



# LSR TECHNOLOGY

IN THE LIFE SCIENCE INDUSTRY

**simtec**  
SILICONE PARTS

# How LSR Technology Can Advance Your Company in the Medical Industry

Medical grade silicone rubber is unlike conventional forms used in the medical industry. Its dozens of features and characteristics surpass expectations, and liquid silicone rubber, or LSR, is the ideal material in manufacturing life science products. Whether you're searching for small or large, flexible or high durometer products, LSR can accommodate any application in the field.

If your company requires long-term solutions — that actually last an entire lifetime — through high and low temperatures, and that will increase the performance, safety, and comfort of your medical products, liquid silicone rubber from SIMTEC Silicone Parts is your answer. We can create medical grade liquid silicone rubber parts such as diaphragms and syringe stoppers, plus infusion pumps and dialysis filters.

LSR in the life science industry can keep up with the ever-changing demands of product regulations, safety checks, and high standards. SIMTEC continues to perfect our LSR and LSR 2-Shot processes because we know medical experts rely on our expertise to save lives. Our innovative technology and techniques can help propel medical liquid silicone and give your company a competitive advantage.

## **Our E-Book Will Help You Learn How SIMTEC Solutions Influence LSR in the Medical Industry**

As you read our e-book, it will help you understand what LSR is, its properties, and how it serves injection molding in the medical industry. SIMTEC professionals implement three different silicone rubber processes and work with you to determine which solutions work best for your application. We produce various medical device LSR parts to suit the needs of doctors, surgeons, and nurses.

SIMTEC also places our rubber through a vulcanization process to create more durable products. And with the cross-linking that occurs during vulcanization, we can develop the most durable rubber on the market. We can craft an endless number of solutions to match your needs — anywhere from seals, gaskets, and O-rings to vibration dampers, connectors, caps, and syringe stoppers. Our technicians manufacture all medical LSR products to fit your particular needs.

Throughout the guide, we provide an extensive list of parts we can create, but the list isn't limited to our abilities. This guide will help you understand the features of LSR and how liquid silicone rubber can positively affect your products. Further on, we discuss the advantages of using silicone rubber for various medical components. For example, our solutions can withstand extreme temperatures — both hot and cold — and are biocompatible, which is vital in your line of work. Other pros of LSR include it being flexible, UV resistant, and tasteless.

Learning about liquid silicone rubber and how it can advance your company is essential before beginning the process of designing products. SIMTEC will support you each step of the way to ensure you have perfect components and solutions that are compatible with their functions.

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# What Is Liquid Silicone Rubber and Its Process?

## What Is LSR in the Life Science Industry?



**LIQUID SILICONE RUBBER OR LSR IS AN ODORLESS,  
TASTELESS AND HYPOALLERGENIC MATERIAL.**

Let's begin with the basics. Liquid silicone rubber or LSR is an odorless, tasteless and hypoallergenic material. LSR is a standard solution used in various industries ranging from medical and food to automotive, household goods, and wearable technology. But for you to learn how it can impact your company, we will start from the beginning.

Liquid silicone rubber is based on silicon dioxide or sand. Silicone has alternating silicon and oxygen molecules, and when they react with methyl chloride, it creates polydimethylsiloxane, also known as PDMS. Silicone has inorganic as well as organic properties, but LSRs are pure with no curing agents, plasticizers, stabilizers, or promoters. Therefore, they are cross-linked or cured through a reaction.

LSR is a two-component material. Component A is the catalyst, and component B is the cross-linking agent. The reaction between both materials induces the curing process, and cross-linking occurs. SIMTEC Silicone Parts can manufacture LSR in a range of grades, types, and properties for dozens of medical rubber parts in the pharmaceutical industry. There are three main steps in creating LSR — mixing, molding, and finishing.

## How LSR Starts as a Raw Material

Manufacturing silicone medical products requires special machinery unlike conventional molding with thermoplastics. LSR begins as two separate raw materials — components A and B. Silicon dioxide, or sand, is processed into silicone then reacted with methyl chloride in a 1:1 ratio. Both components A and B are shipped to SIMTEC's facility in separate containers to prevent the chemical reaction from occurring before arrival.

## SIMTEC's LSR Injection Molding Technique

For us to begin forming LSR, we feed both of the components through high-pressure hoses from drums into a mixing head. During this stage, cold runners keep temperatures below the curing point which helps make sure the silicone remains uncured before reaching the molding cavities. The water-cooled injection barrels are often set between 60 and 100 degrees Fahrenheit.

When mixed in a static mixer, the silicone and methyl chloride begin to react. Once LSR forms, it has a low viscosity which helps it fill each piece of the mold and other small features of your product. It has a pasty consistency similar to peanut butter. Although a low viscosity can lead to flash, our intricate mold designs minimize any occurrences. Different forms of LSR have viscosities ranging from 10,000 to 1,000,000 cps.

