UPDATE.27

GERRESHEIMER

Customer Newsletter
February 2019

Drug Delivery & Packaging
Pharmapack

February 6–7, 2019 | Paris, France
Booth B62 (Gerresheimer)
Booth A94 (Sensile Medical)

SenseCore micro pump
Smart platform for precise drug delivery

Irradiated dropper bottles
Expanded service

Gx InnoSafe®
Safe and easy syringe handling

Gx RTF® ClearJect®
COP syringes for sensitive medications

Duma® Standard CR
New bottle with child-resistant Duma® Handy Cap

Gx® RTF glass vials
Standardized platform for sterile vials

Gx® Elite glass vials
Perfect type I injection vials

Solutions for digital and electronic drug delivery products with micro rotary piston pumps

On February 6 and 7, Gerresheimer will be showcasing its products at the Pharmapack in Paris with its new subsidiary Sensile Medical AG for the first time. In July of last year, Gerresheimer acquired Sensile Medical, expanding its business model to become an original equipment manufacturer (OEM) for drug delivery platforms with digital and electronic capabilities. The company works closely with pharmaceutical and biotech companies to develop devices to deliver liquid drugs.

Sensile Medical specializes in the development of key technologies for the patient-oriented delivery of liquid drugs. Its leading position in micro pump technology combined with drug delivery devices featuring electronic and connected capabilities for medical applications is progressing to market readiness in specific customer projects with pharma companies. The company is involved with pharma companies in the early stages of drug and therapy development. Sensile Medical is to become the Development Division, covering the field of development devices for the entire Gerresheimer Group. It is already working very successfully on projects with customers to develop devices for diabetics and in other treatment areas such as Parkinson's disease.

> "Sensile Medical AG has developed a new kind of patented micro pump, which is the key component of all product platforms. SenseCore is small and very precise in dosage. Consisting of only two plastic parts, it can be produced at a low cost. Thanks to its high degree of flexibility, it is compatible with a variety of drugs."
>
> **Sandra de Haan**
> *Chief Business Officer*
> *Sensile Medical*

Wearable micro pump certified to EU standards for Parkinson's treatment

A wearable micro pump of this type designed specifically for the treatment of Parkinson's received the EU certificate only recently. A European pharmaceutical company has obtained the CE declaration and will now launch the product on the market. This makes it the first micro pump by Gerresheimer's subsidiary Sensile Medical to be used commercially. The micro pump is used in advanced Parkinson's treatment.

From left to right:
Small-volume infusion pump, large-volume patch pump, reconstitution system, and pen.

Patch Pump Therapy

The correlations between viscosity, needle diameter, flow rate and dose accuracy

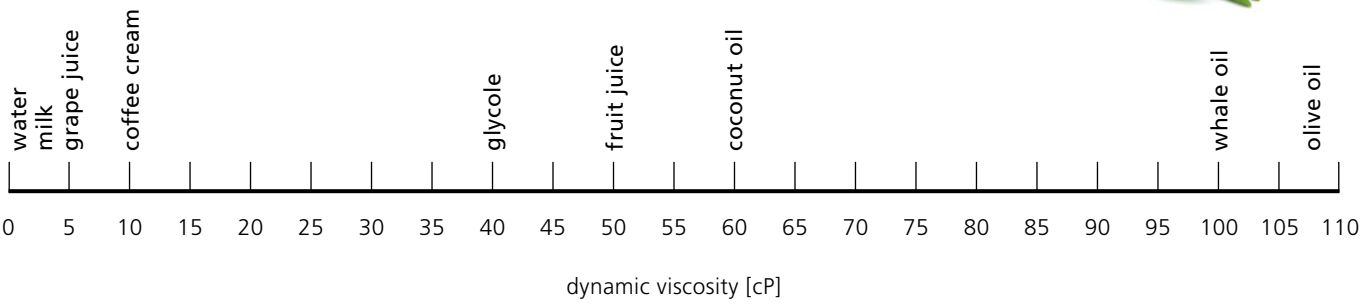
Patch pump therapy is a convenient way of drug administration. The devices can be worn directly on the body, no tubing has to be attached and the cannula or needle is inserted automatically. They are often equipped with programmable delivery patterns, which allow high flexibility and rational adjustment to the patient's needs.

Michael Girschweiler, Technology Manager at Sensile Medical, explains what is important to the patients when using the patch pump therapy and how the requirements for functionality and dose accuracy can be fulfilled.

In turn, the patch pumps must fulfill highest criteria in dosage accuracy and safety. The fluidic path through the whole device including body resistance at the injection site, combined with the physical properties of the drug define the pressure loss that the pump needs to overcome. Since smaller needles are more comfortable and therefore preferred, they often represent the bottleneck of the system. The dependencies thereof are depicted hereafter.

Viscosity range of suitable medication

Many common drugs for patch pump therapy are aqueous solutions in the range of 1 cP to 30 cP. Fluids with higher agent concentration or larger molecules might reach up to 50 cP or even higher. This often requires large needle diameters or significantly lower flowrates. As reference, the viscosities of some common fluids are displayed below.



