

Building
New Solutions

Business division
Clean Rooms

 **Lindner**



Cleanliness Down to the Last Detail

**Lindner SE |
Clean Rooms**



Rethinking Spaces



Add.Vantage

Over time, the Lindner Group has developed into a technically sound, solution-oriented and reliable partner with a rock-solid commercial footing. Our comprehensive product and service portfolio for building envelopes, interior fit-out and insulation technology in almost all fields of application is second to none. True to our motto "Rethinking Spaces" we develop perfectly customised and yet versatile solutions and concepts for your building project.

As a 100% family-owned company we attach particular importance to our environment. With innovative concepts such as Cradle to Cradle® Certified, low-emission products and well thought-out room concepts we create Add.Vantage for people and their environment. As a service provider and employer we place people at the centre of our activities. Our customers notice this too: We enjoy our work, have conviction in what we do and are proud of what we are capable of achieving.

Stability and Growth

Our headquarters have been in Arnstorf in Lower Bavaria, where we have seen massive growth in recent decades since the company was founded in 1965 by Hans Lindner. We are proud to be the largest employer in the Rottal-Inn district with some 7,100 employees worldwide. We handle 2,500 projects on a daily basis, mostly revolving around our core business of construction. This is complemented by our foundation, the mk | hotels, microbreweries and – most recently – sustainable agriculture and forestry.



Cleanliness Down to the Last Detail



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Laboratory Soluna Heilmittel
Donauwörth, Germany



Fresenius Kabi USA LLC, Melrose Park,
Illinois, USA

Many Years of Product Experience

Lindner SE | Clean Rooms in Arnstorf is one of the leading full-service providers for clean rooms, laboratory facilities and operating theatres. With over 100 employees, this division implements construction projects in the pharmaceutical, sterile and medical technology sectors as well as in microelectronics and semiconductor technology. The range of services extends from consulting and planning to maintenance and other services. The above-average vertical integration of product manufacture enables maximum flexibility for special project-based solutions. The main products used for the interior fit-out of special areas, ceilings, walls, floors and doors are from our own production. Our product range is completed by lighting solutions from Lindner

SE | Leuchtenfabrik and technical equipment such as filter fan units and overflow grilles. The international network of Lindner branches enables complete global solutions from one source.

Contamination control is an extremely complex task – and should preferably be assigned to a trained hand. Lindner combines decades of experience in supporting, planning and executing clean room projects with the technological edge due to our proprietary research and development. We simultaneously rely on a well developed network of leading clean room equipment providers who we seamlessly integrate into our development solutions.

- complete solutions for clean rooms in every use category

- in-house development and production of fit-out products
- practical ergonomics due to function-oriented planning
- time savings through rapid implementation
- investment certainty due to interchangeable, standardised elements

Production in Arnstorf, Germany

Manufacture of ceiling, floor and partition systems, luminaires, facades and clean room components; production of high quality joinery products for interior fit-out and the fitting-out of cruise liners and ships

- 64,250 m² of production space
- 200,000 m² corporate premises



European XFEL, Research Campus Schenefeld
Hamburg, Germany

Futuristic patient room
Arnstorf, Germany



Brainlab Headquarters, Tower Riem
Munich, Germany

Inspiration & Innovation



Lindner Research & Development

Ready for the Extraordinary:

- individual concepts to meet your requirements
- special solutions for structural design, statics, acoustics and fire protection
- wide-ranging expertise
- the highest demands on quality and function

Everything Always Under Control – Lindner Test Labs and Workshops

Each project we execute meets the highest demands in terms of structural design, statics, acoustics and fire protection. Our research and development partner maintains efficient experimental workshops and has its own TÜV-certified test laboratories. Here we test the physical properties of new developments and adapt products to your individual requirements. We can therefore respond quickly and effectively to your specific needs.

