Integrated Solutions for Hospitals and Operating Theatres
Lindner Clean Rooms and Operating Theatres
Building new solutions.

Lindner undertakes major projects worldwide in all areas of interior fit-out, insulation technology, industrial services and building facades. From pre-planning through to project completion Lindner is your partner of choice.

The Company’s extensive manufacturing capability enables quality to be strictly maintained whilst allowing maximum flexibility to meet individual project requirements.

Environmental considerations are fundamental to all Lindner’s business principles.

Through partnerships with clients Lindner turns concepts into reality.

Choosing Lindner you have:

Lindner Concepts: Tailored solutions specifically geared to satisfy individual project requirements

Lindner Products: Quality materials and systems to the very highest industry standards

Lindner Service: Comprehensive project management services
The Lindner Health Care System

Do you need a comfortable temperature and soft adjustable background lighting in your operating theatre? Our designs include walls with integrated heating and glass panels with LED lighting for a pleasant working atmosphere.

Whether automatic or manual sliding doors, built-in lights, walls, ceilings, ventilation and air conditioning systems, radiation protection, fire safety or sound insulation – Lindner is a strong partner and a one-stop shop for all-in-one solutions – not only for your operating theatre but also for all other hospital areas.

As general contractor, we take charge of projects through all stages, coordinating all necessary trades and thinking through how we can minimise crossover to maximise efficiency for you. We also arrange the full spectrum of work and services from the technical building systems and plumbing right through to instrumentation, control, electrical, ventilation and air conditioning.

Benefits at a glance
- Decades of experience in building surgical centres, clean and sterile rooms
- New constructions and refurbishments for the private and public sectors
- Completion of turnkey clinics
- Extensive range of products and solutions to any particular application
- High degree of expertise for hybrid operating rooms and surgical showrooms
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</table>
Product Features

- **RAL**
  - RAL colour chart coating

- **Conductive powder coating**

- **GMP**
  - GMP compliance

- **Easy to clean and disinfect**

- **CE marking in accordance with EU regulation**

- **Fire resistance according to DIN 4102 and EN 13501-2**

- **Sound insulation according to DIN 4109 standard**

- **Hermetic**
  - Hermetic

- **Pressure-tight**

- **Radiation protection according to DIN 6812 standard**

- **Protection category according to DIN EN 60529**

- **Protection class 1 according to DIN EN 61140**

- **Panic and emergency light function**

- **Lamp included**

- **Electronic ballast or LED driver**

- **Efficiency factor**

- **Power-operated doors**

- **Automatic door systems**
Siloah Hospital, Hanover
Photo: © samba photography
Flexible, modular and reliable

A flexible, modular partition system is a basic prerequisite in a modern operating theatre. We can offer you the maximum number of different options in terms of high-end wall systems for your project. You may need integrated monitor systems, glazing panels, LED-backlit glass partitions, gas supply, electricity, network services or a customised solution designed entirely to your individual specifications – whatever your requirements, Lindner will provide you with everything you need in a hospital room for processes to run smoothly. The walls can also be supplied in radiation protection and sound insulation quality, and with a number of different surface finishes. We also prioritise the use of clean room silicone for the sealing of wall and ceiling joints.

The room’s atmosphere can be controlled by the colour of the partition systems or the lighting. The increasing importance which is being attached to design, ambience and comfort also extends to operating theatres, hospital corridors and patient rooms.

What we offer

- Custom-built partition systems
- Thermowall panels for heated rooms
- Various wall thicknesses to accommodate media supply equipment
- Maximum flexibility and combination options
- Harmonious blend of technology & design
- Fire proofing, sound proofing and radiation protection
The Logic-OT and Life-OT partition systems have been designed specifically for operating theatres. The partitions can be made of various materials, such as stainless steel or HPL. One highlight of this system is the option of integrating the Life-OT coloured glass panel which can be fitted with LED backlighting. All surfaces, joints and points of connection to other parts are designed to facilitate cleaning and disinfection so as to allow top standards of hygiene.

