

# Intelligently Choosing the Best Glass for American Buildings

## Introduction

**Intelligently Choosing the Best Glass for American Buildings** is the essential guide to selecting the right glass for your building project. Whether you're an architect, engineer, contractor, or building owner, this book will provide you with the knowledge and tools you need to make informed decisions about glass.

With clear and concise language, Pasquale De Marco explains the different types of glass available, their properties, and their applications. You'll learn about energy efficiency, daylighting, acoustics, safety, security, sustainability, codes and standards, and future trends.

This book is packed with valuable information, including:

- A comprehensive overview of glass properties and types
- Detailed explanations of energy efficiency concepts
- Practical guidance on daylighting design
- Expert advice on acoustics and noise control
- In-depth coverage of safety and security considerations
- A discussion of sustainability issues related to glass
- A review of relevant codes and standards
- A glimpse into the future of glass technology

Whether you're new to the world of glass or a seasoned professional, **Intelligently Choosing the Best Glass for American Buildings** is the definitive resource you need. With this book in hand, you'll be able to confidently select the right glass for your next project.

**Pasquale De Marco** is a leading expert in glass and glazing. He has over 20 years of experience in the industry, and he has written extensively on the subject. He is a member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Illuminating Engineering Society (IES).

## Book Description

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# Chapter 1: Glass Properties

## Composition and Structure of Glass

Glass is a non-crystalline, often transparent material made from the fusion of silica and other ingredients such as soda ash and lime. It is an inorganic solid that is typically hard, brittle, and has a conchoidal fracture. Glass is usually transparent to visible light, but its appearance can be altered by adding coloring agents or by undergoing various manufacturing processes.

The composition of glass can vary greatly depending on its intended use. The most common type of glass is soda-lime glass, which is used in a wide variety of applications, including windows, bottles, and jars. Soda-lime glass is made from a mixture of silica, soda ash, and lime. Other types of glass include borosilicate glass, which is used in cookware and laboratory glassware, and lead crystal glass, which is used in fine glassware and crystal.

The structure of glass is also important to its properties. Glass is a non-crystalline material, which means that it does not have a regular, repeating pattern of atoms like crystals. Instead, the atoms in glass are arranged in a random, disordered manner. This gives glass its characteristic transparency and brittleness.

The composition and structure of glass are two of the most important factors that determine its properties. By carefully controlling these factors, manufacturers can create glass with a wide range of properties, including strength, durability, and optical clarity.

## Paragraph 2

Glass is a versatile material that can be used in a wide variety of applications. It is used in windows, bottles, jars, cookware, and laboratory glassware, among other things. Glass is also used in art and architecture, and it can be found in everything from stained glass windows to glass skyscrapers.



The properties of glass make it an ideal material for many applications. Glass is transparent, which allows light to pass through it. It is also hard and durable, which makes it resistant to scratching and breakage. Glass is also non-porous, which makes it resistant to moisture and bacteria.

### Paragraph 3

The composition of glass can be varied to create different properties. For example, adding lead to glass increases its refractive index, which makes it more brilliant and sparkly. Adding boron to glass increases its resistance to thermal shock, which makes it less likely to crack or break when exposed to extreme temperatures.

The structure of glass can also be varied to create different properties. For example, tempering glass increases its strength and durability. Laminating glass creates a safety glass that is less likely to shatter into sharp pieces.

#### Paragraph 4

Glass is a complex material with a long and fascinating history. It has been used by humans for centuries, and it continues to be an important material in our modern world. The composition and structure of glass are two of the most important factors that determine its properties, and by carefully controlling these factors, manufacturers can create glass with a wide range of properties to meet the needs of a variety of applications.

#### Paragraph 5

In addition to its many practical applications, glass is also a beautiful material that can be used to create stunning works of art and architecture. Glass has been used in art for centuries, and some of the most famous works of art in the world are made of glass. Glass is also used in architecture to create beautiful and iconic buildings. Some of the most famous buildings in the

world, such as the Empire State Building and the Sydney Opera House, are made of glass.