The next step involves heating the LSR to initiate the curing process for solidification. Unlike traditional rubber solutions, where heat melts and reforms rubber, heating LSR turns the liquid into a solid. Temperatures range between 355 and 390 degrees Fahrenheit to build LSR, and high clamp forces allow it to fill the mold without any gaps. However, LSR doesn't need a lot of force because it already expands during the curing process due to the cross-linking method.

As opposed to other processes, LSR is different from organic rubber because it's heat resistant, biologically inert, and has low-temperature flexibility. Liquid silicone rubber cures faster and has properties unobtainable with traditional forms. For example, latex doesn't cure all the way which can lead to poor reactions between medical rubber products and patients in the medical realm.

### LSR IS DIFFERENT FROM ORGANIC RUBBER BECAUSE:

- ✔ IT'S HEAT RESISTANT
- ✔ IT'S BIOLOGICALLY INERT
- ✔ IT HAS LOW-TEMPERATURE FLEXIBILITY

Benefits of choosing LSR as a solution includes it not degrading until heated to extreme temperatures and being able to handle the sterilization process. You can combine several components at a time, and the process often involves aggressive undercuts. We will dive into the benefits further in the guide.

## **The Closed-Loop System of Medical Injection Molding**

Using a closed-loop system to produce LSR products, SIMTEC can limit the product's exposure to contaminants like dust and moisture. It creates a clean production site and also reduces waste and rework because one of our trained technician controllers can alter the flow of material for each project. No air touches the parts until we remove it from the mold which improves part quality.

A closed-loop system allows the machine to react to changes in viscosity along with air bubbles. We monitor the correct amount of material ratio using a helical gear flow meter which has gear teeth to measure the flow in increments for precise amounts. Data gets sent back to one of our operators who controls the valve and can alter the flow which creates the closed loop.

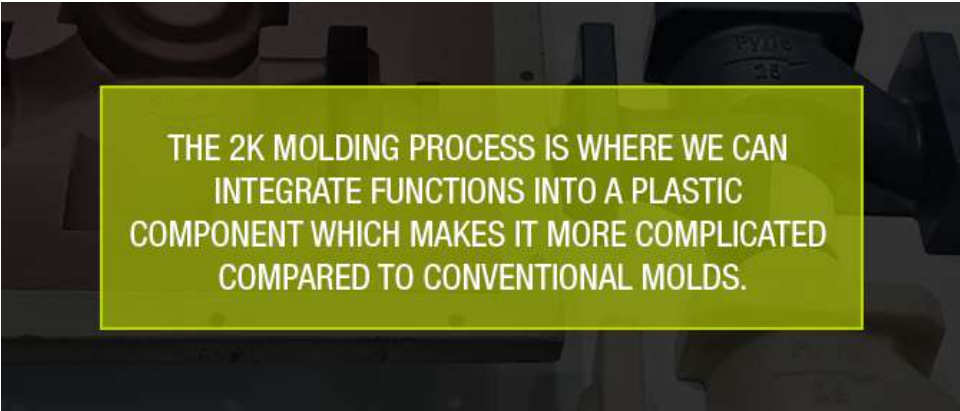
LSR cures fast which is critical for the medical industry, and the solutions won't leak chemicals or cause potential reactions.

# SIMTEC's LSR 2-Shot and Overmolding Innovative Technology

## Our 2-Shot Solutions at SIMTEC Silicone Parts

Injection molding for the medical industry with SIMTEC's LSR 2-Shot technology provides incomparable benefits to medical professionals. Our 2-Shot solutions are also known as multi-component, double-shot, twin-shot, and 2K molding. The process is where we integrate several materials, parts, and functions into one piece, using one machine that has two injection units. If we didn't use 2-Shot techniques, we would need different materials for various functions which would increase costs for assembly and material.

But with the multi-component solution, the injection process occurs in a single machine. The first area holds the initial material. Before inserting the second, we modify the mold to have channels and cavities for both elements. The piece with the lowest melting point is usually injected first. The 2K molding process is where we can integrate functions into a plastic component which makes it more complicated compared to conventional molds. However, material and assembly costs decrease because no additional assembly is necessary despite its complexities.



**THE 2K MOLDING PROCESS IS WHERE WE CAN  
INTEGRATE FUNCTIONS INTO A PLASTIC  
COMPONENT WHICH MAKES IT MORE COMPLICATED  
COMPARED TO CONVENTIONAL MOLDS.**



SIMTEC can fuse together parts in various sizes and configurations to suit the medical industry in thousands of ways. Using the same injection molding machine and mold, the 2-Shot process combines features of two materials. Benefits of 2K injection molding include:

- Better appearance
- Greater integrity
- More ergonomic
- Quality control

Our solution results in more complex designs, multiple material integration, part weight optimization, and various functions in one piece. With modern technology and skilled technicians, we can produce repeatable solutions for high-volume requests. The 2-Shot process decreases the need for further assembly which makes it an economical choice. It also provides dimensional control and forms a stronger bond between parts. Working with LSR often involves a combination of hard and soft elements.

