



THE DEFINITIVE GUIDE TO DISPOSABLE GLOVES

CHOOSE THE RIGHT
GLOVE FOR THE JOB.
EVERY TIME.



CONTENTS

INTRODUCTION	3
LATEX GLOVES	4
VINYL GLOVES	6
NITRILE GLOVES.....	7
POLY GLOVES	9
INDUSTRIAL or EXAM GRADE.....	10
ELASTICITY	12
CHEMICAL RESISTANCE.....	13
THICKNESS	14
TEXTURE	16
COLOR.....	18
FINISH.....	20
CLOSING	22
SIZING CHART	23



GLOVES MADE SIMPLE

For a seemingly simple, straightforward product, disposable gloves can cause a great deal of uncertainty and confusion.

At AMMEX, we get a lot of glove questions. A sampling:

Q: “How long are these, from fingertip to wrist?”

A: Most gloves are 9½ inches long. Some are 12 inches; some, even longer.

Q: “Anyone use these for beekeeping?”

A: We must confess that we have done no testing with bees. But we do love honey.

Q: “Can I use these to change diapers and apply ointment on my baby’s bottom?”

A: Yes, if they’re exam grade. We’re guessing that baby will appreciate it.

Q: “Which material is right for [insert job here, everything from rebuilding carburetors to marinating chicken thighs]?”

A: Well, that depends.

AMMEX offers disposable gloves in four materials: nitrile, latex, polyvinyl chloride, and polyethylene. They come in mil thicknesses from 1 (poly food service gloves) to 13 (heavy-duty

latex exam gloves). They come in a variety of colors and textures for a large number of applications. And they come in sizes from extra small to extra-extra large, so you’ll always have the perfect fit. [See our Glove Sizing Chart on Page 23 for help with this continuing source of mystery.]

Whether you’re a distributor looking to Grow Your Glove Sales®, a small-business owner who wants to protect your employees, or a homeowner with a long to-do list, AMMEX can help you choose the right glove for the job, every time.

GLOVE MATERIAL: Latex



The primary characteristics of latex gloves are excellent dexterity, comfort, and fit. Latex is the most elastic, resilient, and consistent-fitting material on the market. It is both more flexible and offers greater tactile sensitivity than nitrile.

Latex gloves are manufactured in both industrial and exam grades and

are available both powdered and powder free. Powdered latex gloves were prohibited for medical use in the United States by the Food and Drug Administration in January 2017.

Because of its superior fit

and feel, latex has been used most often in medical and exam applications, although nitrile and vinyl are gaining popularity as general exam gloves because of allergy concerns and vinyl's lower cost.

Industrial-grade latex gloves are popular for automotive,

janitorial, and such other applications as paint shops and printing operations.

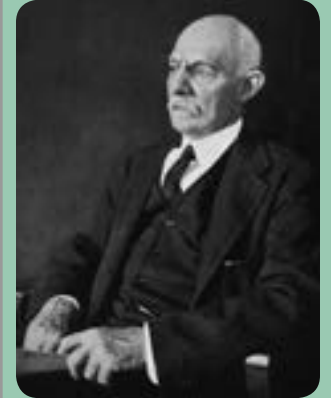
They're made

from component materials that comply with FDA regulations for food contact. In exam grade, the gloves are suitable across the healthcare spectrum, for use in medical, dental, and laboratory applications

Continued on Page 5

[AMMEX has latex gloves for all your needs, including heavy-duty gloves with a thickness of 13 mils.](#)

HISTORY LESSON



The genesis of disposable gloves centers on one man's vision to help his nurse alleviate the rashes that developed on her hands when she was assisting in surgery.

In 1890, Dr. **William Stewart Halsted** became the first surgeon-in-chief at Johns Hopkins Hospital in Baltimore. His nurse Caroline Hampton, who became his wife, suffered severe skin irritation from the chemicals that surgeons and nurses were expected to tolerate barehanded.

In 1894, Halsted approached the Goodyear Rubber Company about creating gloves for her made from natural latex rubber. It was such a success that soon his entire surgical staff wore gloves during operations.

(Ironically, in 2008 Johns Hopkins Hospital became the first major medical institution in the United States to end all use of latex gloves in an effort to eliminate allergic reactions to latex.)



HISTORY LESSON



Latex is a natural rubber product derived from the sap of the mature *Hevea brasiliensis* tree, native to South America but also grown in such Southeast Asian countries as Indonesia, Thailand, and Vietnam. It replaced the India rubber plant in the early 20th century as the primary source of natural rubber. Latex is a milky fluid that contains rubber hydrocarbon along with other substances such as proteins, carbohydrates, water, or sugar.

Once the sap is collected, it must be chemically treated through a process called vulcanization, which was patented in the United States by **Charles Goodyear** in 1844. Vulcanizing natural rubber

converts the polymers into a more durable, stretchable material. This process also incorporates a number of additives such as antioxidants and pigments that give the product its final properties.