Benefits at a glance
- Meets hygiene requirements
- High degree of flexibility thanks to modularity
- Solid wall panel system based on lightweight construction method
- Facing wall or excess width panels
- Wall heating system (Thermowall)
- Cavity ducting for media network
- Can be combined with various Lindner glazing systems
Panelling types and surface finishes

**Logic-OT Metal**
- Metal wall panel with electrostatically applied powder coating
- Ground and brushed stainless steel wall lining

**Logic-OT HPL CF Board**
- HPL on fibre cement base

**Logic-OT HPL GF Board**
- HPL on gypsum fibre base

**Logic-OT HPL Compact**
- HPL solid core panel

**Life-OT**
- Tinted safety glass on gypsum fibre base

**Life-OT Graphics**
- Safety glass on gypsum fibre base with digital print on back side (choice of photograph or graphic)

**Life-OT Ambient Light**
- Tinted safety glass on gypsum fibre base with LED light channel

**Life-OT Backlight**
- Floor-to-ceiling tinted safety glass with full LED backlighting

**Life-OT Graphics Backlight**
- Floor-to-ceiling tinted safety glass with full LED backlighting and digital print on back side (choice of photograph or graphic)

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### Technical data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall thickness</strong></td>
<td>≥ 100 mm</td>
</tr>
<tr>
<td><strong>Standard width</strong></td>
<td>1,200 mm to max.</td>
</tr>
<tr>
<td></td>
<td>1,410 mm (depending on panelling)</td>
</tr>
<tr>
<td><strong>Wall heights</strong></td>
<td>Up to max. 5,000 mm</td>
</tr>
<tr>
<td><strong>Fire resistance class</strong></td>
<td>F0</td>
</tr>
<tr>
<td></td>
<td>F30 under DIN 4102</td>
</tr>
<tr>
<td></td>
<td>EI30 under EN 13501-2</td>
</tr>
<tr>
<td></td>
<td>EI60 under EN 13501-2</td>
</tr>
<tr>
<td><strong>Radiation protection</strong></td>
<td>Customised solutions depending on project specification</td>
</tr>
</tbody>
</table>

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KRH Hospital, Nordstadt
The entire surface of the safety glass is bonded with a highly compressed base and can be supplied with a RAL or NCS colour coating on the rear or with a print of your choice. The smooth glass surface makes it easy to clean and disinfect, and it is resistant to the cleaners and disinfectants included in the VAH List.

**Benefits at a glance**
- Glass surface meets hygiene standards
- High-specification LED lighting technology
- A wide range of individual design options with a selection of colours and motifs
- Pleasant ambience for operating theatre staff
Life-OT Glass Ambient Light
An LED light channel can be fitted in the partition system running horizontally around the top, middle or bottom.
A wide variety of colour options can be selected with the LED units. The glass panel is made without any additional horizontal joint.

Life-OT Glass Backlight
Life-OT Glass Graphics Backlight
This model is made with laminated safety glass mounted only at the top and bottom in order to guarantee full and entirely consistent illumination of the glass panel. The entire RGB colour range is possible. A wide selection of prints offers unlimited individual design options.

Hamad Medical Hospital, Doha
Logic/Life-Thermowall

The Lindner Thermowall was specially developed for use in operating theatres and clean rooms. The advantage of this system is the flexibility with which heating can be integrated in the rooms. The system is preferable to a radiator with regard to hygiene because of the smooth non-rippled surfaces. Wall panels fitted with copper dampers at the factory are connected to the heating circuit. Our 24 V/30 V electric heating is an interesting alternative for interim solutions, small spaces or conversions.

Benefits at a glance

- Meets hygiene requirements
- Tried and tested heating technology
- High degree of flexibility
- Heating provided by hot water or electricity
- Choice of stainless steel, HPL or glass panelling
Surface finishes and panelling types
- Metal wall panel with electrostatically applied powder coating: Choice of RAL or NCS colours
- Ground and brushed stainless steel
- HPL on base plate, class A building material
- HPL solid core panel
- Glass

