Application note

Automated sample storage in Europe’s largest screening network for chemical biology

EU-OPENSCREEN

Abstract

EU-OPENSCREEN operates a publicly accessible database and utilizes a unique collection of chemical substances. With more than 30 affiliated high-throughput screening platforms and medicinal chemistry research groups at partner sites in nine European countries, EU-OPENSCREEN provides external researchers worldwide with access to leading technologies to explore and develop their own bioactive compounds.

For the highly complex process of automated storage of substances dissolved in dimethyl sulfoxide (DMSO) at –20°C, LVL SAFE® 2D Tubes and racks from LVL technologies, as well as the LVL SAFE® 8-Channel and 96-Channel Capper/Decapper, are used. Thanks to the excellent quality and tightness of the tubes, the reliable readability and error-free nature of the codes, and the exceptional compatibility of the tubes with the capper/decapper and automation systems, a smooth process is ensured. More than 100,000 samples are stored in LVL SAFE® 2D Tubes.

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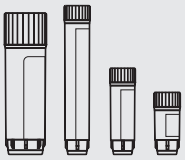
LVL technologies

SYMBIOSIS OF CHEMICAL EXPERTISE AND BIOMEDICINE

Biologically active compounds find widespread application in various fields, including pharmaceuticals, agrochemicals, cosmetics, the food industry, and environmental protection. One of the main methods for discovering new bioactive compounds is high-throughput screening of large libraries of chemical compounds to identify promising chemical probes and lead compounds for the development of new products in these application areas.

EU-OPENSCREEN represents a non-profit European Research Infrastructure Consortium (ERIC) focused on chemical biology and early drug discovery. The overarching mission of EU-OPENSCREEN is to secure a leading position in the biological, chemical, and medical sciences for the European Union and participating countries. The consortium supports scientists by providing an extensive selection of individually curated compounds based on a large number of selection criteria for their scientific studies and experiments. The range includes transferring thousands of compounds at a predetermined concentration for broad screening to a few selected compounds in various concentrations for subsequent development steps. Additionally, large collections of compounds are screened in their own laboratories for biological activity using specialized bio-assays.

SAMPLES AND PROCESSES



Delivery of new substances in pre-provided LVL SAFE® 2D Tubes

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Sample processing in the pipetting robot, automated capping/decapping with LVL SAFE® 96-Channel Capper/Decapper

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Controlled freezing and storage in the fully automated storage system at –20°C

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Requests from European partners for research purposes

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Automated selection and sample dispensing, transfer into MTP for shipment

Sample handling with LVL SAFE® 2D Tubes

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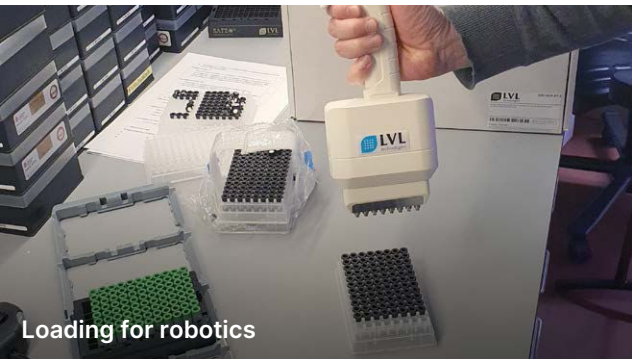
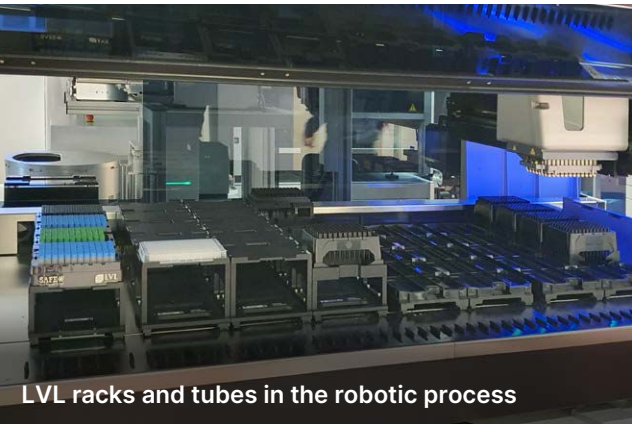
Use in scientific studies and experiments