In the early years of disposable gloves, lycopodium spores—a type of ground moss—were mixed with talcum powder to lubricate the inside of gloves so they were easier to don and remove. However, in the 1920s lycopodium spores were discovered to be mildly

toxic to humans, and talcum powder was used alone for more than 40 years. By the 1970s, talcum powder had been linked to various health complications and was replaced by food-grade cornstarch, which is still in use today.

Demand for latex gloves remained steady until the 1980s, when the HIV crisis caused demand worldwide to increase exponentially. In 1992, the U.S. Occupational Safety and Health Administration published its [Bloodborne](#)

[Pathogens Standard](#), which required employers to provide personal protective equipment, including disposable gloves, to employees so they could avoid contact with bodily fluids. Use extended well beyond

hospitals and doctor's offices to countless others who have direct physical contact with the public.

With the increased demand, the cost of latex gloves rose and the market was flooded with poorly made, overpriced gloves. Manufacturers searching for a lower-cost, dependable alternative began to produce gloves made from polyvinyl chloride (PVC), which were cheaper but sacrificed the excellent fit and high tactile sensitivity of latex gloves.



GLOVE MATERIAL:

Latex

and non-surgical procedures, as well as EMS uses, depending on jurisdiction.

Latex allergies are present in less than 1 percent of the U.S. population (about 3 million people). This number grows to between 8 and 17% of health care workers, because regular use of products containing latex may trigger sensitivity. Some may develop an allergic reaction known as contact dermatitis even where no allergy existed before.

As many as 68% of children with spina bifida are allergic because of the frequent surgeries they endure. Anyone who has multiple surgeries is at risk. Those with type I allergies face the most severe reactions, including anaphylaxis.

Washing of gloves in a chlorinated solution can reduce latex proteins, but not eliminate them entirely. Chlorination also softens gloves but reduces their shelf life.

Latex gloves have better puncture resistance than vinyl, but not as good as nitrile. Pricing is subject to fluctuation due to factors that affect any natural resources, including weather and economic instability.

GLOVE MATERIAL: Vinyl



[See AMMEX's selection of vinyl gloves to find the right fit for you.](#)

The second generation of disposable gloves after latex, vinyl gloves are made from polyvinyl chloride (PVC). Normally rigid, it is mixed with a plasticizer to make the material flexible and soft for molding into gloves. Vinyl gloves consist of only PVC monomers, making them more cost-effective than nitrile, which is also made from synthetic materials.

Scientists accidentally discovered vinyl through experiments carried out

during the 19th century. German inventor **Friedrich Heinrich August Klatt** first patented the material in 1913, when he found a way



to use sunlight to polymerize vinyl chloride. Researchers have since determined which additives to include to make the material more flexible. In addition to disposable gloves,

vinyl is used to make bottles, toys, credit cards, rain gutters, and a long list of other products.

Vinyl gloves come in both industrial and exam grades,

both powdered and powder free.

Vinyl has a comfortable fit that is looser than latex or nitrile. It eliminates concerns about latex allergies as well as avoiding the petroleum properties of nitrile gloves.

Vinyl is an economical option, especially for applications where frequent glove changes are required. For that reason it is popular in food service. While most vinyl gloves are clear or ivory colored, some are blue and targeted specifically at food processing. If a piece of blue glove should detach and get into the food, it is more easily seen and removed.

GLOVE MATERIAL: Nitrile



Nitrile is the third-generation material for disposable gloves, having been introduced in the 1990s.

Today it is the most highly recommended disposable glove material—stronger than latex or vinyl, with fit, feel, and comfort rivaling that of latex. Nitrile has three times the puncture resistance of latex, as well as more abrasion and chemical resistance. It is recommended for working with 76 percent of common chemicals on the market. Nitrile is able to withstand mineral oils, vegetable oils, grease, gasoline, diesel

[AMMEX carries a wide variety of nitrile disposable gloves for industrial and medical uses.](#)

fuel, and many acids.

Because it is free of organic latex proteins, nitrile does not aggravate latex allergies. That is an important consideration not only for those who are sensitive to latex but also for users who come into direct physical contact with the public, especially medical and dental professionals, security personnel, tattoo artists, and salon workers.

Nitrile gloves are popular for automotive, manufacturing, janitorial, plumbing, paint shop, chemical, and industrial uses. They're made from component materials that

Continued on Page 8

HISTORY LESSON

Development of synthetic rubber began in response to critical shortages of natural latex rubber during World War I. Nitrile butadiene rubber was patented in 1934 by German chemists Erich Konrad and Eduard Tschunkur, and commercial production began in earnest in the 1930s. By the late 1960s Reichhold Industries and its predecessor companies began to market nitrile for gloves on a commercial scale.



Neil

Tillotson and Luc DeBecker received a patent for nitrile exam glove technology in 1991 after producing the first 100 percent nitrile disposable glove. It was initially slow to catch on in medical circles, but soon nitrile gloves became the Next Big Thing in the industrial sector. Not only did they protect against a wider variety of harsh chemicals, but they also provided the added benefit of not aggravating latex allergies.