Adeptly Organised – with Lindner Project Implementation

We jointly plan the entire project execution with you and establish an efficient overall concept. This minimises your coordination effort and prevents inefficiencies.

We are available to you as an experienced partner in every phase of your project. Numerous highly specialised professionals and innovative technologies enable the implementation of even the most extraordinary designs.



Hamad General Hospital
Doha, Qatar

Application Areas

Everything from a Single Source

We not only supervise the complete interior fit-out of major special projects in close cooperation with developers, planners and architects, we also implement them: from complex machine enclosures and hybrid operating theatres to the development of entire production facilities for the pharmaceutical and electronics industries.

Modern clean rooms and operating theatres combine functionality with the utmost process safety for patients and staff. Our designers, technicians and engineers ensure the optimal realisation of your concepts – so that your finished project operates at full capacity.

Clean Room Development

Lindner has represented competence and quality in the development of clean rooms for over 30 years. Whether in the pharmaceutical industry, clean rooms for the microelectronics industry or cytostatics dispensaries within hospitals – Lindner clean room technology offers efficient and complete turnkey solutions for your project.





Overview of our Application Areas



Clean Rooms for the Pharmaceutical Industry

The pharmaceutical industry is one of the sectors that sets the highest requirements for the interior fit-out of clean rooms: Thanks to many years of expertise and extensive know-how, Lindner SE | Clean Rooms is the ideal partner for GMP-compliant implementation of your construction project. We never compromise on quality and are up to every challenge.

Further details on page 12



Clean Rooms for the Electronics Industry

We are experienced specialists in the interior fit-out of clean rooms subject to ISO 14644 – our broadly diversified product portfolio means we can supply and fit everything including ceiling systems, partition systems, different types of raised flooring and filter fan units.

Further details on page 14



Development of Operating Theatres

We have supervised the planning and full fit-out of many operating theatres and surgical centres over recent years. We have also contributed to major progress, e.g. in the form of glass operating theatres and hybrid operating theatres.

Further details on page 16



Hospital Development

Lindner has the necessary experience and equipment to deliver complex hospital construction projects as a complete fit-out service – including public areas, patient rooms and high-tech operating theatres.

Further details on page 18



Interior Fit-out of Laboratories

Our interior fit-out products, including ceiling systems and advanced laboratory partitioning systems, feature a large number of variants. They can therefore be used in a wide range of laboratories and their individual departments, such as forensics, microbiology or general medicine.

Further details on page 20



Clean Rooms for the Pharmaceutical Industry

Complete Turnkey Solutions for Pharmaceutical Areas

Laboratories, operating theatres or clean rooms for cannabis production – our clean rooms are as versatile as their requirements. Our 30 years of experience mean that we can guarantee you seamless consulting, planning and implementation of a wide range of clean room projects within the pharmaceutical sector.

This involves us being able to accomplish both small and large projects: We minimise the interfaces among the individual trades when we take on a major project as general contractor and thus ensure timely and successful completion. Our extensive product portfolio enables us to provide ceilings, partition walls, hinged and sliding doors, lighting, filter fan units

and airlock control systems from a single source – whereby our superior vertical range of manufacture generally results in us being able to assure the high quality of the products we supply.

The Highest Quality Standards

Our experts in Research and Development are constantly involved in launching new and innovative clean room solutions. But we don't always believe in "one size fits all", so we also develop special individual solutions for specific requirements. Yet whether it's a standard or a special solution – what each of our products have in common is that they meet all the requirements according to GMP and ISO 14644. Certified surfaces guarantee maximum

cleanliness.

In addition to the supply of high quality products, we can gladly assist you with GMP qualification or technical aspects, such as statics, fire protection or sound insulation. Should you so desire, our experienced fit-out crew can also deal with the installation of a wide variety of clean room systems. And we don't consider that our service necessarily ends with completion of the project: We can also assume responsibility for maintenance work or provide you with other services.