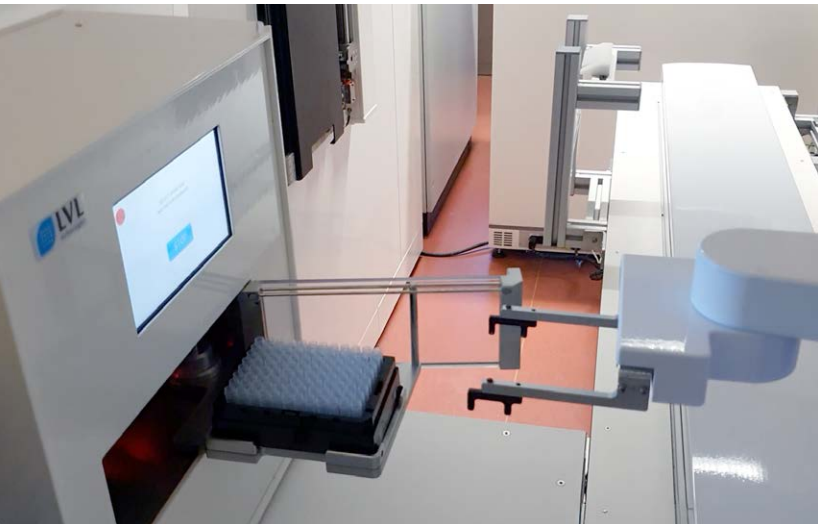
LVL racks



Loading for robotics


LVL racks and tubes in the robotic process

- Procurement of purchased chemical substances from over 50 worldwide commercial suppliers, delivered in provided LVL SAFE® 2D Tubes at the requested concentration in DMSO or as a solid substance.
- Handling of samples in LVL SAFE® 2D Tubes, including assignment of all substance information to the LVL 2D code, handling of tubes in the laboratories of respective suppliers using the LVL SAFE® 8-Channel Capper/Decapper.
- In approximately 10% of cases, delivery of substances from academic laboratories in tubes with larger volumes for easier handling – transfer of substances/solutions from these tubes into LVL SAFE® 2D Tubes in the EU-OPENSCREEN laboratories for further processing and storage according to standard procedures.
- Depending on the delivery condition, preparation for storage in the pipetting robot, reformatting, etc. – automated opening and closing of tubes using the integrated LVL SAFE® 96-Channel Capper/Decapper in the process.
- Transfer of LVL racks with prepared samples in 2D tubes into the automated storage system for storage at –20°C, including a specified freezing process in the storage system.
- Provision of selected samples for research projects:
  - database-driven selection and automated picking of tubes in the storage system
  - transfer of partial volumes of the respective DMSO solutions into microtiter plates using a pipetting robot for shipment to scientists across Europe



Automated LVL SAFE® 96-Channel Capper/Decapper in the automated process


Preparation/programming for automated storage


View of the automated storage system

PRODUCTS FROM LVL TECHNOLOGIES

Tubes: LVL SAFE® 2D LX1000 (external thread)
Devices: LVL SAFE® 96-Channel Capper/Decapper;
Handheld LVL SAFE® 8-Channel Capper/Decapper

CUSTOMER FEEDBACK
USER EXPERIENCE & BENEFITS

Compatibility with equipment and workflow of the entire process

- Reliable readability of the coding, both machine-readable and manual, in both dimensions – 2D code at the bottom and barcode on the side.
- The compatibility of tubes and racks with the equipment meets all requirements for a smooth process. There are no restrictions in the process mapping with automated systems such as pipetting robots, cell isolation robotics, freezing robotics, and automatic nitrogen storage systems.
- Very good handling for manual processes in the laboratory.
- Suitable for use at different temperatures, both for processing at room temperature and for storage at –20°C, –80°C, and in the gas phase of liquid nitrogen at –196°C.

Extensive product portfolio of 2D tubes with excellent product features enables optimal selection of suitable products for specific requirements

- The tubes have an external thread, significantly reducing contamination/carryover, etc.
- The tubes are suitable for storing substances in the desired organic solvent DMSO (dimethyl sulfoxide) – low leachable material, IATA-certified leak-tightness through injected TPE seal. The product feature was decisive in the purchasing decision.
- The barcode is machine-readable even with colored solutions – this could not be guaranteed with previously used solutions due to the transparency of the tubes.

Reliable product and delivery quality as a prerequisite for long-term use

- The product quality of the tubes and racks is consistently at the highest level, with an extremely low failure rate.
- LVL accepts individual purchasing and delivery concepts, which are implemented securely and effectively.
- Flexible delivery options, such as tubes with screw caps pre-attached or separate delivery of tubes and screw caps.

Use of LVL SAFE® Capper/Decapper for automated tube sealing highly satisfactory

- The automatic sealing capability provided a crucial basis for optimizing the automated workflow.
- Cappers and tubes are perfectly matched to each other. There is no need for an adapter plate, which has been known to cause undesirable complications. The concept of rack feeding to the fixed head proves to be positive in terms of smooth usage and the robustness of the entire system.

> *"For many years, we have greatly valued the excellent collaboration with LVL Technologies. The company stands out for its exceptional expertise, especially in its optimal configuration of the product portfolio, which is individually tailored to the requirements of our processes. Its technical service, particularly in connection with the equipment used, is extremely pleasant and straightforward to use. We experience very fast response times, and the support is always competent and solution-oriented. Our satisfaction extends across the entire support experience, and we highly value our partnership with LVL Technologies."*

Reference

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