During the 1990s and early 2000s, as awareness of workplace safety became more prominent, disposable gloves saw more everyday commercial use. Since then nitrile's popularity has extended well beyond industrial applications, and nitrile gloves are widely used in medical applications as well.

GLOVE MATERIAL: Nitrile

comply with FDA regulations for food contact, which makes them well-suited for food processing applications.

Also known as nitrile butadiene rubber (NBR), nitrile is a synthetic copolymer of acrylonitrile and butadiene monomers combined with a carboxylic acid. Acrylonitrile enhances chemical resistance, and butadiene creates flexibility and tear resistance. It is widely used in products that require oil resistance: fuel hoses, automotive and aeronautical gaskets and seals, and self-sealing fuel tanks, among others. It can withstand temperatures from minus-40 to 226 degrees Fahrenheit.

Nitrile gloves are manufactured in industrial and exam grades, and are available powdered—with food-grade cornstarch—and powder free. As body heat warms nitrile gloves, they conform to hands for a uniform, more comfortable fit.

Pricing is dependent on the cost of petroleum. They are more expensive than other materials, but are more durable and better suited for extended-duration use. Many industrial-grade nitrile gloves are thicker to better withstand more demanding applications. Nitrile gloves also have a longer shelf life than natural latex rubber.



GLOVE MATERIAL: Poly

The most affordable glove material, polyethylene is used primarily in the food service industry. It is even more economical than vinyl, preferred for activities involving short-duration tasks and frequent changes of gloves, and is also popular in salon and cosmetic applications, painting, arts & crafts, and light cleaning.

Polyethylene gloves are made in industrial grade only. They are powder free and latex free.

Polyethylene is a polymer that is synthesized from ethylene and a thermoplastic that is formed into various shapes as it cools from a liquid state to a solid state. High-density polyethylene (HDPE) is stiffer and harder than low-density polyethylene and is used for the least-expensive gloves, such as those for pumping gasoline. Low-density polyethylene (LDPE) is more flexible and used for gloves that require greater sensitivity, as well as plastic grocery bags and dispensing bottles.

LDPE is a non-leaching plastic in its natural state. This means it will not re-



HISTORY LESSON

Like polyvinyl chloride (PVC), polyethylene was created by accident. German chemist **Hans von Pechmann** made the first polyethylene in 1898. In 1933, Reginald Gibson and Eric Fawcett, two scientists at Imperial Chemical Industries, also accidentally created polyethylene, and their employer became the driving force behind the material's innovation in its early years.



lease unwanted chemicals into food, which is why poly gloves are especially well suited for the food service industry. Additionally, LDPE is used for creating protective film for food packaging.

Poly gloves are not dipped like nitrile, latex, or

vinyl gloves, but are constructed from two heat-sealed sheets of material, which creates a seam along the edge. That means they are not impervious to liquids. The texture (embossing) is put onto the material before the glove is made.



INDUSTRIAL GRADE OR MEDICAL GRADE

Once disposable gloves are finished and dried, they undergo rigorous inspection before they are ready for sale and use. Whether in industrial applications involving harsh chemicals or medical applications with potential exposure to bloodborne pathogens, gloves' primary requirement is that users' hands are protected.

Exam-grade gloves must pass a series of tests to meet safety requirements established by the U.S. Food and Drug Administration. Gloves are tested for puncture and abrasion resistance, run through tension and elongation tests, and checked for chemical resistance.

Glove inspection is based on acceptable quality limits (AQL) set by the FDA. Test-

ing methods for AQL come from the American Society for Testing and Materials (ASTM), which creates standards for industries across the world.

AQL is a method that applies to batches of gloves and functions as a percentage. For example, in a batch of 100 gloves with an AQL of 3.0, only three gloves in the batch can fail the test.

Continued on Page 11

INDUSTRIAL *OR* MEDICAL GRADE



[Check out AMMEX's overview of where disposable gloves come from and how they get from the production line to those who wear them on the job.](#)



Most of the time when you purchase industrial-grade gloves, they are very nearly medical grade.

(For medical-grade gloves, the AQL is 1.5 or lower). If more than three gloves fail, the entire batch does not meet the standard. In this case, manufacturers will review the manufacturing process to determine what requires adjustment.

If the glove does not pass the ASTM tests, it is not considered “approved” by the FDA; however, it may be “accepted.” That means while all glove manufacturers are aiming to meet the FDA guidelines, they may miss a few by a small margin. Given the risks in

the medical field, the AQL number is lower for medical-grade gloves.

Glove quality testing involves various inspections. The pinhole leak test, which checks for barrier integrity, is one that determines whether gloves are suitable for medical applications. Even the smallest breach in the glove material can allow exposure to pathogens.

In this test, manufacturers fill the gloves with one liter of water, close the gloves at the cuff, and hang the gloves upside down. Gloves that do not have leaks

during the testing period are acceptable for medical applications.