Technical data

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<table>
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<tr>
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<tbody>
<tr>
<td><strong>Wall thickness</strong></td>
<td>≥ 100 mm</td>
</tr>
<tr>
<td><strong>Standard width</strong></td>
<td>1,200 mm</td>
</tr>
<tr>
<td>(dimension between centre lines)</td>
<td></td>
</tr>
<tr>
<td><strong>Wall heights</strong></td>
<td>Up to 3,500 mm</td>
</tr>
<tr>
<td><strong>Heating system connection</strong></td>
<td>Flexible plastic hoses and compression sleeves are used for the connection to the distributing main. Hot water supply temperature up to 50°C. Oxygen barrier conforming to DIN 4726 standard</td>
</tr>
<tr>
<td></td>
<td>- Optional electric voltage 24 V/30 V</td>
</tr>
<tr>
<td><strong>Hot water heat output</strong></td>
<td>Max. 130 W/m²</td>
</tr>
<tr>
<td><strong>Electric heating power</strong></td>
<td>Max. 330 W/m²</td>
</tr>
<tr>
<td><strong>Radiation protection</strong></td>
<td>Customised solutions depending on project specification</td>
</tr>
</tbody>
</table>

Image of technical measurements

Temperature data
- Messpunkt: 43.5°C
- Rechteck: Max. 51.0°C, Min. 23.5°C, Differenz 23.1°C

FLIR image
- Abst: 6.0° C, Trefl: 20.0° C, ε: 0.90
- FLIR measurement: 23.4° C
The Lindner Life-OT 137 consists of two divided aluminium frames with bonded, flush-mounted panels which are fixed in the base support. The unique structural glazing sealant technology developed by Dow Corning obviates the need for edge sealing and is a guarantee of reliable service and long life. The system can be supplied with full glazing, partial glazing or overhead glazing. Electric Venetian blinds or roller blinds can also be easily integrated, as well as radiation shielding glass.

**Benefits at a glance**

- Structural glazing sealant technology
- Wide range of design options
- Entirely suitable for integration in Lindner Operating Theatre Partition Systems
- Compatible with many different accessories
- Available in toughened safety glass or laminated safety glass
- Changeable transparent/opaque glass
## Technical data

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<table>
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<tr>
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<tr>
<td><strong>Standard width</strong></td>
<td>1,200 mm</td>
</tr>
<tr>
<td></td>
<td>Up to max. 1,500 mm (depending on panelling)</td>
</tr>
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<td>F0</td>
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<tr>
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<td></td>
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<td></td>
<td>EI60 under EN 13501-2</td>
</tr>
<tr>
<td><strong>Radiation protection</strong></td>
<td>Customised solutions depending on project specification</td>
</tr>
</tbody>
</table>

Life-OT 137 glazing integrated in Logic-OT Metal
Lindner Door Systems

Flexible, robust, combinable

Door systems designed specifically for operating theatres and hospitals are required to meet high demands. That is why we design and develop high-quality, robust doors which meet the required hygiene standards and satisfy the fire safety, smoke control and sound insulation requirements set out in EU directives and DIN standards.

The doors can be fitted with a variety of different switches, sensors and displays and can be integrated in various partition systems.

What you can expect from us

- Automatic or manual sliding doors
- Decontamination barrier function for people and/or beds
- Different door leaf materials
- Integrated Venetian blinds and roller blinds for privacy or laser shielding protection
- Optional combination of swing door and sliding door
Lindner operating theatre sliding doors are designed specifically for use in hospitals and are specifically tailored to the requirements in various areas.

The system may optionally consist of one or two door leaves, be running into the wall or sliding in front of the wall, and be built up to floor-to-ceiling height.

Customised solutions can be devised at any time to meet specific project requirements.

**Benefits at a glance**

- Meets hygiene requirements
- Numerous design options
- Various types of drives
- Radiation protection, laser shielding and sound insulation
- Option of integrating control and monitoring systems
- Pressure-tight finish
### Surface finishes and door leaf materials

- Electrostatically applied powder coating:
  - Choice of RAL or NCS colours
- Coil coating
- Ground and brushed stainless steel
- HPL custom finish
- Option of glass with digital print

### Glazing panel in metal/HPL door leaf

<table>
<thead>
<tr>
<th>Glazing panel</th>
<th>- Rectangular</th>
</tr>
</thead>
</table>
| Installation alternatives       | - With screwed-on trim  
|                                 | - Flush fitting without trim  
| Blackout facilities             | - With inside electric Venetian blind  
|                                 | - With inside manual Venetian blind  
|                                 | - With inside electric roller blind  
| Special glazing requirements    | - Radiation protection  
|                                 | - Laser protection  