Needle limitations

To limit pain at needle insertion, small needle diameters are a preferred option. Typical needle diameters for patch pump therapy range from 27G up to 31G. While thinner needles are desired, the pressure loss over the needle increases with smaller inner diameter, higher viscosity and flow rate. Depending on the available maximum pressure of the patch pump and the drug viscosity, a 31G needle might be preferred and suitable for low flowrates but may not be suitable for high viscosities. Penetration depth and insertion angle define the needle length, which linearly scales up the pressure loss. A common range for subcutaneous injection is 8 mm to 13 mm.

Limitations of flowrate

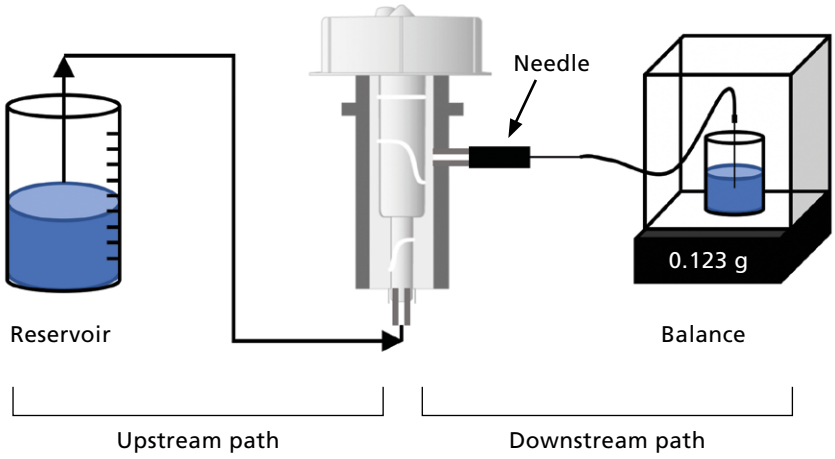
If for certain therapies, pharmaceutical companies desire shorter dose delivery durations and therefore higher flowrates, this can result in pressure variations and therefore in possible dosage deviations. Choosing adequate pump size, internal tubing and needle is key for high dosage accuracy. The chosen needle usually defines the maximum flow rate. In this study, maximum flow rate is assumed to be in continuous delivery mode (worst case).

Lower flow rates can always be achieved by delivery patterns with certain pauses or slower motor rotation. The selected pump size defines the minimum partial dosage increment that can be delivered and results in a possible limitation of the maximum flow rate.

Influence of total fluidic resistance on Delivery Volume Accuracy (DVA)

Each fluidic part in the up- and downstream fluidic path (bends, tubes, transitions, etc.) adds to the total fluidic resistance of the system, resulting in higher pressure loss and potentially lower DVA. Flexibility in the fluidic connection between pump and needle allows the dampening down of pressure peaks and acts as fluidic buffer, enhancing the pump's functional zone. However, in most applications, the flow situation inside the needle primarily dominates the pressure loss of the complete fluidic system.

Sensile Micropump



Figures on the right:
Correlation of needle diameter and viscosity at different flow rates

In the following figures (1), calculated pressure losses for several needle diameters and a range of viscosities are correlated to measured delivery accuracy of two Sensile micro pumps (2 µl and 10 µl volumetric pumps). The green and yellow areas represent the pumps' pressure capability at ±5% and ±10% DVA in continuous delivery mode for tested viscosities.

The maximum feasible operation points at ±5% DVA (intersection points of needle pressure loss curves and green area boarder) are extracted and plotted in the figures below. These graphs (figure 2) can be used to predict needle limitations for flowrate and viscosity combinations.

For example, for a 31G needle, a liquid with 10 cP would flow well up to 0.5 ml/min but could not be delivered at higher flow rates with a DVA of ±5%. For scenarios resulting in operation points above the green area, a reduction of flow rate is the best option.

For this study, all assumptions were chosen conservatively so that sufficient performance is probably reached even when choosing points somewhat over the presented limitations. The results were verified at different flowrates, viscosities and needle combinations.