## **What Is Overmolding and How Is It Used in the Healthcare System?**

Overmolding is the third method we conduct at SIMTEC with injection molding and 2-Shot molding as the initial two techniques. With overmolding, we take a completed object — often plastic or metal — and place it into the LSR mold. We overmold a new part onto the existing which results in benefits such as:

- Alignment of medical gaskets, seals, etc.
- Integrated bonding and non-bonding materials
- Consistent thickness and clean surfaces
- Ability to mold complex designs
- Design flexibility
- Quality control
- Superior surface finish
- Save time and money with reduction of assembly steps, material waste, and production time

The procedure includes the addition of an extra layer of LSR to an existing part which can have a positive impact on medical tools and devices.

For example, soft-touch handles are a significant product of the overmolding procedure which creates softer handles on silicone medical products for comfort. LSR overmolding can improve the grip of specific tools and form ergonomic shapes that fit the hands of doctors and nurses. We first overmold the shaft of metal with LSR. The thermoplastic makes a soft-touch handle with a seamless surface and no gaps, which limits the potential for contaminants getting trapped.

## How the Overmolding Method Works for Medical Silicone Molding

Medical device injection molding from SIMTEC using the overmolding process is when we apply uncured LSR to another base material. We then cure it into a new shape where the liquid silicone rubber adheres to the surface through chemical or mechanical bonding or both. Chemical bonding is the most reliable because it takes place on a molecular level. Mechanical requires various undercuts and interlocks. Aggressive undercuts on LSR products form positive retention between both of the materials.



## Types of Materials You Can Overmold

Three common materials you can overmold using liquid silicone rubber are silicone, metal, and thermoplastics. Silicone on silicone is the easiest and most popular technique that can achieve multiple colors at once and various durometers, which is the degree of hardness for an LSR object. It's ideal if you want to combine a less expensive silicone with a more expensive LSR.

If you want to incorporate LSR onto a metal, most require a barrier or primer which promotes the solution's chemical adhesive properties and prevents the leaching of chemicals like sulfur. Sulfur acts as an inhibitor to the cross-linking. SIMTEC professionals can sandblast, texturize, orpeen metal products to generate more surface area bonding.

Using overmolding technology on a thermoplastic is one of the fastest growing segments in the industry. It takes the properties of silicone — like compression set, temperature, and biocompatibility — and combines it with properties of the engineered resins. However, overmolding LSR onto other thermoplastics is the most challenging because not all thermoplastics bond to silicone. It's also difficult because the thermoplastic glass transition temperature is lower than what's required to cure LSR.

## The Advantages of Using 2K and Overmolding LSR

Not only does the LSR 2K and overmolding technology from SIMTEC give you the freedom to design various devices with soft-grip rubber and other characteristics, but it also costs less and improves the quality of the solution. Multi-component liquid silicone molding has a flexible design where you can combine unique materials to craft more projects and higher performance abilities.

Because silicone parts have a tacky surface, they are more difficult to assemble, so by molding LSR onto another part, it's quicker and easier. Our solutions also offer fewer material costs. Using a less expensive substrate in combination with LSR, you can receive the pieces you need at a more cost-effective rate. Improved quality is another advantage because overmolding forms a greater bond between the two materials as opposed to other methods.

# The Vulcanization Process of LSR

## What is the Vulcanization Process Used by SIMTEC Silicone Parts?



**VULCANIZATION:**  
THE CHEMICAL PROCESS OF CONVERTING RUBBER  
INTO DURABLE MATERIALS USING HEAT.

Vulcanization is the chemical process of converting rubber into durable materials using heat. While extreme temperatures often melt materials, in this case, heat triggers the chemical reaction between component A and B. As a result, LSR becomes a solid and cannot be altered otherwise. The vulcanization method also involves heating rubber and sulfur or other curatives to adjust the polymer to create cross-links.

## Liquid Silicone Rubber vs. Solid Silicone Rubber

Liquid and solid silicone rubber exist, and while each has the same basic structure, the curing process is what sets them apart from one another. LSR is a two-component material. Component A is the catalyst solution, and component B is methyl hydrogen siloxane. Component B acts as a cross-linker and inhibitor during the vulcanization process. Both materials arrive separately at the SIMTEC facility, but we mix them during the LSR process using [cold runner equipment](#) to prevent the chemical reaction from occurring before the LSR enters the mold.

Cross-linking during vulcanization is when elastomer chains chemically cross-link. It releases energy to form an exothermic reaction. A 3D matrix develops because a catalyst bonds the long chains of the elastomer together. The intricate network of the silicone rubber improves the material's mechanical properties.

## Vulcanization Cross-Linking Benefits for Medical Grade Silicone Injections

Cross-linking of components A and B creates a stronger LSR that has durability unlike any other material in the healthcare industry. Vulcanized rubber can withstand more damage and stress from various environmental factors compared to non-vulcanized materials.

The advantages of using vulcanized rubber can surpass your expectations, and the only disadvantage of vulcanized rubber is that if burned or melted, the material becomes toxic and cools quickly, which can create a hazard when people are handling it.