### Fittings

| Long U-shaped door handle (on one side or both sides)  
| Recessed door handle (on one side or both sides)  

### Frame/running gear case

| Materials                             | Galvanised and powder-coated steel sheet  
|                                      | Stainless steel, optionally powder-coated  
| Controls                              | Buttons*  
|                                      | Push-button cleats*  
|                                      | Contact-free units*  
|                                      | Emergency open button (for decontamination barrier function)  
|                                      | Customised solutions to specific requirements  
|                                      | * For automatic doors only  
| Signals                               | Red/green lights (for decontamination barrier function)  

### Door drive

| Types of drive                         | Manual or automatic  
| Special functions                      | Decontamination barrier function  

### Safety measures

| Sensors                               | Control of door movements in accordance with DIN 18650  
| Resistance control                    | Electronic monitoring of resistance (dynamic force limitation) on opening and closing.  
|                                      | The door stops and is immobilised as soon as the resistance prescribed in DIN 18650 prevents the movement of the door leaves.  

### Frame design options:

<table>
<thead>
<tr>
<th>Design</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inset frame</td>
<td><img src="image" alt="Inset frame" /></td>
</tr>
<tr>
<td>Sound insulating inset frame</td>
<td><img src="image" alt="Sound insulating inset frame" /></td>
</tr>
<tr>
<td>37 dB</td>
<td><img src="image" alt="37 dB" /></td>
</tr>
<tr>
<td>42 dB</td>
<td><img src="image" alt="42 dB" /></td>
</tr>
<tr>
<td>Blind frame</td>
<td><img src="image" alt="Blind frame" /></td>
</tr>
<tr>
<td>Blind double-leaf frame</td>
<td><img src="image" alt="Blind double-leaf frame" /></td>
</tr>
</tbody>
</table>

### Wall design options:

<table>
<thead>
<tr>
<th>Design</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid wall</td>
<td><img src="image" alt="Solid wall" /></td>
</tr>
<tr>
<td>Lightweight partition wall</td>
<td><img src="image" alt="Lightweight partition wall" /></td>
</tr>
<tr>
<td>Logic Life</td>
<td><img src="image" alt="Logic Life" /></td>
</tr>
<tr>
<td>Logic OT Life OT</td>
<td><img src="image" alt="Logic OT Life OT" /></td>
</tr>
<tr>
<td>Hybrid wall</td>
<td><img src="image" alt="Hybrid wall" /></td>
</tr>
</tbody>
</table>
Door leaf design options:

- HPL
- Metal
- Glass & aluminium frame
- Fine-framed glass
- Tubular frame/metal
Floor-to-ceiling sliding door

Wall design options:
1. Solid wall
2. Lightweight partition wall
3. Logic Life
4. Logic OT Life OT
5. Hybrid wall

Frame design options:
- Inset frame
- Blind frame
- Blind double-leaf frame
Door leaf design options:
- HPL
- Metal
- Glass & aluminium frame
- Fine-framed glass
- Tubular frame/metal
Combination swing & sliding door

**Frame design options:**

1. Inset frame
2. Blind frame
3. Blind double-leaf frame
4. Steel frame

**Wall design options:**

1. Solid wall
2. Lightweight partition wall
3. Logic Life
4. Logic OT Life OT
5. Hybrid wall
Door leaf design options:

- HPL
- Metal
- Glass & aluminium frame
- Fine-framed glass
- Tubular frame/metal
Swing Doors

Lindner swing doors are suitable for a wide and diverse range of applications. Originally developed for use in GMP clean rooms, they also provide an excellent service in areas with top hygiene requirements and are designed specifically for these fields of application. The inbuilt flexibility allows construction of a radiation protection design for operating theatres or X-ray rooms without any visual changes.

The door unit can be designed as a total package with automatic drive, decontamination lock system control unit, magnetic clamp or other electric components. Whether for straightforward manual use, automated operation or as a complex system integrated in decontamination barrier system control units – the options are virtually unlimited. Customised solutions can be devised at any time to meet specific project requirements.