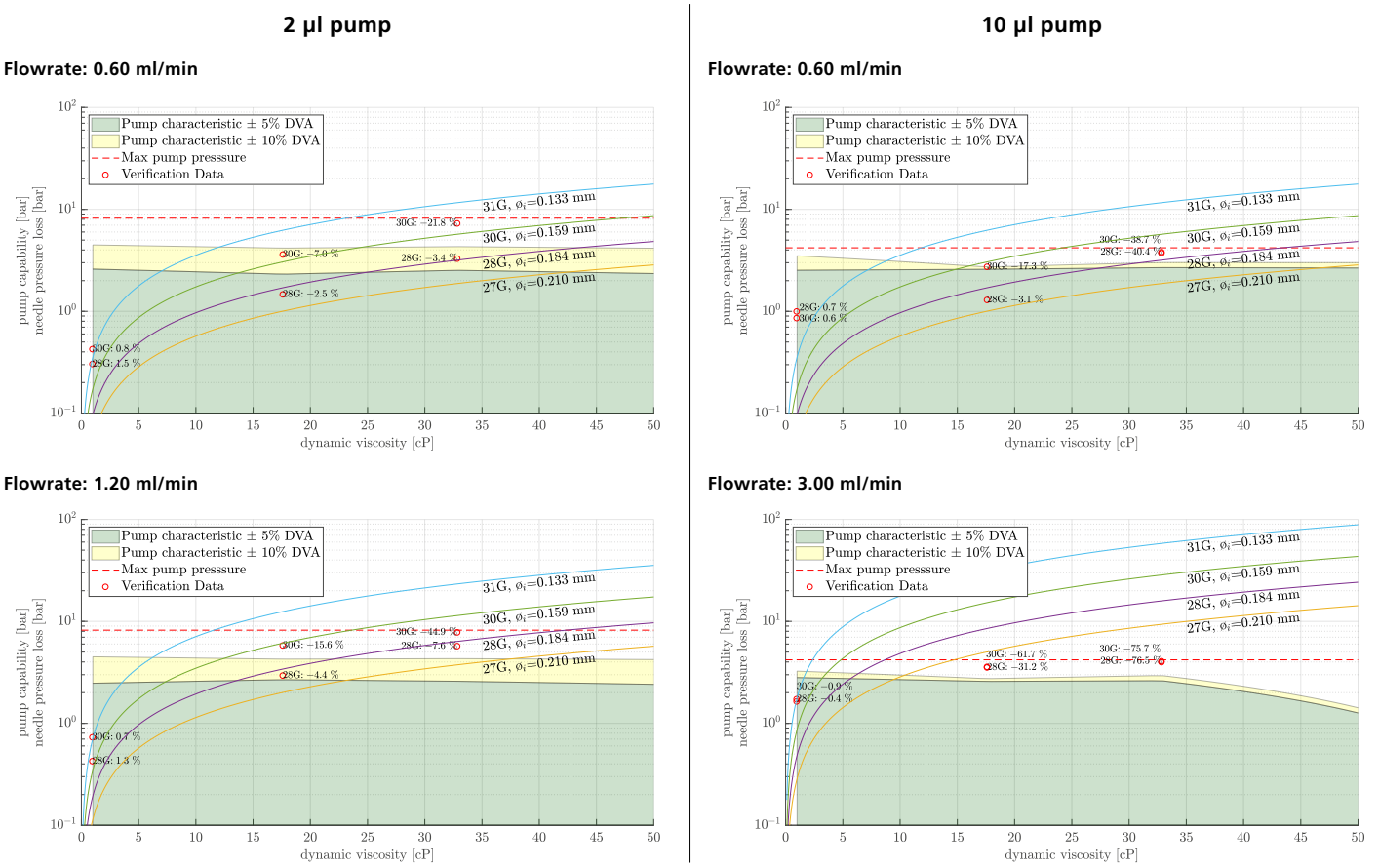


FIGURE 1: Pump characteristic for a 2 µl pump (left) and a 10 µl pump (right) at different flowrates (pump rotational speeds). The lines indicate the calculated pressure loss for different needle diameters with needle length 12.7 mm (calculated length 22 mm). Density assumed 0.997 g/cm³. To achieve a desired accuracy (DVA) of ±5%, the needle pressure loss needs to be in the green area.

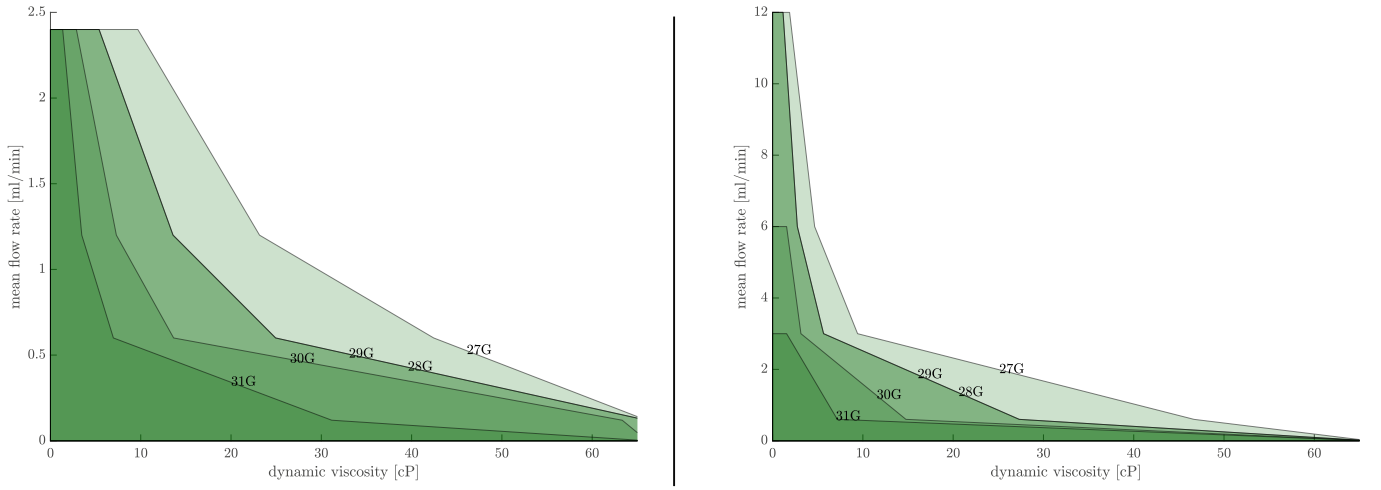


FIGURE 2: Flow rate vs dynamic viscosity for Sensile 2 µl pump (left) and a 10 µl pump (right). The green areas´ shadings represent ±5% DVA functional zone for several needle diameters (needle length 12.7 mm, fluid density 0.997 g/cm³).