If a glove is not officially “approved,” it does not mean that it is not safe. Manufacturers typically produce medical- and industrial-grade gloves on the same production line. Most of the time when you purchase industrial-grade gloves, they are very nearly medical grade.

Exam-grade gloves are not “sterile.” Only surgical gloves, which have been irradiated, are considered sterile.

ELASTICITY

The elastic property of a glove can change how easy it is to don and remove, and how comfortable it is to wear.



Too often when elasticity is considered, it is simply about how far it will stretch without tearing. The more important factor is how it moves with you as you work, especially on the back of the hand, where it can play a major role in hand fatigue.

Latex gloves have the highest degree of elasticity, which gives them decidedly superior form, fit, and feel. There is no material, either synthetic or natural, that after stretching recovers its original form with the same precision as latex. This is what gives these gloves their excellent adaptability,

dexterity, and the prolonged comfort that helps prevent hand fatigue, even after hours of wear.

Nitrile gloves are slightly less elastic and form fitting than latex, but as the material absorbs body warmth, they conform well to the contour of the user's hand. Nitrile has a great deal more elasticity than vinyl.

Vinyl gloves are not very elastic and have a loose fit. This is an advantage in applications that require frequent glove changes, especially food service. For other uses that require greater control, stretch vinyl—which comes in industrial and exam varieties—offers improved flexibility and fit over normal vinyl.

CHEMICAL RESISTANCE CHART

Environmental conditions, exposure times, chemical concentrations, and residues may affect glove performance. It is strongly advised that onsite testing of all gloves be conducted to help determine safe usage parameters. **Glove chemical resistance is based on 5-mil gloves. Glove material thickness will affect chemical resistance duration.**