### **Paragraph 6**

Glass is a versatile and beautiful material that has been used by humans for centuries. It is an important material in our modern world, and it continues to be used in a wide range of applications, from windows and bottles to art and architecture.

# Chapter 1: Glass Properties

## Thermal Properties of Glass

Thermal properties are important considerations when selecting glass for buildings. These properties affect the amount of heat that is transferred through the glass, which can impact the energy efficiency of the building.

One of the most important thermal properties of glass is its thermal conductivity. Thermal conductivity is a measure of how easily heat can flow through a material. The lower the thermal conductivity, the better the material is at insulating against heat flow. Glass has a relatively low thermal conductivity, which makes it a good insulator.

Another important thermal property of glass is its specific heat capacity. Specific heat capacity is a measure of how much heat a material can absorb without changing its temperature. Glass has a

relatively high specific heat capacity, which means that it can absorb a lot of heat without getting too hot.

The thermal properties of glass can be affected by a number of factors, including the thickness of the glass, the type of glass, and the presence of coatings or films. Thicker glass has a lower thermal conductivity than thinner glass, and different types of glass have different thermal properties. Coatings and films can also be applied to glass to improve its thermal properties.

Understanding the thermal properties of glass is important for architects and engineers who are designing buildings. By choosing the right type of glass and using the appropriate coatings and films, they can improve the energy efficiency of their buildings and create more comfortable indoor environments.

**This extract presents the opening three sections of the first chapter.**

**Discover the complete 10 chapters and 50 sections by purchasing the book, now available in various formats.**

## Chapter 10: Future Trends

### 3D Printed Glass

3D printed glass is a revolutionary new technology that has the potential to change the way we design and construct buildings. This technology allows for the creation of complex glass structures that would be impossible to produce using traditional manufacturing methods.

One of the most exciting applications of 3D printed glass is in the creation of custom facades. These facades can be designed to meet the specific needs of a building, and they can be used to create unique and eye-catching architectural effects. For example, 3D printed glass facades can be used to create curved surfaces, intricate patterns, or even custom sculptures.

Another promising application of 3D printed glass is in the creation of structural elements. These elements can be used to create strong and lightweight structures that

are resistant to earthquakes and other natural disasters. For example, 3D printed glass columns can be used to support the weight of a building, and 3D printed glass beams can be used to create long-span structures.

In addition to its structural applications, 3D printed glass can also be used to create a variety of functional elements. For example, 3D printed glass tiles can be used to create flooring and countertops, and 3D printed glass panels can be used to create windows and doors.

3D printed glass is still a relatively new technology, but it has the potential to revolutionize the way we use glass in construction. This technology offers a number of advantages over traditional manufacturing methods, including the ability to create complex shapes, reduce waste, and improve energy efficiency. As the technology continues to develop, it is likely to become increasingly common in the construction of buildings.

### **Benefits of 3D Printed Glass**



- **Design flexibility:** 3D printed glass can be used to create complex shapes that would be impossible to produce using traditional manufacturing methods. This design flexibility allows architects to create unique and eye-catching buildings.
- **Reduced waste:** 3D printing produces less waste than traditional manufacturing methods. This is because 3D printers only use the material that is needed to create the object.
- **Improved energy efficiency:** 3D printed glass can be used to create energy-efficient buildings. This is because 3D printed glass can be used to create airtight seals and to reduce heat loss.

### **Applications of 3D Printed Glass**

- **Custom facades:** 3D printed glass can be used to create custom facades that meet the specific needs of a building. These facades can be

designed to create unique and eye-catching architectural effects.

- **Structural elements:** 3D printed glass can be used to create strong and lightweight structural elements. These elements can be used to create buildings that are resistant to earthquakes and other natural disasters.
- **Functional elements:** 3D printed glass can be used to create a variety of functional elements, such as flooring, countertops, windows, and doors.

### **The Future of 3D Printed Glass**

3D printed glass is still a relatively new technology, but it has the potential to revolutionize the way we use glass in construction. As the technology continues to develop, it is likely to become increasingly common in the construction of buildings.

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