Benefits at a glance
- Meets hygiene requirements
- Numerous design options
- Radiation protection, laser shielding and sound insulation
- Option of integrating control and monitoring systems
- Use in decontamination lock systems
**Surfaces**

- Electrostatically applied powder coating:
  - Choice of RAL or NCS colours
- Coil coating
- Ground and brushed stainless steel
- HPL custom finish
- Option of glass with digital print

**Glazing panel in metal/HPL door leaf**

<table>
<thead>
<tr>
<th>Glazing panel</th>
<th>Rectangular</th>
<th>Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation alternatives</td>
<td>- With screwed-on trim</td>
<td>- Flush fitting without trim</td>
</tr>
<tr>
<td>Blackout facilities</td>
<td>- With inside electric Venetian blind</td>
<td>- With inside manual Venetian blind</td>
</tr>
<tr>
<td>Special glazing requirements</td>
<td>- With inside electric roller blind</td>
<td></td>
</tr>
</tbody>
</table>

**Fittings**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Door knob</th>
<th>Handle</th>
</tr>
</thead>
</table>

**Frame**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Door knob</th>
<th>Handle</th>
</tr>
</thead>
</table>

**Materials**

- Galvanised and powder-coated steel sheet
- Stainless steel

**Controls**

- Buttons*
- Push-button cleats*
- Contact-free units*
- Customised solutions to specific requirements

* For automatic doors only

**Signals (optional)**

- Emergency off button (for decontamination lock function)
- Red/green lights (for decontamination lock function)

**Special functions (optional)**

- Decontamination lock function

**Safety measures**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Door knob</th>
<th>Handle</th>
</tr>
</thead>
</table>

**Sensors (optional)**

- Control of door movements in accordance with DIN 18650

**Resistance control**

- Electronic monitoring of resistance (dynamic force limitation) on opening and closing; door reverses as soon as the resistance prescribed in DIN 18650 prevents the movement of the door leaves
Wall design options:

1  Solid wall
2  Lightweight partition wall
3  Logic Life
4  Logic OT Life OT
5  Hybrid wall

Frame design options:

- Butt steel frame
  - 35 dB
- Rebated steel frame
  - 35 dB
- Double rebated flush steel frame
  - 42 dB
Door leaf design options:

- HPL
- Metal
- Tubular frame/metal
Wall design options:

1. Solid wall
2. Lightweight partition wall
3. Logic Life
4. Logic OT Life OT
5. Hybrid wall

Frame design options:

- Butt steel frame
  - 35 dB
- Rebated steel frame
  - 35 dB
- Double rebated flush steel frame
  - 42 dB
Door leaf design options:

- HPL
- Metal
- Tubular frame/metal
Hamad Medical Hospital, Doha
Combined swing-sliding door
Lindner Ceiling and Lighting Systems

Versatile, available and visually appealing

Lindner will design, make and install your ceiling system according to your performance requirements, all standards and regulations relating to operating theatres are taken into account. You also have the choice of various types of ceiling panels and different modular dimensions. The systems offer flexibility in terms of the ceiling cavity and allow connection to low-turbulence displacement flow panels and integration of different lighting concepts. An operating theatre is also demanding in terms of the required light intensity and light fixture sealing. Lindner operating theatre lights are compatible with all operating theatre ceilings and our calculations ensure the best possible end results in terms of the lighting in your room. Naturally we can also comply with any requests for advanced LED technology in all colour ranges. LED lighting is state-of-the-art technology and is used in the recessed luminaires and in the downlights. The lights can also be used in MRT areas where there are extremely strong magnetic fields.

Benefits of our Ceiling Systems
- Fireproof ceilings for corridors which meet hygiene requirements
- Backlight panels combined with clip-in panel ceilings offer the potential for unique designs
- Production of special ceilings

Benefits of our Lighting Systems
- Compact panel-mounted light fixtures
- LED technology
- Various sizes
- A range of wattages with optimum efficiency
- Electrical plug-in connections
The Clip metal ceiling system is made up of a galvanised substructure consisting of suspension channels and clip-in profiles. The individual sections can be supplied with or without bevelled edges and in clip-in design or clip-in/swing-down design. The system can be combined with many standard fittings which are commercially available, such as light fixtures, air vents and low-turbulence displacement flow panels.