Charles Laboratory
Wangen, Switzerland



Raumedic
Helmrechts, Germany







Clean Rooms for the Electronics Industry

Maximum Cleanliness for Critical Production Processes

Precise manufacturing techniques in the electronics industry make a safe process environment indispensable for the production of fault-free components. Clean room technology plays an essential role in this: All our products are therefore developed according to the requirements of ISO 14644 and specifically adapted to your project. In addition to aluminium junction ceilings, post-and-beam partition

systems, door systems, raised floor systems, filter fan units and lightings for photolithographic processes, we can also implement various special solutions on your behalf.

Everything from a Single Source

We are a full-service provider for clean room technology and consistently assist you with consulting, planning and implementation; including support with all technical aspects like statics,

fire protection and sound insulation. We see timely implementation as self-evident. Our many years of experience in equipping clean rooms for the microelectronics industry, the optical sector, precision engineering and surface technology as well as server farms and battery production facilities is certain to benefit your project.



New building for Leica Camera AG
Wetzlar, Germany



European XFEL, Research Campus Schenefeld
Hamburg, Germany

Development of Operating Theatres

Quality and an Ideal Work Environment

Operating theatres can only optimally fulfil their function as complex medical facilities if they are understood as working environments and focus on the requirements of personnel who have to provide a faultless performance every day and every time. We have supervised the planning and full fit-out of many operating theatres and surgical centres over recent years. We have also contributed to major progress, e.g. in the form of glass operating theatres and hybrid operating theatres.

- decades of experience in the construction of surgical centres, clean rooms and sterile areas
- complete interior fit-out services

- new construction and conversion of hospitals for both private and public sectors
- comprehensive product portfolio and realisation of all conceivable special solutions
- high competence in the construction of hybrid operating theatres and surgical showrooms
- mastery of the latest technologies for equipping operating theatres

In addition to human factors, equally important for successful treatment is that the best equipment and high-quality materials are to be found in the operating theatre. We therefore offer a very wide range to create the ideal working conditions for hospital staff.

Our product portfolio includes walls with easy-to-disinfect stainless steel, glass or HPL surfaces plus LED-backlit glass walls or walls with integrated heating as well as a variety of door systems, air locks and operating theatre ceilings. We are one of the few manufacturers to offer fire protection ceilings meeting the hygiene requirements usual in hospitals. We use high-quality LED lighting for optimum illumination of workstations and their surroundings. We can demonstrate many global references as a specialist for hybrid operating theatres and surgical showrooms.



KRH Hospital Siloah
Hanover, Germany



Hornheide Specialist Clinic
Münster, Germany







Hospital Development

Healthier Surroundings in Good Hands

Hospitals and health care buildings are among the most complex buildings ever. They develop from treatment facilities into comprehensive health centres. Whereas in the past the pure function was decisive, today what matters to all users of the building, both staff and patients, is additional convenience, comfort and well-being. The demands are increasing in every respect – including the architecture – with regard to compliance with all hygiene requirements, for example. Lindner has the necessary experience and equipment to deliver such construction projects as a complete fit-out service – including public areas, patient rooms and high-tech operating theatres.

- new construction and conversion of hospitals for both private and public sectors
- complete fit-out of entire clinics
- in-depth expertise in acoustics and fire protection
- specialists in the execution of hygiene zones and operating theatres
- long-term international customer support

We are happy to assume general contractor responsibility for all trades involved and to offer you well-conceived minimisation of interfaces. This involves us coordinating the entire range of services from

technical building equipment and sanitary facilities to instrumentation and control, electrical and ventilation technology.

In addition to surgical areas, our service includes all other space requirements in a hospital: waiting areas for patients and relatives, wash areas for operating staff, control rooms and patient rooms, through to x-ray rooms with special laser and radiation protection. High quality materials and selected equipment are used, all of which ensure a clean environment and a pleasant atmosphere for patients and hospital staff.