Conclusion

The correlation between flow rate, viscosity and needle diameter delivers a horizontal and vertical asymptotic pattern. Delivering viscosities greater than 50 cP can still be managed with large needle diameters and very low flow rates to meet dosage accuracy targets. On the other end of the scale, flow rate is limited by the fluid's viscosity and the mechanical limitations of the pump. Here, the larger 10 µl pump's limit is at 12 ml/min where viscosities up to 2 cP can be delivered with a 27G needle. The performance scales linearly with the needle length.

Gx RTF® ClearJect®: Start of series production of the high-quality plastic syringe

Gerresheimer is showcasing its new Gx RTF® ClearJect® syringes produced in Germany at the Pharmapack trade fair in Paris.The products of the high performance plastic COP (Cyclo Olefin Polymer) are used where especially sophisticated medications need to be packaged. The new Gx® RTF ClearJect® syringe 1 ml long with cannula is the first plastic syringe developed and produced by Gerresheimer itself.

Gerresheimer brought together its comprehensive competence in glass production at the Bünde location and the expertise of its plastic specialist in the Technical Competence Center (TCC) Wackersdorf for the development and industrialization of the new syringe. The production facility was thus planned and built by the automation team of the Technical Competence Center; the know-how for the quality control and quality guidelines for primary packaging originates from the inspection specialists of the glass location Bünde, and was adapted jointly to the specific requirements of plastic production. Production takes place pursuant to the especially high quality requirements for pharmaceutical primary packaging material corresponding to GMP. The new production facility is conceived in such a way that the entire processing chain from injection molding to finished RTF packaging is covered. A series of cameras were installed at various stations for quality control, with which all relevant geometrical parameters and cosmetic-visual defects are checked for each individual product.

Low interaction potential

Innovative medications mean strict requirements for their primary packaging. Especially biotechnologically manufactured active agents may not interact with the packaging, because this could mean undesirable effects for patients. Gx RTF® ClearJect® syringes offer especially low interaction potential. The material COP has a high pH tolerance, does not emit metal ions into the medication solution, and therefore causes no displacement of the pH value while in storage. The syringe is manufactured as an injection molding part in an hot runner mold. The cannula is also thereby injected at the same time and does not need to be retroactively glued in. Tungsten and glue residue is therefore eliminated with the Gx RTF® ClearJect® syringes. The precise geometry of the injection molding part reduces the dead volume in the syringe, leaving behind less of the expensive medication in the syringe. Also attractive is the increased safety for the end consumer. COP is particularly break-resistant, making it suitable for packaging aggressive or toxic materials.

The new Gx RTF® ClearJect® plastic syringe

Gx RTF® ClearJect® 1 ml long

The new Gerresheimer Gx RTF® ClearJect® COP syringe is available in the long 1 ml size with cannula. The design corresponds to ISO 11040-6. The first version of the syringe is equipped with a 27-gauge, 1/2-inch (12.7 mm), and thin-walled stainless-steel needle with three bevels. The syringes are siliconized with a precisely controlled amount of high-viscosity, and thus low-particle Dow Corning 360 MD (12,500 cSt) silicone oil, offering a comprehensive syringe system that completes the COP syringe body with plunger rods, plunger stoppers, finger flange, and closure systems. An economically efficient complete solution is achieved through the use of commercially available standard components.

Production in the clean room according to GMP Grade C of the pre-fillable plastic syringe with cannula

Pharmapack Paris 2019

Joint talk on February 6, 10 a.m.

„New Meets Old: Challenges and Solutions with Developing a Custom Primary Container“

Portal Instruments, a medical device company, is launching a connected needle-free drug delivery system, for which Portal Instruments and Gerresheimer have jointly developed the system's disposable COP cartridge. Andrew Coats, VP of Engineering Portal Instruments, and Dr. Wenzel Novak, Senior Global Director Business Development Gerresheimer Bünde GmbH, will lead the presentation.

Gx InnoSafe®: Greater protection against needle stick injuries

Gerresheimer to present an integrated and passive safety system for avoiding needle stick injuries at Pharmapack Paris

With their exposed cannulas, used syringes are a source of risk at physicians' surgeries, laboratories, and hospitals the world over. Although existing needle protection systems reduce the risk of injury for the end user, they are more complex for pharma companies to fill and must be handled by medical specialists. With the Gx InnoSafe®, Gerresheimer is now offering a syringe with an integrated passive safety system that avoids inadvertent needle stick injuries, prevents repeated use, and is designed with pharmaceutical companies' production processes in mind as well as being optimized for simple and intuitive use by medical specialists.