## How Vulcanized Rubber Impacts the Medical Market

The vulcanization process for silicone rubber medical devices creates resilient and thermally stable rubber for any project. It's a procedure that develops superior performance products that can last a lifetime regardless of exterior conditions. When our experts mix the silicone catalyst with the methyl chloride, the curing reaction takes place. We release the heat as soon as the chemical bonds form which boosts the temperature of the system. The viscosity of the material decreases as the temperature of the resin increases, which also releases air bubbles and permits better flow.

Even though the heat during the vulcanization process increases — up surging the temperature — the viscosity of the material rises. When the LSR reaches its gel point, the resin stops. This means we reached the viscosity and temperature limit. As curing proceeds, cross-linking stops since the viscosity increases, and the diffusion rate declines.

When it comes to medical-grade devices, tools, and instruments, rely on SIMTEC's detailed vulcanization process to receive superior products. If you want a more in-depth view of SIMTEC's LSR vulcanization process, [see how it's done here](#).

# How Medical LSR Can Benefit Your Company

## What to Expect With Medical Grade Liquid Silicone

Professionals in the medical field are always searching for the ultimate list of benefits for their company when designing medical grade silicone. Anywhere from reduced costs and extended product life to improved quality and the expectations of meeting stringent standards. Throughout time, it's proven to be a challenge to find the perfect material that can outperform current medical rubber on every level — until LSR came about.

Finding the right solution for your business requires diligent research to determine the best material selection and manufacturing process. You should consider factors like biocompatibility, regulations, and qualifications when forming silicone medical devices. Liquid silicone rubber gives you the freedom to select which durometer and other properties are the most appropriate characteristics for your application. The curing process with LSR turns it from a liquid to solid, and it remains that way, unlike other rubbers.

A photograph of a factory floor with a yellow text box overlaid. The text box contains the following text:

**YOU SHOULD CONSIDER FACTORS LIKE  
BIOCOMPATIBILITY, REGULATIONS, AND  
QUALIFICATIONS WHEN FORMING SILICONE  
MEDICAL DEVICES.**

## The Importance of LSR in the Medical Industry

The medical industry — whether a trauma-care setting or a regular doctor's office — makes stringent demands on medical grade silicone molding products because if the devices and tools don't perform as expected, serious consequences can result. SIMTEC Silicone Parts understands that these extraordinary regulations in the medical industry can help prevent problems, which is where liquid silicone rubber comes into play. Medical regulations exist because almost all materials will be in contact with human skin and living tissue, whether it's internal or external.



LSR CAN WITHSTAND TEMPERATURES THAT  
OTHER MATERIALS CANNOT, SO IT CAN BE  
STERILIZED TO COMPLY WITH HEALTH REGULATIONS.

It's vital that neither the tissue nor the material affects one another, and it's been challenging to find a solution until LSR was introduced. Sterilization is another significant factor within the medical realm as well. It doesn't matter if you need a tool for one-time use or long-term. The sterilization process usually involves exposure to high heat. LSR can withstand temperatures that other materials cannot, so it can be sterilized to comply with health regulations across the board. Liquid silicone rubber can also survive chemicals and disinfectants.

SIMTEC LSR solutions will surpass your expectations and medical regulations for any instrument you require. It's vital to choose a material for your medical device that is compatible with the function of your equipment. Our solutions support specialty medical uses such as:

- Cardiology
- General, plastic, and bariatric
- Neurosurgery
- Oncology
- Ophthalmology
- Orthopedics

## The Incredible Performance Characteristics of LSR

Your considerations involve making sure the material you choose is compatible with the functionality of your equipment. Liquid silicone rubber is a biocompatible material that reduces costs and is up to par with medical regulations. Several advantages of implementing LSR include its ability to withstand high heat and pressure as well as chemical exposure. Other features include:

- Compression set
- Fluid resistant
- Hardness
- Tensile strength

## Various Exposure Categories Liquid Silicone Rubber Can Withstand

Unlike other rubber products such as latex, LSR is compatible with human tissue, whether it be for a short or extended period. Three types of exposure categories exist where the rubber solution can make a significant impact on the medical field.

- **Limited:** Limited exposure is when an LSR product has brief contact with the body, coming in contact with skin, breached surfaces, or mucosal membranes for 24 hours or less.
- **Prolonged:** Also known as healthcare grade, prolonged exposure has surface or implant contact between 24 hours and 30 days. LSR has been tested based on genotoxicity, hemolysis, toxicity, and histopathology.
- **Permanent:** Permanent exposure means the liquid silicone rubber is a long-term implantable for prolonged use. It has gone through physiochemical and biological testing like chronic toxicity and carcinogenicity.

## The Benefits of Our Solutions for Your Company

As mentioned before, SIMTEC knows every business searches for the best cost-saving solution to produce long-term products. When we engage our overmolding process, we can formulate high-volume productions for a streamlined process. With the reduction in costs, you can allocate saved money to other operations.