recommended	not recommended
not rated	limited use

Chemical Resistance	Latex	Nitrile	Vinyl	Chemical Resistance	Latex	Nitrile	Vinyl
Acetaldehyde, 99.5%	●	●	●	Hydrochloric Acid, 38%	●	●	●
Acetic Acid	●	●	●	Hydrofluoric Acid, 48%	●	●	●
Acetone, 99.5%	●	●	●	Hydrogen Peroxide, 30%	●	●	●
Acetonitrile, 99%	●	●	●	Hydroquinone	●	●	●
Acrylic Acid, 99%	●	●	●	Iodine	●	●	●
Ammonium Fluoride, 40%	●	●	●	Isobutyl Alcohol, 99%	●	●	●
Ammonium Hydroxide, 85%	●	●	●	Iso-Octane, 99%	●	●	●
Amyl Acetate, 100%	●	●	●	Isopropanol	●	●	●
Amyl Alcohol, 99%	●	●	●	Isopropyl Alcohol, 99%	●	●	●
Aniline, 99%	●	●	●	Isopropyl Benzene	●	●	●
Animal Fats	●	●	●	Kerosene, 100%	●	●	●
Aqua Regia	●	●	●	Lactic Acid, 85%	●	●	●
Battery Acid	●	●	●	Lauric Acid, 36%	●	●	●
Benzaldehyde, 99.5%	●	●	●	Linoleic Acid	●	●	●
Benzene	●	●	●	Linseed Oil	●	●	●
Benzyl Chloride	●	●	●	Maleic Acid, 100%	●	●	●
Bromine	●	●	●	Methanol	●	●	●
Bromopropionic Acid, Sat.	●	●	●	Methyl Acetate	●	●	●
Butane	●	●	●	Methyl Alcohol, 99.9%	●	●	●
2-Butoxyethanol	●	●	●	Methylamine, 40%	●	●	●
Butyl Acetate, 99%	●	●	●	Methyl-Butyl Ether, 99.8%	●	●	●
Butyl Alcohol, 99%	●	●	●	Methyl Cellosolve, 99%	●	●	●
Butyl Cellosolve, 99%	●	●	●	Methylamine	●	●	●
Butyrolactone, 99%	●	●	●	Methyl Chloride	●	●	●
Calcium Hypochlorite	●	●	●	Methylene Chloride	●	●	●
Carbolic Acid	●	●	●	Methyl Ethyl Ketone, 99%	●	●	●
Carbon Dichloride	●	●	●	Methyl Isobutyl Ketone	●	●	●
Carbon Disulfide, 99.9%	●	●	●	Methyl Methacrylate	●	●	●
Carbon Tetrachloride, 99%	●	●	●	Methyl-T-Butyl Ether	●	●	●
Castor Oil	●	●	●	Mineral Oil	●	●	●
Cellosolve Acetate, 99%	●	●	●	Mineral Spirits, 100%	●	●	●
Cellosolve Solvent	●	●	●	Monoethanolamine, 99%	●	●	●
Chlorine	●	●	●	Morpholine, 99%	●	●	●
Chloroacetone	●	●	●	Muriatic Acid, 100%	●	●	●
Chloroform	●	●	●	Naphtha VM&P, 100%	●	●	●
Chloronaphthalene	●	●	●	N-Methyl-2 Pyrrolidone, 99%	●	●	●
Chlorothene VG	●	●	●	Naphthalene	●	●	●
Chromic Acid, 50%	●	●	●	Nitric Acid, 10%	●	●	●
Citric Acid, 10%	●	●	●	Nitric Acid, 70%	●	●	●
Cottonseed Oil	●	●	●	Nitrobenzene, 99%	●	●	●
Creosol	●	●	●	Nitromethane, 95.5%	●	●	●
Cumene	●	●	●	Nitropropane, 95.5%	●	●	●
Cutting Oil	●	●	●	Octyl Alcohol, 99%	●	●	●
Cyclohexane	●	●	●	Oleic Acid, 99%	●	●	●
Cyclohexanol, 98%	●	●	●	Oxalic Acid, 12.5%	●	●	●
Diacetone Alcohol, 99%	●	●	●	Paint Remover	●	●	●
Dibutyl Phthalate, 99%	●	●	●	Palmitic Acid, Sat.	●	●	●
Diamine	●	●	●	Pentachlorophenol, 35%	●	●	●
Diethylamine, 99%	●	●	●	Pentane, 98%	●	●	●
Diethyl Ether	●	●	●	Perchloric Acid, 60%	●	●	●
Di-Isobutyl Ketone, 80%	●	●	●	Perchloroethylene	●	●	●
Dimethyl Acetamide, 99%	●	●	●	Petroleum Ether	●	●	●
N,N-Dimethyl Formamide, 99%	●	●	●	Phenol, 90%	●	●	●
Dimethyl Sulfoxide, 99%	●	●	●	Phosphoric Acid, 85%	●	●	●
Diocetyl Phthalate, 99%	●	●	●	Picric Acid	●	●	●
1,4-Dioxane, 99.9%	●	●	●	Potassium Hydroxide, 50%	●	●	●
Epichlorohydrin, 99%	●	●	●	Printing Ink	●	●	●
Ethanol	●	●	●	Propyl Acetate, 99%	●	●	●
2-Ethoxyethanol	●	●	●	Propyl Alcohol, 96%	●	●	●
Ethyl Acetate, 99%	●	●	●	Propylene Oxide	●	●	●
Ethyl Alcohol, 90%	●	●	●	Pyridine, 99%	●	●	●
Ethyl Ether, 99%	●	●	●	Rubber Solvent, 100%	●	●	●
Ethylene Dichloride	●	●	●	Rule Solvent	●	●	●
Ethylene Glycol, 99%	●	●	●	Sodium Hydroxide, 50%	●	●	●
Ethyl Glycol Ether, 99%	●	●	●	Sodium Hypochlorite	●	●	●
Ethylene Trichloride	●	●	●	Stoddard Solvent, 99%	●	●	●
Fluorine	●	●	●	Sulfuric Acid, 95%	●	●	●
Formaldehyde, 99%	●	●	●	Tannic Acid, 37.5%	●	●	●
Formalin Solution	●	●	●	1,1,2,2-Tetrachloroethane, 99%	●	●	●
Formic Acid, 95%	●	●	●	Tetrachloroethylene, 100%	●	●	●
Freon TF, 99%	●	●	●	Toluene, 99%	●	●	●
Furfural, 99%	●	●	●	Toluene Di-Isocyanate	●	●	●
Gasoline, 100%	●	●	●	1,1,1-Trichloroethane, 99%	●	●	●
Glycerine	●	●	●	Trichloroethylene	●	●	●
Glycerol	●	●	●	Tricresyl Phosphate, 90%	●	●	●
Heptane	●	●	●	Triethanolamine, 85%	●	●	●
Hexamethyldisilazine, 97%	●	●	●	Tung Oil	●	●	●
Hexane, 99%	●	●	●	Turbine Oil	●	●	●
Hydraulic Fluid-Petrol Based	●	●	●	Turpentine, 100%	●	●	●
Hydraulic Fluid- Ester Based	●	●	●	Vegetable Oil	●	●	●
Hydrazine, 65%	●	●	●	Xylene	●	●	●

THIS CHEMICAL RESISTANCE CHART IS FOR ADVISORY USE ONLY



HOW THICK IS YOUR GLOVE?

Glove thickness is usually expressed in mils. Gloves of 3 mils or less are suited for jobs that do not require strong protection from chemicals or hazardous materials.

Gloves in the 5- to 6-mil range are dependable for a variety of applications, from general duty to heavier automotive or industrial needs involving tools and machinery. Gloves 8 mils and above are rated for heavy-duty use, and as mil thickness increases, more specialized uses become prevalent; dishwashing gloves, for instance, are generally 17 or more mils to protect hands from harsh cleaning solutions and hot water.