> "For health care workers, handling used hypodermic needles is part of their day-to-day job. In some cases, this leads to serious diseases being transmitted. It is estimated that around one million needle stick injuries occur in Europe every year. In the worst case, it can lead to serious infections. There is also the risk of used syringes being used for a second time by accident."
>
> **Maximilian Vogl**
> *Product Manager Injection Devices*
> *Gerresheimer Regensburg*

Syringe positions: 1. Start, 2. Pre-injection, 3. Injection, 4. Disposal

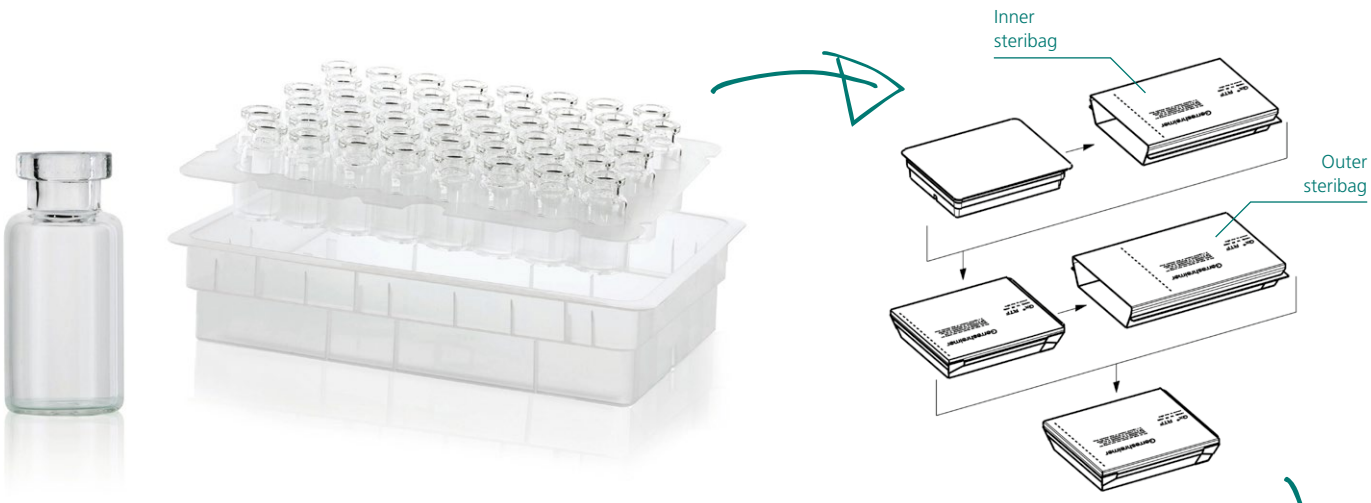
Gx InnoSafe® reliably protects against inadvertent needlestick injuries and prevents repeated use. Unlike many existing solutions, the needle shield mechanism is activated automatically and does not require any additional manipulation by the end user.

It is therefore known as a passive needle protection system. The processing of the Gx InnoSafe® syringes, which can be carried out without any major changes to existing filling lines in a nested state, is just as beneficial to pharmacists. This eliminates the need for an additional step to assemble the safety system, as is currently standard on the market.

The user wants a safety system that does not change the familiar injection procedure, that is intuitive and ergonomic to handle, and that requires no additional manual activation to secure the cannula before it is disposed of. As part of the manufacturing process, the Gx InnoSafe® safety system is installed on Gx RTF® glass syringes in the clean room like a standard needle shield. The syringe body is completely visible so that the presence of the active ingredient, its purity, and its administration can be observed and monitored ideally. The injection itself is also administered as usual. After removing the ergonomic sealing cap with an integrated, flexible needle shield, the syringe is placed on the injection site, the cannula is inserted into the tissue to be administered, and the active ingredient is injected as with a common syringe. The safety system cannot be activated inadvertently because the mechanism is not preloaded before the injection. The system is only activated when the cannula is inserted and it automatically ensures that the safety mechanism is permanently locked when the syringe is removed from the injection site. This guarantees that the cannula is reliably covered and the syringe cannot be reused.

Gx InnoSafe® provides advantages for pharmaceutical companies in the filling process of ready-to-fill syringes. The safety system is installed during the RTF process entirely automatically and fully checked for any punctures and positioning with a visual inspection. The syringes are then packaged into trays of 100 (nests) and tubs, including the safety system, and are then sealed and sterilized with ethylene oxide gas. They can be processed on existing filling lines without any additional preparation or assembly steps.

The design of the safety mechanism avoids inadvertent activation during filling, packaging, and transport. The flexible needle shield part is available in all standard market elastomers for pharmaceutical applications. With the introduction of the new product line, Gx InnoSafe® is available for the 1.0 ml long Gx RTF® glass syringe with ½" cannula. Further needle variants will follow.



Gx® RTF Vials: Standardized platform for prefillable, sterile injection vials

Gerresheimer is presenting the new Gx® RTF vials in Paris at Pharmapack. The customer can receive identically packaged sterile injection vials from two different manufacturers as Gerresheimer's RTF vials will be delivered adopting Ompi EZ-fill® packaging process.