Liquid silicone rubber options are a great way to design branding techniques on your products. You can insert your company name, logo, or colors onto your solutions that have tight tolerances and closed parts. It's a way to enhance your image by placing your stamp on medical grade products anywhere from syringes and tubes to pull-rings and caps.



We also give you a competitive edge. It's imperative to keep up with the innovative nature of the medical field as it's always evolving with advanced technologies and higher expectations. When you rely on a material that can keep up with modern advancements like LSR from SIMTEC, you will see how our top degree of repeatability ensures consistent, precise, and accurate devices. You will have access to different blends of LSR characteristics and durometers to help you receive the best combination of materials and features for your specific requirements and applications.

Another way LSR can advance your company is that LSR can reduce production time which leads to less expensive material and assembly costs. Overmolding with a closed system is ideal for items that need handles. Instead of creating a new product, our LSR process eliminates certain steps like priming.



**LSR CAN REDUCE PRODUCTION TIME  
WHICH LEADS TO LESS EXPENSIVE MATERIAL  
AND ASSEMBLY COSTS.**

With our solutions, you add rubber only where it's needed to serve a functional purpose, so you aren't wasting time and materials on unnecessary processing. It's more economical, and we can even develop a prototype to make sure it's up to par with your standards before you commit to a high-volume order.

# LSR Products, Devices, and Instruments Used in the Medical Industry

## LSR Products in the Medical Industry

Like most industries that use LSR solutions, the medical industry has endless design options when it comes to manufacturing appropriate products for various functions. Anything you need that requires biocompatibility, thermal stability, and flexibility along with dozens of other benefits can be crafted using SIMTEC Silicone Parts' rubber solutions. We can manufacture items such as syringe stoppers, caps, catheters, liquid feeding bottles, rings, gaskets, and dialysis filters.

For more details, [see how we support the healthcare market with different products.](#)

## Flow Control Valves

Flow control valves made from liquid silicone rubber offer high precision and uniform components. LSR provides the ideal flexibility for silicone valves because the material can yield under pressure but closes when released. We manufacture control valves and slit them in-mold for a seamless contact seal.

## Syringe Stoppers

If you are in the market for syringe stoppers, SIMTEC's solutions ensure optimal sealing pressure plus friction. LSR has strength and low compression set, and our technology assures repeatable, consistent, and high-quality parts. There is no variability, and our overmolding methods can add exceptional value to syringe stoppers.

## Multi-Component Metal and Plastic

Liquid silicone rubber is also ideal for multi-component metal and plastic devices. Benefits include heightened part quality and consistency along with the elimination of complicated assemblies. It reduces costs and assembly time, and overmolding tool handles increases grip for added comfort and accuracy. You can sterilize the multi-component parts without damaging the surface.

## Connectors, Caps, and Device Components

Connectors, caps, and device components are other tools we can develop as we can mold connectors and silicone valve caps into any shape with various grades of strength and elasticity. We chemically or mechanically bond LSR to other plastics or metals. The LSR injection molding process is suitable for device components, such as medical grade silicone tubing connectors. Benefits include high purity, flexibility, inertness, and transparency. SIMTEC constructs diaphragms that provide dimensional stability, high transparency, and purity.



THE LSR INJECTION MOLDING PROCESS  
IS SUITABLE FOR DEVICE COMPONENTS, SUCH AS  
MEDICAL GRADE SILICONE TUBING CONNECTORS.

## Infusion Pumps, Dialysis Filters, and Pull Rings

If your company produces infusion pumps and dialysis filters, you need components like silicone rubber seals, connectors, gaskets, and impellers, and LSR is the ideal material. It is versatile and will sustain its physical and mechanical features when exposed to different environments and substances. The instruments we create are suitable for medical devices that come in contact with blood, chemicals, and bodily fluids. With the high compression set and hypoallergenic properties of LSR, pull rings will have high purity levels and mechanical properties that will allow the tool to yield under applied pressure.

## Sterilized Products

When it comes to sterilization, materials like thermoplastic rubber or other rubber seals will fail and age when exposed to extreme temperatures and chemicals. However, liquid silicone rubber has long-lasting, non-aging mechanical properties with minimal variances through extreme temperatures and situations. You can treat any LSR product with ethylene oxide, steam-autoclave, electron beam radiation, and gamma radiation with no damage done to the silicone rubber.

## Vibration Dampers

SIMTEC can develop precision equipment like vibration dampers, too. If you're using high electronic or mechanical equipment like surgical cutting tools, strategically placing a vibration damper on a device can reduce vibration for more accuracy during surgery or other skilled practices.

## Seals, Gaskets, and O-Rings

LSR is the perfect material to craft gaskets, seals, and silicone rubber O-rings because of its high purity and chemical inertness. Our rubber solution can maintain low mechanical aging, compression set, and stress relaxation. LSR outperforms other rubbers when it comes to electronic equipment valves, seals, and casing.