[Our Gloveworks® HD brand is extra thick for protection from harsh chemicals. They're perfect for automotive applications!](#)

When gloves are made, ceramic hand-shaped formers are positioned on the assembly line, fingers pointed downward. As the formers move along the line, gravity pulls the solution down toward the bottom of the glove. Once the gloves are completely dried, the fingers will be the thickest part of the glove, while the wrists will be the thinnest. In most applications, disposable gloves endure the most wear and tear on the fingers.

In addition to gravity, glove thickness is determined by dipping the formers into the solution more times. Each time they are dipped, another layer of solution is added.

Continued on Page 15

GLOVE THICKNESS



[Heavy-duty gloves such as AMMEX's Royal Blue Nitrile are thicker and more durable than standard disposable gloves, and have a raised diamond texture for added grip.](#)

Some glove manufacturers use calcium carbonate as a filler to reduce the amount of raw material in a nitrile glove. Calcium carbonate is one of the most popular fillers in the plastics industry. Its addition allows the manufacturer to use less raw material, produce more in the same batch, and offer each product at a lower price. This filler helps to provide a smooth, glossy finish. In the right amount, calcium carbonate will increase the strength and stiffness of the product. In disposable gloves, calcium carbonate will make the glove feel thicker and

it will measure in mils as a thicker glove, just as if the raw material was built up to the same thickness. Fillers do reduce the shelf life of gloves and make gloves more brittle over time.

In the application and use of disposable gloves, there is a direct correlation between thickness, material, and chemical resistance. The thicker the glove, the stronger the chemical resistance (but the more dexterity is reduced). Thicker gloves are more expensive to make, and therefore cost more. Glove manufacturers generally state that doubling the thickness of a

glove quadruples the breakthrough time of a chemical.

Another factor to consider when deciding the appropriate gloves for a particular job is cuff length. Most disposable gloves are 9.5 inches from the tip of the finger to the base of the cuff. Some models are 12 inches or longer to provide extra splash protection. Longer gloves are generally thicker to withstand heavy-duty applications.

The cuffs on most disposable gloves are rolled to make the glove easier to don. The rolled edge reinforces the glove so you can pull it on without tearing.

TEXTURE



Smooth vinyl

HELPS YOU

GET A

GRIP



Micro-roughened latex



Micro-roughened nitrile



Raised diamond texture nitrile

Texture is a key consideration when selecting the right glove for the job. It originates on the formers of gloves during production. There are two processes used to create roughened and micro-roughened texture: sandblasting, which uses ceramic balls and forced air to create texture on the surface of the former, and spray-on, which directly applies a coating.

The processes have essentially the same function but differ in pattern and

customer preference. Sandblasting is used on thicker gloves; spray-on is used on thinner gloves.

Gloves may be textured on the entire surface, the fingers, the fingertips, the inner palm and fingers, or both sides of the glove. If a glove is ambidextrous, as most disposable gloves are, both sides are textured.

Textured surfaces on gloves create a stronger grip. Textures range from micro-roughening for basic needs to aggressive raised diamond texture, which

channels away liquids so that grip is maintained even when gloves are wet.

Smooth: These are gloves that have no texture, and most are made from vinyl. Smooth gloves are suitable for such applications as salon care, food preparation, and food service, where a precise grip is not essential.

Embossed: The lightest texture, it is created in the manufacture of polyurethane food service gloves. A pattern is imprinted on

Continued on Page 17

GLOVE TEXTURE



both sheets of polyurethane to improve grip and make the glove easier to manipulate.

Micro-roughened: Used mostly for nitrile and latex gloves. In fact, 95% of nitrile gloves are micro-roughened. These gloves have a surface that appears to be lightly sanded. They are well-suited for medical applications because they provide a better grip for holding

tools and small objects, but have no exaggerated surface to irritate patients.

Aggressive texture: The most intense level of texture in disposable gloves. An example is AMMEX's raised diamond texture, used in its heavy-duty suite of nitrile industrial gloves. This texture has channels between each raised diamond that allow liquids to pass through, which enables greater sur-

face contact with the glove, enhancing the grip. Raised diamond texture is ideal for gripping small objects and tools that are wet or slippery.

Gloves with aggressive texture require more material, and therefore offer added thickness and protection. These gloves are best for automotive, manufacturing, and other industrial applications.





THE SCIENCE AND SAFETY BEHIND COLOR

Disposable gloves are offered in a variety of colors, often associated with specific applications.

Black is popular for automotive technicians, for instance, because it conceals dirt, grease, and grime and projects a professional look. It also is favored among tattoo artists, police and security personnel, and in many high-end restaurants—for both kitchen and front-of-house staff.

When nitrile gloves first came to the market, manufacturers needed a way to differentiate between nitrile, latex, and vinyl. Latex by nature is a light ivory, neutral color. Vinyl gloves are naturally transparent. Nitrile gloves were introduced to the market in light blue to distinguish them from latex and vinyl. Today, nitrile gloves come in a variety of colors.

Nitrile gloves also come in high-visibility orange and green, as part of AMMEX's [raised diamond texture suite](#). These bright colors add extra protection, because not only is it easier

Continued on Page 19

GLOVE COLOR

to see hands in dark work environments, but also easier for managers to ensure workers are wearing gloves.