DONAUISAR Clinic Deggendorf
Deggendorf, Deutschland



KRH Hospital Siloah
Hanover, Germany

Interior Fit-out of Laboratories

In the Service of Science: Controlled, Safe, Reliable

Trust our years of experience and expertise in the development of laboratories. Our development products, including customised ceiling systems and advanced laboratory wall systems with built-in furniture, feature a large number of variants. They can therefore be used in a wide range of laboratories and their subsections, such as forensics, microbiology or medicine.

- all services from a single source
- manufacture to the highest quality standards
- development of special solutions
- fewer project interfaces
- fully integrated supply technology

Whether standard laboratories, forensic laboratories or those subject to a specific safety need – we turn

your requirements and ideas into reality. This includes implementation of a biological protection level up to Class BSL 2 and a biosafety level up to Class S2.

Special solutions are of course also possible in addition to our standard product portfolio offering the right fit-out components for each application.



Netherlands Forensic Institute (NFI)
Den Haag, Netherlands



SWAN isotope building
Bern, Switzerland



Sophisticated Product Solutions

With Understanding and Experience

We are well used to the abundance of tasks required in the construction of clean environments and have extended our expertise. Our focus is always on designs compliant with GMP and DIN EN ISO 14644 using easy to clean surfaces and flush fixtures as well as adherence to VDI 2083. All conceivable special solutions are possible given our coordinated product portfolio.

We realise modern manufacturing facilities and develop innovative products, such as plug-in air lock control systems. Production occurs solely in Germany. Our extensive product and project experience enables us to realise safety laboratories meeting DIN EN 12128.

Our products are continuously subject to strict quality controls. Regular inspections in both TÜV-certified test laboratories and those of Fraunhofer IPA are an integral part of new and further developments. Air permeability tests pursuant to EN 12114: 2000-03 are conducted by ift Rosenheim.





Clean Room Ceilings

Lindner clean room ceiling systems are designed and manufactured according to your specific needs. All clean room-related standards and regulations are accordingly taken into consideration. You also have the choice of different ceiling types and grid dimensions.

- aluminium grid ceilings
- steel grid ceilings
- aluminium junction ceilings
- ceilings with clip-in tiles



Clean Room Partition Walls

Looking for a product that can be adapted to spatial changes at any time? Modular design means that individual elements of Lindner clean room and operating theatre walls can be easily moved or replaced, even after installation.

You can also obtain our walls as customised special solutions: in fire, noise or radiation protection versions and with absolutely flush surfaces, for example. All partition systems can of course be easily combined with our floor and ceiling systems.



Clean Room Doors

Top-quality clean room doors specially manufactured by Lindner ensure high impermeability in your rooms. They are manufactured without any organic materials and equipped with surfaces suitable for clean rooms. The requirements of all applicable clean room standards are always met. We also supply doors meeting fire, smoke and noise protection requirements under the applicable EU directives and DIN standards.

- high transparency due to glass panes
- tailored to Lindner partition systems
- potential for integrating scuff protection
- option for special fixtures as per customer request



Clean Room Floors

Load-bearing capacity, airflow and electrostatics are decisive for a floor used in clean rooms. Our raised floors meet all the requirements for a technically high-quality clean room solution. We manufacture your floor system to the highest precision and fit accuracy. You can obtain our solutions as full panels and as ventilation panels with up to 54% free cross-section, which we can also gladly produce from existing full panels.