## Drug-Eluting Devices

Drug-eluting devices are another popular end product of LSR. For example, the rubber can hold hormones as used in the NuvaRing, or introduce anti-inflammatory meds directly into heart tissue when used in a pacemaker heart catheter lead. LSR won't leak or break after prolonged use or exposure to various elements.



LSR WON'T LEAK OR BREAK AFTER PROLONGED  
USE OR EXPOSURE TO VARIOUS ELEMENTS.

Other medical solutions we produce include:

- Disposable medical pieces
- Drug delivering systems
- Electrical connectors
- Endoscopic devices
- Gynecological and urological devices
- Hydrocephalic shunts
- Infant care products
- Masks
- Medical implants
- Needle-free valve sights
- Replacement finger joints
- Respiratory components
- Sealing membranes
- Seals
- Wound drain bulbs

# Advantages of Implementing LSR Components

## Partnering With SIMTEC

Relying on the right material to save lives is imperative, whether your device is in contact with a human body for 30 seconds or 30 years. The [benefits of implementing medical grade rubber](#) into the field provide boundless opportunities for long-term effects as well as keeping up with safety and health regulations. The pros of liquid silicone rubber range from being UV safe, which means it doesn't yellow or break down, to being soft, which makes it comfortable for patients.

At SIMTEC, our advanced technology can manufacture countless skin contact devices. LSR is inorganic, hypoallergenic, naturally stable, and biocompatible along with many other characteristics that are ideal for the healthcare sector. The rubber is perfect for devices that interact with skin and won't cause irritations or respond to tissues. For example, respiratory masks made of LSR won't cause distress on a patient's skin and will feel comfortable.

For your business, you will want to choose the best material for your medical devices, and select a manufacturer with the modern technology and experience of SIMTEC Silicone Parts. Our resolutions can solve challenging technical issues, and we ensure consistent production of precision parts. The core attributes we deliver to every project include quality, speed, scalability, and cost-effectiveness. SIMTEC uses a [high-quality control process that meets the standards of ISO 9001:2015, ISO 13485:2016/NS-EN ISO 123485:2016 and ISO/TS 16949:2009](#) certifications.

We implement a rigorous quality control method where we verify part excellence via an in-process inspection. Our experts monitor pieces for defects, inconsistencies, and damage. We can even trace each product back to the exact date and time of production, including what process we implemented and the materials used. Especially when it comes to medical devices, we put them through stringent testing and evaluation of properties such as part quality and purity.

We have one of the lowest defect rates in the industry as well as Class VIII (100,000) and Class VII (10,000) clean room conditions. Our sterile facility prevents contamination from airborne particles and dust. Operations after the curing process eliminate gases and reduce the number of volatile substances. Our trained technicians and professionals customize the production of injection molded LSR medical parts to suit your needs.



WE HAVE ONE OF THE  
**LOWEST DEFECT RATES**  
IN THE COUNTRY.

## Advantages and Specifications of LSR for Medical Devices

Compared to other rubber solutions, LSR provides more clarity, purity, chemical resistance, and value. It will last a lifetime no matter the environment in which it's placed. With its process flexibility of creating surgical silicone and the combination of performance and biocompatibility, LSR becomes the perfect go-to material for when you require high-precision products that are reliable and have a smooth surface. Several advantages of LSR medical products include:

- Bacterial resistant
- Chemically inert
- Compression, fatigue, and tear resistant
- Easy to clean
- Gas permeable
- Incredible color stability
- Limited scrap during the process
- Low toxicity and viscosity
- Stainless

## A More In-Depth Look at the Pros of Liquid Silicone Rubber

The many qualities of liquid silicone rubber will surpass all expectations as well as medical regulations. The advantages of using silicone rubber for your product solutions overshadow all other options.

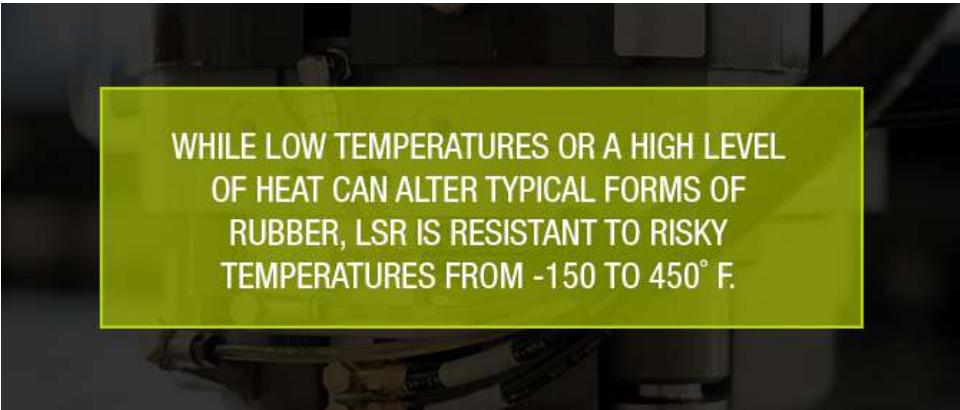
### Biocompatibility

One of the most significant advantages of liquid silicone rubber in the healthcare industry is that it's biocompatible. Biocompatibility means LSR is not harmful to living tissue. The skin-safe silicone rubber meets USP Class VI tests, ISO 10993-1, and RoHS standards. As an odorless, tasteless, and inorganic material, our LSR solutions don't release harmful chemicals within an organic environment.