Two manufacturers – one packaging

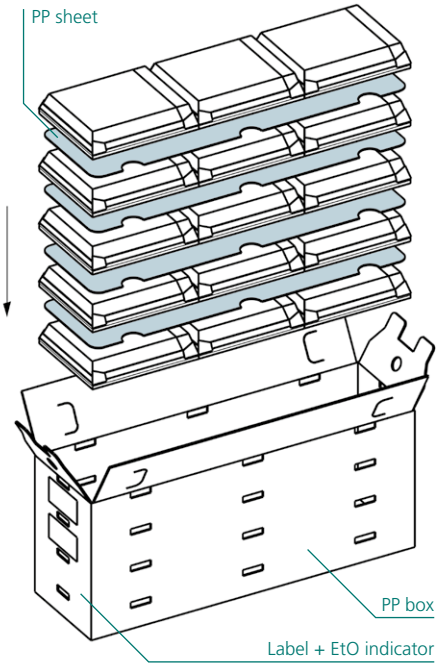
Gerresheimer's two areas of expertise – the glass forming of vials from tubular glass and the ready-to-fill processing of prefillable glass syringes – will also be combined with recognized Ompi EZ-fill® packaging technology for the new Gx® RTF vials. The Gx® RTF vials are washed, packed in trays or in nests and tubs and sterilized before being delivered to pharmaceutical customers. They can then be filled straight away without the need for any further steps in the process.

> "Our new injection vials meet our customers' increasing desire for comprehensive solutions. By setting up a standardized packaging platform for sterile vials, we are making the process much simpler for the customer."
>
> **Andreas Schütte**
> *Member of the Management Board for Plastics & Devices*
> *Gerresheimer AG*

Flexibility through various packaging configurations

The new product currently exists in the 2R, 6R, and 10R (4 – 13.5 ml) formats in nests and tubs as well as in formats ranging from 2R and 6R (4 – to 10 ml) in tray. Further formats will follow. The new packaging solution allows the vials to be used from the development phase of new medications to small or large-scale production.

"We are very happy that Gerresheimer is adopting our leading technology. Our scalable solution gives the customer more flexibility, enhances quality and safety, and reduces time to market", says Mauro Stocchi, General Manager Pharmaceutical Systems Division of the Stevanato Group.



Top quality requirements

The Gx® RTF injection vials are made from borosilicate glass type I. They meet all established requirements of the applicable ISO standards and pharmacopoeias (USP and Ph. Eur.). By using the Ompi EZ-fill® packaging formats, the risk of glass-to-glass contact, which could result in breakages, cosmetic defects, and particle contamination is minimized.

Gx® Elite Vials – Perfect injection vials

The Gx® Elite vials have set new standards for type 1 borosilicate glass vials. They are the result of comprehensive optimization measures in the conversion process, which have focused on designing out the risk to create product flaws during production including the removal of all glass-to-glass- or glass-to-metal-contact beginning with the tubing material all the way through final packaging. The chemical composition of the borosilicate glass still stays the same.

The best in its class

"The Gx® Elite vials are the result of several years of careful product development. Avoiding glass-to-glass contact during the production process has an enormous impact. Our customers are really impressed by the glass quality of these vials."

Hans-Ulrich Pieper
Sales Director Europe
Tubular Glass Converting
Gerresheimer Wertheim

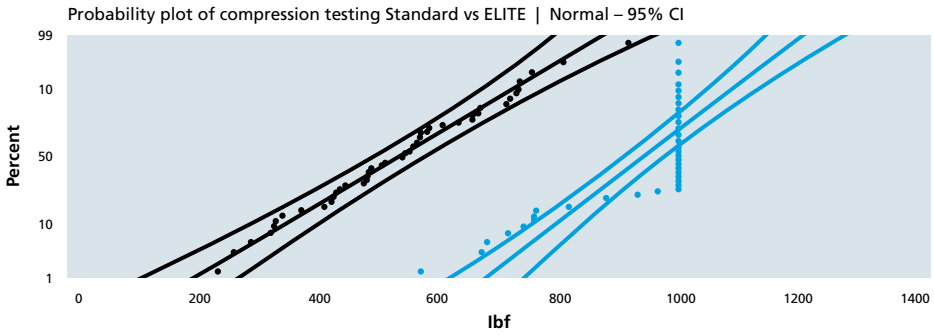
The highly shatter-resistant vials are extremely durable and free of cosmetic defects. They also boast an incredibly robust structure, while their resistance to delamination protects the drug inside. Simple handling and a range of packaging options ensure that Gx® Elite vials can be supplied for end-to-end use on various filling lines. This cuts costs while improving quality, as countless past and ongoing tests by notable customers have shown.

Intelligent defect recognition

All of Gerresheimer's tubular glass plants that produce vials work with standardized monitoring, inspection, and packaging technologies, which essentially comprise the Gx® G3 and Gx® RHOC systems. The inspection systems, for one, are developed in-house and form part of a close-knit testing system that ensures the highest precision and quality assurance in line with the latest standards. Complete with modern HD cameras, the Gx® G3 inspection system makes sure that cosmetic defects are identified reliably, for instance. The intelligent software detects and classifies the defects in a few fractions of a second, while the Gx® RHOC system ensures dimensional quality with HD matrix cameras and a hypercentric ID camera.