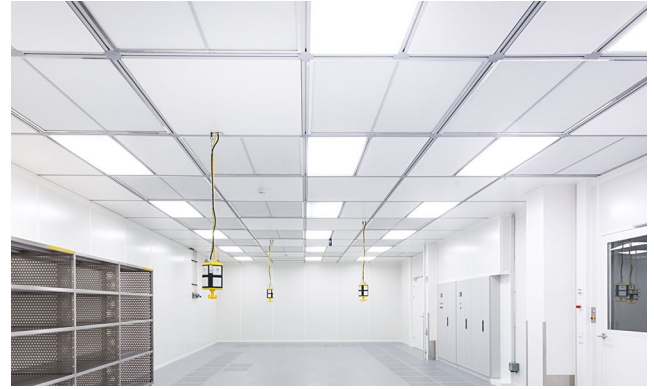
- top precision
- abrasion resistant with respect to air
- corrosion resistant
- anti-magnetic
- outstanding electrostatic discharge
- high load-bearing capacity



Clean Room Airlocks

Airlocks are essential for zoning in a clean room. Airlocks are sealed areas located between two or more rooms, e.g. those with a different clean room class. Their purpose is to control the airflow between rooms if a room is to be accessed or material transported. Lindner supplies different air lock versions, control systems and material and document transfer hatches – entirely according to your individual needs.

- The airlock function is available for all Lindner clean room doors.
- Transfer hatch and airlock dimensions can be project-specific.



Clean Room Lighting

Clean rooms place particularly high demands on the light intensity and sealing of luminaires. Lindner LED clean room lights are compatible with all clean room ceilings. Our lighting calculations ensure they are ideally tailored to your space in advance. You'll receive recessed and surface-mounted lights with state-of-the-art LED technology meeting the highest requirements – a true ray of light for your project.

- long service life
- numerous options

leuchten.fabrik

Ein Unternehmen der Lindner Group



Clean Room Ventilation Technology

Lindner ventilation components meet all criteria to keep your clean room free from particles and germs. We equip all clean room technology zones with the necessary ventilation components: from adjustable ceiling outlets for supply and/or exhaust air to software-controlled filter fan units and overflow grilles for wall installation.

- coordinated ventilation components
- numerous options
- innovative concepts





Extension at Fresenius Kabi Melrose Park, Illinois, USA

Healthcare company Fresenius Kabi has also been represented in North America since 2008. The MPEX Melrose Park location is being extended to be the largest of its 70 global production sites by 2026. This involves the location being expanded by 12,000 m² of clean rooms according to plans by CRB Group. The new building also offers space for a conference centre, offices and a cafeteria for some 700 employees. At the end of the construction period, further clean rooms were created in the same building according to plans by Genesis Architects from Philadelphia, also all equipped with Lindner clean room systems.

Lindner SE | Clean Rooms was responsible for the interior fit-out of Class C, D and CNC clean rooms, including intensive planning services. This involved close cooperation among the Lindner team, the planners at CRB Group and the Fresenius Kabi Technology Center. Appropriate solutions were jointly developed, in part involving new product developments. Gilbane Building Company acted as the main contractor in coordinating the construction site and the local workforce. Installation of the clean room systems to a very high level was implemented by local installation specialist Thorne and an experienced team of Lindner supervisors. Lindner was able to perform specific activities like sealing work, door commissioning and activation in collaboration with local partners such as Dormakaba USA.



Dornbirn City Hospital, Extension of Operating Theatre Area, Dornbirn, Austria

Dornbirn Hospital invested around 22.5 million euros in the extension of its operating centre. Seven new rooms, ranging in size from 44 to 52 m², were added to the existing six operating theatres. The new operating theatres were equipped to an equally high standard of construction to ensure the greatest possible flexibility.

Lindner SE | Clean Rooms contributed partition systems and sliding doors to the extension with seven new operating theatres. The partitions involve a system in shell construction, the design of which accommodates various parts of the building services and makes them usable for the staff by means of appropriate fixtures. Examples of

this are the air ducts and their outlets into the room as well as the media ducts with integrated workstations. At selected points, large windows with radiation protection features and interior darkening were incorporated into the partitions. The clean room sliding doors were also designed in accordance with the required radiation protection, for which a flush integrated lead glazing was also constructively implemented. The doors moreover support the processes in the hospital given their automatic operation and the integration of control elements for various functions.