LSR has undergone extensive forms of testing to ensure it's compatible with human fluids and skin. When you compare LSR to other elastomers, our solutions are resistant to bacteria growth and won't corrode over time, which is vital for medical use, especially implants.

## Thermal Stability

SIMTEC's LSR also has superior thermal stability compared to all other competitor products. It can retain its flexibility, resiliency, and aptitude of transmitting mechanical forces within a range of extreme temperatures. While low temperatures or a high level of heat can alter typical forms of rubber, LSR is resistant to risky temperatures from -150 to 450 degrees Fahrenheit. Because silicone rubber cures when heated, high temperatures don't alter its performance. And when it comes to freezing conditions, LSR doesn't become brittle.



WHILE LOW TEMPERATURES OR A HIGH LEVEL  
OF HEAT CAN ALTER TYPICAL FORMS OF  
RUBBER, LSR IS RESISTANT TO RISKY  
TEMPERATURES FROM -150 TO 450° F.

## Flexibility Features Remain Intact in Cold Conditions

LSR remains elastic at low temperatures, and its properties remain the same at cold temperatures, such as when using liquid nitrogen like for wart removals and other procedures. The rubber won't become brittle and break. Its high flexibility features differ with each type of LSR, as some have an elongation breaking point of 1,000 percent. Its ability to resist heat and tolerate below-freezing conditions means it's up for any operation in the medical field.

## Smooth and Comfortable Surface

The mixture of silicone and methyl chloride, along with the cross-linking methods, formulates a smooth end product of liquid silicone rubber. The LSR injection molding process produces dry and non-tacky surfaces that make for a comfortable material. SIMTEC can achieve different textures depending on the application, but for the most part, medical tools are smooth to the touch which is ideal for items coming in contact with sensitive skin areas.

## Electrical Insulating Properties

LSR also holds ideal insulating properties. As an electrical insulator, silicone rubber can maintain its top-quality features despite environmental stresses such as moisture, UV and ozone factors, and extreme temperatures. The medical grade compliant rubber is free of impurities and doesn't discolor from UV light. UV light can cause other rubbers to turn yellow and break down.

## Elongation Characteristics

Elongation is another benefit because LSR can flow into long sections to create complex shapes that have aggressive undercuts. It produces a small level of draft, and it can adhere to plastics without priming as opposed to other rubbers.

## Hydrophobic Elements of LSR

SIMTEC Silicone Parts manufactures hydrophobic solutions, meaning LSR repels water, resulting in exceptional sealing properties. By creating sealed components, your business can trust that our LSR product won't leak if you use devices such as syringe stoppers.

## LSR Can Endure Sterilization

The silicone rubber we produce even withstands sterilization whether you use E-beam, ETO, autoclave, or gamma radiation processes. Cleaning your tools means they are reusable. Sterilization is essential in the medical field, and LSR is up to par by withstanding harsh chemicals. Without clean devices ready at hand, medical personnel will suffer and have to buy new products, which becomes expensive and non-sustainable continuously.

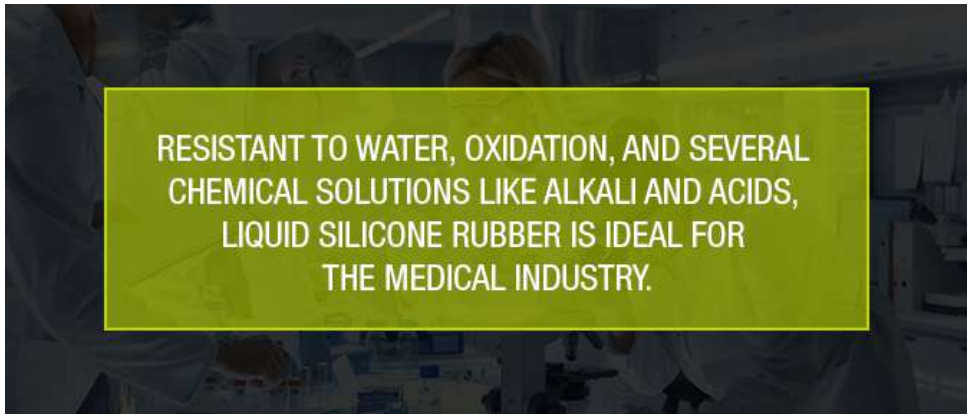


## Cosmetic Benefits

Cosmetic reasons is another variable where liquid silicone rubber excels. While other rubber degrades over time and even turns yellow, LSR retains every property throughout. Although another rubber product may be in top condition, the discoloration will cause doctors and patients to think otherwise. It can be perceived as a faulty or a defected tool. However, you won't come across this with LSR as it's not affected by various environmental factors and lasts long-term.