Injection vials set the benchmark for primary packaging for parenteral drugs. Gerresheimer's vials come in all sizes and comply with the relevant international standards and pharmacopoeias. The company's range includes solutions for bioengineered drugs and other specialist pharmaceuticals.

Gx® Elite vials are a step up from standard products, performing significantly better in vertical compression and internal pressure tests.

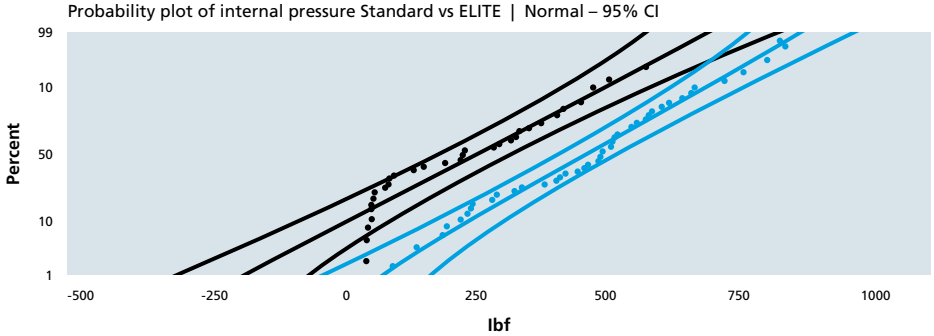


Compression Testing

80% of material greater than 2x the strength of normal glass vials

Sample VL 25 mL
Vertical load Control 25 mL
Vertical load ELITE 25 mL

Mean	StDev	N	AD	P
531.2	147.7	50	0.227	0.805
941.6	113.5	50	10.089	<0.005



Pressure Testing

80% of material has slightly less than 4x the strength of normal glass vials

Sample IP 25 mL
Internal Pressure Control 25 mL
Internal Pressure ELITE 25 mL

Mean	StDev	N	AD	P
253.3	191.3	34	0.897	0.020
463.3	174.3	45	0.442	0.276

Irradiation of plastic dropper bottles: Gerresheimer to expand its services

Gerresheimer will use this year's Pharmapack as a platform to unveil their latest ophthalmology and rhinology services. The company has teamed up with select certified partners to add surface finishing of plastic dropper bottles to their irradiation services.

> "We want to make life easier for our customers when it comes to procuring their dropper bottles and, by treating our products with gamma radiation, we are adding in an important work step before filling. To help us in this, we are relying on selected, recognized, and certified partners. The chosen partner companies have the requisite certification in accordance with ISO standards 11137, 11737, and 13004."
>
> **Niels Düring,** *Global Executive Vice President Plastic Packaging Gerresheimer Vaerloese*

Benefits

The benefits of this service speak for themselves: Gerresheimer is assuming responsibility for handling this work step from start to finish, including transport to the irradiation company, monitoring and inspecting its work, and delivering to the location specified by the customer. The inspection processes also involve physically and chemically testing the product characteristics after irradiation. Gerresheimer regulates the validation and revalidation of the entire process, helping to reduce costs for the customer.

Cleanroom production

Gerresheimer's range of ophthalmology and rhinology products encompasses bottles and dropper inserts made from low-density polyethylene (LDPE) with pump systems to match. Irradiation also ensures the products are germ-free. As a specialist in plastic packaging for the pharmaceutical industry, Gerresheimer offers a wide range of innovative packaging solutions for solid, liquid, and opthalmological products. All of the company's primary packaging for the pharmaceutical industry is produced in ISO class 7 and class 8 cleanrooms at its plants in Vaerloese (Denmark) and Bolesławiec (Poland).

Low germ level thanks to ISO-standard irradiation

The population of viable microorganisms on the surface of a product and/or packaging is called the bioburden. The bioburden is determined in accordance with ISO 11737. Raw materials, components, packaging, and medical products are all investigated in order to gather information about the germ composition and level of germ contamination before treatment. A stable bioburden guarantees a successful irradiation process.

Duma® Standard container: Childproof packaging for drugs is a vital requirement

Gerresheimer will take the wraps off their first snap-on cap with child-resistant (CR) solution at this year's Pharmapack. Conventional child-resistant screw caps are made of two components.

> "Packaging drugs in a childproof manner is imperative. Small children explore their world by touching everything and putting everything in their mouths. This is why we have to stay cautious and alert to keep drugs from finding their way into children's hands."
>
> **Niels Düring,** *Global Executive Vice President Plastic Packaging Gerresheimer Vaerloese*

Packaging like the new Duma® Standard CR container with its child-resistant cap is designed to prevent young children from getting hold of items like medicines that could be harmful to their health. Many products that could pose a threat to young children's health are required to incorporate a safety device under national and international law. ISO standard 8317 (2015) applies in Europe and US 16 CFR section 1700.20 in the U.S.