Some facilities require additional compliance beyond a worker's preferences. [Hazard Analysis and Critical Control Points \(HACCP\)](#) is a management system that controls safety in food processing facilities: raw food production, procedure, and handling, in addition to the manufacturing and distribution of the finished product.

HACCP regulates the stages of food production to avoid cross contamination. For instance, the first stage may include cleaning and preparation of raw foods, the next stage cooking raw foods, then handling and preparing the cooked foods for packaging, and finally packaging and shipping. Each stage will often be clearly identified by a color-coded system of personal protective equipment and disposable gloves. No worker wearing the wrong color is allowed to enter a different produc-

tion area without first properly washing and changing their gear to avoid cross contamination.

Similarly, color coding will also help to avoid cross contamination for those with allergies in factories, restaurants, and kitchens. Those handling vegetables, for example, would wear green disposable gloves, those



handling seafood would wear blue, dairy would wear indigo, and black for meat. Such facilities or kitchens often extend the color code to knives, cutting boards, and other equipment.

Beyond food processing facilities, color coding is also common in manufacturing facilities with groups of workers rotating shifts throughout the week and workday. Those working the

morning, afternoon, or night shifts would wear different colors. This is a common practice in manufacturing facilities and processing plants where security of products and processes are high. Color coding workers by processes ensures that no employee will know the entire process from beginning to end.

Most commonly, basic color coding gloves is found at workplaces where gloves are color coded by size.

At AMMEX, nitrile gloves come in green, orange, blue, black, royal blue, and indigo. Latex gloves come in ivory and blue, and vinyl gloves

come in ivory, clear, and blue.

In medical settings, color coding can help health care workers differentiate glove materials such as latex versus nitrile. This allows hospitals to easily educate their healthcare workers on which exam glove to use depending on the situation. Latex exam gloves are typically ivory, while nitrile are blue, indigo, or black.



THE PERFECT FINISH

The main distinction in a glove's finish is whether its interior is powdered or powder free. If it's the latter, there are several production techniques used to make gloves go on and off easier.

Some people prefer the feel of powdered gloves, which are coated on the inside with food-grade cornstarch for easy changes when hands are wet. They are popular for applications that involve moisture-rich environments. Historically, glove formers were powdered for ease in removing the gloves from the former. For this reason, powder

[It's easy to get lost in all our product options—it even happens to us sometimes. Call us and we can point you in the right direction.](#)

was already on the glove and those that were made free of powder required an extra step to remove residue. Powder is now applied to gloves after manufacturing.

In January 2017, the Food & Drug Administration banned powdered latex exam gloves from sale in the United States because of concerns about the cornstarch impairing the healing of wounds, as well as being a conduit for spreading latex allergies.

Powder-free gloves are generally preferred for industrial uses as well, because

Continued on Page 21

GLOVE FINISH



of concerns that powder can interfere with painted surfaces, seals, varnishes, or adhesives. Powder-free gloves have three types of finishes applied during the manufacturing process:

Polymer coating—silicones, acrylics, and hydrogels—on the inside of gloves creates a sleeker finish and reduces surface friction, which makes them slip on and off more easily. The polymer coating is applied after the manufacturing process while the

gloves are still on the former, and is most commonly applied to nitrile gloves.

In **chlorination**, gloves are washed in a solution or with chlorine gas, which causes them to have a softer texture and a more comfortable feel, and to go on and off more easily. They are then thoroughly rinsed.

In latex gloves, chlorination also reduces the level of residual latex proteins, thereby reducing exposure and making them less likely to aggravate allergies.

It also slightly reduces the shelf life of the gloves.

Double chlorination is used in some gloves, especially thicker latex gloves, to make donning and doffing easier, because latex is by its nature tackier. It also creates a harder surface and further reduces the level of latex proteins.

In vinyl gloves, **polyurethane** is often used on the inside to reduce surface tackiness, making the glove easier to put on and remove.



Disposable gloves were born and came of age in the medical industry, and many of the innovations over the years resulted from the needs of exam applications. In recent years, attention has shifted to industrial safety uses for disposable gloves, such as automotive repair, food processing and service, and janitorial/sanitation. Exam gloves, meanwhile, have found many uses beyond medical and dental offices in other professions that require direct public contact.

The industrial market is the fastest-growing sector for disposable glove use, with nitrile glove improvements such as raised diamond texture and heavy-duty thickness being important game changers. While

latex endures for specific applications, nitrile is the No. 1 glove material today and its dominance will only increase as further technological advancements bring it closer to latex in fit, feel, and elasticity. Vinyl will continue to provide a versatile, economical alternative.

As awareness of the need for worker protection spreads around the globe—including to Asia and Africa, which today are relatively young markets for safety equipment—the disposable glove business will continue to experience excellent growth worldwide.