Biotest Next Level, Dreieich, Germany

The "Biotest Next Level" construction project included a complex of three buildings which significantly extended Biotest AG's production capacity. Some 300 people are employed there.

Lindner Clean Rooms was responsible for the fit-out of three process levels in Building 02 during the construction project. Each level is 7.50 m high and has a surface area of around 3,000 m². The airlocks, internal corridors and biotechnological process rooms are designed in accordance with GMP classes C or D, depending on requirements. The main services provided by Lindner Clean Rooms included

ceiling and partition systems. Large areas of Line 80 S steel grid ceiling systems were installed. A rail construction was developed for this project to provide fall protection for the accessible ceiling. A project-specific solution was also developed for the partition systems. An 80 mm solid partition system that meets the exacting requirements of the clean room environment was installed rather than the usual wall width of 100 mm. Glass partitions and formwork were also installed. Smoke protection doors and T30 tubular frame doors were integrated within the partitions.



Hamad General Hospital, Doha, Qatar

The population of Qatar has almost tripled in the last ten years. This development required massive changes in the country's healthcare system. One of the largest infrastructure projects is the construction of Hamad Medical City in the capital city of Doha. Several hospitals with varying specialities are currently being built, with an investment volume of around 2.4 billion Qatar-Riyal. The recently completed surgical centre, with its 20 operating theatres (including two CT scanners and one hybrid

MRI scanner) and 50 surgery preparation rooms, extends the surgical capacity of neighbouring Hamad General Hospital.

Lindner SE | Clean Rooms was awarded the contract for the complete interior fit-out of the building. In addition to project planning, production, delivery and supervising the installation of all fit-out services, this also included planning for the CT and MRI areas.







Cannabis Pharmaceutical Company, Denmark

This biopharmaceuticals company produces cannabis for medicinal use in its Danish branch. Besides growing the plants in modern hybrid greenhouses, research into different cannabis varieties is also conducted on site. In association with its Danish general contractor, Lindner followed the plans of architectural firm Koppenhöfer + Partners to realise clean room areas in Class ISO 9/GMP D.

Our load-bearing Line 80S ceiling system with a face width of 80 mm was used for the interior fit-out. The recessed Lindner LED lights integrated within the ceiling ensure powerful laboratory lighting and are sealed all around for

clean room compatibility. Our Lindner Pharma 80S partition system with high quality stainless steel wall shells connects to the ceiling system. This was executed partly in Duplo grinding and partly in white RAL 9003 powder-coating. Directly adjacent to the clean room area are wet rooms with washing stations for cleaning the cannabis plants, which are also in stainless steel. Our Swing Pharma 80 door system – partly with automatic actuation and airlock control – is flush-mounted within the partition systems of the various rooms, and its glass insert provides an impression of transparency.

360° Project Coordination

We provide a project team of specialists individually tailored to your construction project. This team determines and centrally controls all processes. Our project management provides you with a direct point of contact. Such process-optimised collaboration ensures adherence to the defined quality standards, cost framework and schedule. Our CAD design engineers work in close coordination with our in-house production sites even in the planning phase.

We provide you with all services from a single source. You therefore benefit from the handling of all services by a financially strong partner, minimised interfaces and optimum flexibility.

Turnkey Solutions

We are happy to assume general contractor responsibility for the totality of your project. We are thus in a position to realise your vision, which is to be implemented from the building core to the building envelope, on time and to your complete satisfaction.

We always consider the entire process taking place in the clean room or hospital and plan the spatial concept with the appropriate expansion components. Whether clean room ceilings with high quality LED lighting, clean room walls, doors or floors, ventilation and air lock systems, the execution of facade areas or administrative areas such as offices and meeting rooms – we provide everything from a single source on request. This is how we minimise your interfaces, because we control the coordination of all trades involved in the project.





Lindner SE | Clean Rooms

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Title image: Cannabis pharmaceutical company, Denmark

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