ISO 8317 (2015)

ISO 8317 (2015) is the international standard for reclosable child-resistant packaging. The standard describes two test procedures, which any packaging to be tested must be subject to. One test is run with a group of up to 200 young children aged between 42 and 51 months. They must not be able to open the packaging, which is filled with a harmless replacement substance. At the same time, a test group of older people aged between 50 and 70 must be able to open and reclose it without imparing the child-resistant function. Packaging will only meet the requirements of ISO 8317 (2015) if the tests demonstrate that they are safe for children and user-friendly for the elderly, as defined in the standard.

Only the 40 ml version of the new Duma® Standard CR container is currently available with the Handy Cap CR. Other sizes can be supplied upon request.

GERRESHEIMER

PEOPLE

New organization at Plastic Packaging Asia

Jari Tevajarvi, Vice President Asia Plastic Packaging is now responsible for all activities of Plastic Packaging in Asia, effective from December 1, 2018.

As of December 1, 2018 **Prakash Dhameja**, has been appointed as General Manager of Triveni Polymers Pvt Ltd.

As of January 1, 2019 **Paul Chen** is Plant Manager of the new Gerresheimer Plastic Packaging plant in Changzhou, China.

Andreas Schütte steps down from Management Board of Gerresheimer AG

Andreas Schütte (56) will step down from the Management Board of Gerresheimer AG at his own request as of February 28, 2019 in order to pursue new career challenges. Andreas Schütte has served on the Management Board of Gerresheimer AG since 2009 with responsibility for the Plastics & Devices and Advanced Technologies Divisions. These responsibilities will be assumed from March 1, 2019 by Dietmar Siemssen, who took up office as CEO of Gerresheimer AG on November 1, 2018.

Dr. Bernd Metzner to become Chief Financial Officer of Gerresheimer AG

Dr. Bernd Metzner (48) is to become Chief Financial Officer of Gerresheimer AG, taking up office at the latest on July 1, 2019. Dr. Bernd Metzner has been Chief Financial Officer of SDAX-listed Ströer SE & Co. KGaA since 2014.

"In Dr. Bernd Metzner, we have gained a highly experienced Chief Financial Officer for Gerresheimer AG. Along with Chief Executive Officer Dietmar Siemssen and Management Board member Dr. Lukas Burkhardt, Gerresheimer is led by a strong team who will extend the Company's growth trajectory on a lasting basis," said Dr. Axel Herberg, Chairman of the Supervisory Board of Gerresheimer AG.

"Pharma and cosmetics are highly promising, attractive markets. Gerresheimer is a strong global partner to both of these industries. I look forward to being able to bring my experience to bear at Gerresheimer going forward," added Dr. Bernd Metzner.

Dr. Bernd Metzner has been Chief Financial Officer (CFO) at Ströer since June 2014. Ströer SE & Co. KGaA is listed in Deutsche Börse's SDAX market segment. After studying business administration in Siegen, completing his doctorate and starting his career at a law firm, Dr. Metzner held various management positions in finance at the Bayer Group between 2002 to 2011. Among other roles, he was responsible for coordinating the carve-out and initial public offering of Lanxess, held the position of CFO at Bayer Italy as well as that of global CFO in Bayer's Pharmaceuticals Division. Before joining Ströer, he served as CFO of the global, family-owned Döhler Group from mid-2011 to mid-2014.

WORTH A READ

www.ondrugdelivery.com

A comprehensive approach to pharma industrialization partnering

No. 89, August 13, 2018, p. 8–13.

Michael Wiglenda, Global Senior Director Technical Competence Center & Moldmaking Germany, explains Gerresheimer's wealth of expertise in industrial-scale production.

Customised solutions for large volume injectors

No. 90, September 10, 2018, p. 36–39.

Paul Senn, PhD, Vice-President of Business Development, Sensile Medical, discusses the products and philosophy of Sensile Medical, a developer of large volume injection devices utilizing a patented micro pump technology.

GERRESHEIMER

EVENT CALENDAR

FEBRUARY 6–7, 2019
Pharmapack
Paris, France
Pt. De Versailles
Booth B62 & A94

MARCH 11–13, 2019
PDA Annual Meeting
San Diego, USA
Mariott Marquis

MARCH 12–14, 2019
CPhI South East Asia
Bangkok, Thailand
QSNCC | Booth H2

MARCH, 18–21, 2019
DCAT Week
New York, USA
Lotte New York Palace

MARCH 19–20, 2019
PDA Europe Parental Packaging
Venice, Italia
Hilton Stucky Molino

APRIL 30 – MAY 02, 2019
CPhI North America
Chicago, USA
Booth 1227

MAY 7–10, 2019
Respiratory Drug Delivery Europe
Lisbon, Portugal
Estoril Congress Center

MAY 14–17, 2019
China Medical Equipment Fair (CMEF)
Shanghai, China
National Exhibition and Convention Center

MAY 21–23, 2019
FCE Pharma
São Paulo, Brazil
São Paulo Expo

JUNE 11–13, 2019
Medical Design & Manufacturing East (MD&M)
New York, USA
Jacob K. Javits Convention Center

JUNE 18–20, 2019
CPhI China
Shanghai, China

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Gx® Elite Glass Vials

Improved strength – minimum 2x – 4x standard Type I glass

- Same glass chemistry as Type I
- Cosmetically flawless
- Dimensionally superior
- Delamination resistant

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