AMMEX distributors grow their glove sales by an average of 31%. How do we help our distributors achieve this astonishing growth?

A disposable glove with an improper fit won't do anyone any good. Make sure you have the right size.



Glove Sizing Chart

To ensure your gloves have the best fit and feel, we've created this handy sizing chart. Please keep in mind that gloves are like shoes: there are general sizes, but various styles will fit differently.

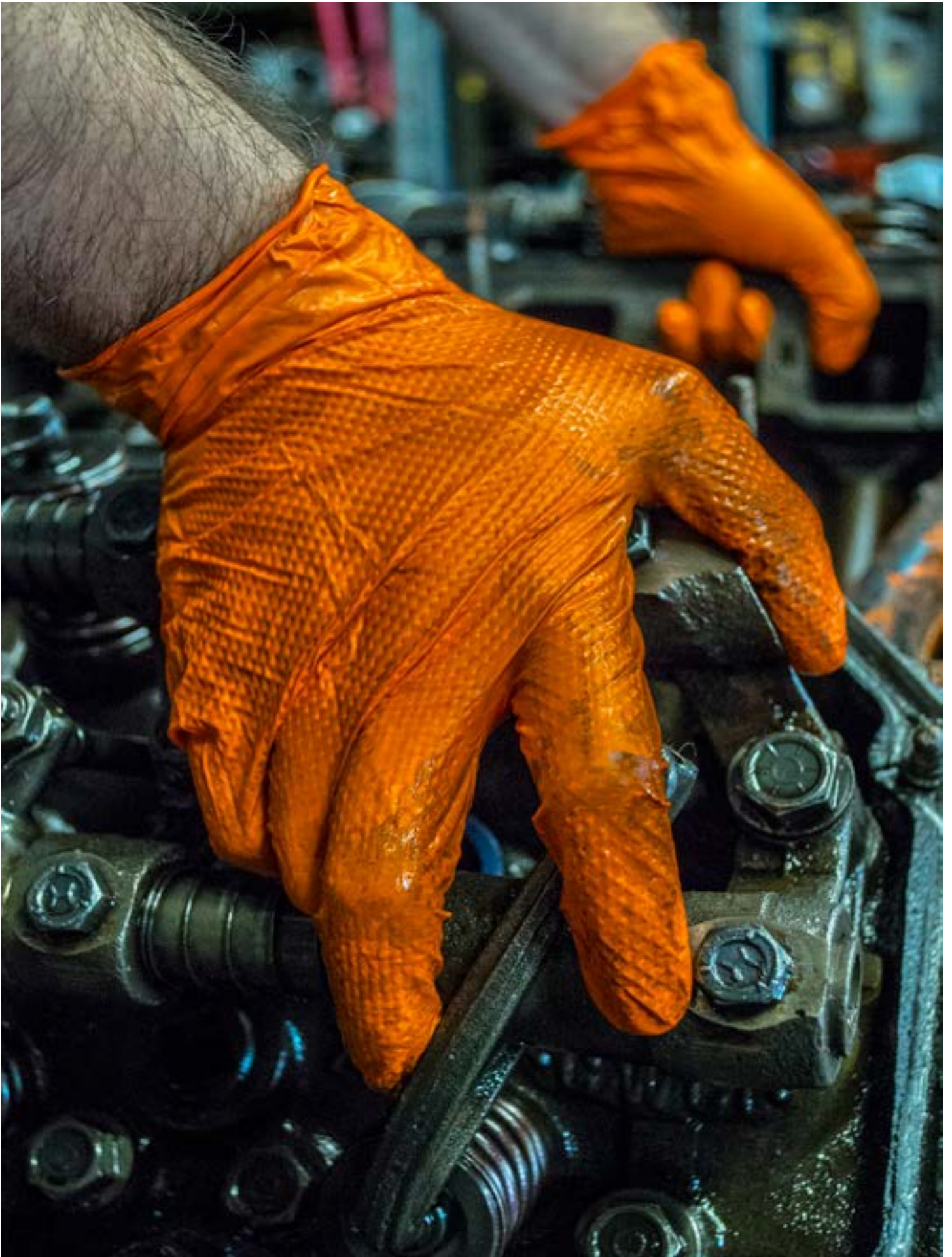
Glove materials, thickness, elasticity, and texture are a few factors that can make one style of glove fit snugger or looser than another.

Palm Measurement

Find your glove size by measuring your hand using the guide below.

Glove Size	Inches	cm
XS	Up to $2\frac{7}{8}$	Up to 7.36
S	$2\frac{7}{8} - 3\frac{1}{4}$	7.36 - 8.32
M	$3\frac{1}{4} - 3\frac{1}{2}$	8.12 - 8.9
L	$3\frac{1}{2} - 4$	8.9 - 10.16
XL	$3\frac{7}{8} - 4\frac{3}{8}$	9.9 - 11.18
XXL	$4\frac{3}{8}$ and over	11.18 and over





Check out the collection of work gloves & hand protection we offer.