the end user will need to determine whether this gas is suitable for their intended application.

3M research scientists are available to provide guidance for running materials compatibility evaluations. Contact your local 3M sales representative for additional information.

Regulatory Status

The component(s) of Novec 5110 gas are in compliance with the chemical notification/registration requirements of the United States, Europe, Canada, Korea, China, Taiwan, New Zealand (in the form of compressed gas mixtures), and Japan. Additional notification/registration activities are in progress in these and other countries or regions. Certain restrictions may apply, including required import of this product through a local 3M subsidiary, import volume limitations, and/or use limitations. Contact your local 3M sales representative for additional information. A current safety data sheet (SDS) and regulatory data sheet for this product is available at 3m.com/sds.

3M™ Novec™ 5110 Insulating Gas

Storage and Shelf Life

The shelf life of 3M™ Novec™ 5110 Insulating Gas is 60-months (5-years) from the date of manufacture when stored in the original packaging materials at 21°C (70°F) and 50% relative humidity. Please read and follow the precautions and directions for use contained in the product label and Safety Data Sheet before using this product.

Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is manufactured and is deemed commercially available from 3M. The COA contains the 3M specifications, test methods and test results for the product's performance attributes that the product will be supplied against. Contact your local 3M representative for this product's COA.

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Safety Data Sheet: Consult Safety Data Sheet before use. https://www.3m.com/3M/en_US/company-us/SDS-search/

Regulatory: For regulatory information about this product, contact your 3M representative.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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