## Chemical Resistance

Resistant to water, oxidation, and several chemical solutions like alkali and acids, liquid silicone rubber is ideal for the medical industry. Whether the product is for short or long-term use, it will not dissolve or degrade, which protects patients.

A photograph of a surgical team in an operating room, with a central text box overlaid. The text box is yellow and contains the following text:

**RESISTANT TO WATER, OXIDATION, AND SEVERAL  
CHEMICAL SOLUTIONS LIKE ALKALI AND ACIDS,  
LIQUID SILICONE RUBBER IS IDEAL FOR  
THE MEDICAL INDUSTRY.**

## Durability

Because LSR can uphold its properties throughout extreme situations like temperature, they are fire retardant and will not melt. This is an advantage during the sterilization process along with other environments that would otherwise destroy other rubber forms.

## The Elimination of Excessive Assembly Parts

SIMTEC's 2-Shot innovative technology manufactures and combines two or more parts at a time, which saves you money and results in quick turnaround times to the market. Instead of paying for several assemblies, invest in multi-shot and eliminate the need for additional parts because the injection mold completes everything at once.



**SIMTEC'S 2-SHOT INNOVATIVE TECHNOLOGY  
MANUFACTURES AND COMBINES TWO OR MORE  
PARTS AT A TIME, WHICH SAVES YOU MONEY.**

Our technology integrates various materials into one mold as opposed to using different substances for a variety of components. It's a complicated yet streamlined process that's a cost-effective solution for the healthcare sector.

## Additional Benefits of LSR

Other advantageous factors presented by LSR include:

- Clarity
- Available color matching
- Compression resistant
- Dielectric strength
- Extended product life
- Gas permeability
- Low toxicity
- Low viscosity
- Non-allergenic
- Resilient to tears and stress
- Scratch-resistant
- Superior light transmittance
- Tight tolerances

## How You Can Use LSR Products to Advance Your Company

Your business within the healthcare sector has the opportunity to mold liquid silicone rubber into an unlimited number of shapes. No matter if you require tiny pieces for precise tools or you need larger forms to create soft-rubber overmoldings, SIMTEC Silicone Parts can manufacture LSR parts according to your needs and expectations. By implementing the 2K overmolding process, we can form several pieces in one mold, reducing material and assembly costs.

With the excellent transparency features of LSR, doctors, nurses, and other healthcare professionals can see through different tools for superior precision. The transparent material is perfect for applications like lenses, light covers, and light pipes. Liquid silicone rubber is second to glass in light transmission.

Silicone rubber solutions from SIMTEC are available in different durometers, and our experts can match it to the exact function of the part you request. We can create products that are a bit tacky to keep things from sliding off or items that are smooth for inserting into a patient.

## Choosing SIMTEC as Your Partner

Now that you understand the various properties of LSR, how it can benefit your company, and the different devices it can develop, you must also consider the right partner for the job. SIMTEC Silicone Parts will help you develop solutions for your business for a competitive advantage. We offer economic conditions on a global scale, and our sole focus is on perfecting our LSR and LSR 2-Shot solutions.

Our manufacturing process reduces waste, which decreases the amount you have to spend. We also leverage the material's characteristics specific to each project. Our technicians use the unique properties of LSR to manufacture perfect solutions. SIMTEC also delivers consistent and high-precision parts with tight tolerances. We spend our time, energy and resources to applying modern techniques and technology to our entire LSR business.

# SIMTEC Silicone Parts Offers Customized LSR and LSR 2-Shot Components for the Medical Industry

SIMTEC Silicone Parts is an industry leader when it comes to silicone parts. We use an advanced vulcanization technique to enhance our liquid silicone rubber components, which offer more advantages than conventional rubber parts. We also provide you LSR 2-Shot processes, which can help you design and create many different medical device elements. Our 2-Shot components decrease assembly and material costs as well as make for a streamlined process.

The medical industry is ever-evolving, and so is LSR at SIMTEC. We understand the strict regulations and sanitary aspects you must follow to ensure a device is safe for internal or external contact with living material, so we create pieces that adhere to everything you need. Our cost-effective solutions give you a competitive advantage.

## Customized Solutions Boost Your Business

Your options to design and manufacture various life science products, devices, and instruments are endless.

We're a global expert in LSR and LSR 2-Shot injection molding processes and are here to help you create superior medical products. At SIMTEC, we collaborate with you to cultivate the best outcomes for your company. Our experts specialize in producing high-volume orders that we can deliver on because we've built an efficient mold and workflow process to fit your precise specifications.

We can produce an array of items for different devices that will last long-term and provide advantages to doctors, nurses, and patients alike. Ranging from biocompatible, low compression, hypoallergenic, and thermally stable properties, the possibilities LSR offers are medically ground-breaking. Reach out to us today, so we can tell you more about [how we can help you](#) focus on bringing your medical devices to market.

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