Benefits at a glance
- Ceiling panels easily removable for inspection
- Sealable ceiling joints sealable to satisfy hygiene requirements
- Easy to clean and disinfect
- Flush-fitting system
- Lightweight
- Straightforward integration of low-turbulence displacement flow panels, operating theatre downlight or strip light fixtures
Clip ceiling system seen from below. Visible side with or without bevelled edge.

View of ceiling system from above. The visible joints on the room side can be sealed to meet cleanroom standards.

Clip ceiling system with circumferential strip lights and connection to low-turbulence displacement flow panel.

**Surface finishes and materials**

- Electrostatically applied powder coating:
  - Choice of RAL or NCS colours
- Ground and brushed stainless steel

**Technical data**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Standard grid dimensions</td>
<td>600 x 600 mm</td>
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<tr>
<td></td>
<td>625 x 625 mm</td>
</tr>
<tr>
<td>Rectangular panels</td>
<td>1,200 x 600 mm</td>
</tr>
<tr>
<td></td>
<td>1,250 x 625 mm</td>
</tr>
<tr>
<td>Special modular dimensions</td>
<td>On request</td>
</tr>
<tr>
<td>Minimum system height</td>
<td>80 mm</td>
</tr>
<tr>
<td>System weight</td>
<td>Approx. 10 kg/m²</td>
</tr>
<tr>
<td>Fire protection class</td>
<td>F0</td>
</tr>
<tr>
<td>Max. ambient pressure levels</td>
<td>± 150 Pa</td>
</tr>
</tbody>
</table>
Lindner Reinraumtechnik features unique LED lighting solutions with a wealth of design options. Digital photographic prints can be chosen at will, enabling virtually any conceivable ambience and creating a sense of harmony in the room.

**Benefits at a glance**
- Meets hygiene requirements
- Possibilities for individual design
- Cutting-edge LED technology
Fireproof Ceilings for areas with hygiene requirements

The fireproof ceilings with F30 fire rating are tested for conformity with DIN 4102-2 and come with a general approval certificate issued by the building inspection authorities. The various designs can be supplied with "F30-A" or "F30-AB" classification. The fireproof ceilings are tried and tested systems. They are particularly user-friendly systems which are perfected down to the last detail. Customised solutions can be supplied to meet specific requirements in any given project.

Benefits at a glance

- Tested for hygienic suitability
- Easy to clean and disinfect
- Non-hazardous to health
- Choice of colours, surface finishes and perforations
- Slimline panels (65 mm)
- Slim connection profiles
- Integration of Lindner LED lighting solutions
- No tools required for opening and closing (detachable and movable)
- Special project-specific solutions are possible
LMD F30-A/AB Type 8 – user-friendly fireproof ceiling carefully engineered in every detail – and tested for hygienic suitability!

LMD F30-A/AB Type 10 Drop-Slide function – no dangling ceiling panels likely to cause disruption to passers-by during inspection works in the cavity.
Operating Theatre Lighting Systems

The recessed luminaires and downlights developed specially for operating theatres and clean rooms combine housing fixtures of the correct standard to meet hygiene requirements with state-of-the-art LED lighting technology. Choose from a variety of shapes, including square or round, or strips around the low-turbulence displacement flow panel. The operating theatre lights are extremely versatile in terms of extra options and add-on technical systems.

LED benefits at a glance

- Up to 50% less energy consumption than conventional lighting
- Very long service life of over 50,000 hours and requiring virtually no maintenance
- Unobstructed availability of lighting in the operating theatre
- Less heat build-up and therefore less cooling required
- Environmentally-friendly manufacture and disposal
- Extremely low installation heights
Technical data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td>230 v/50 Hz</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td>I</td>
</tr>
<tr>
<td><strong>Protection rating</strong></td>
<td>IP 65</td>
</tr>
<tr>
<td><strong>Means of enclosure</strong></td>
<td></td>
</tr>
<tr>
<td>- Toughened safety glass, patterned or plain</td>
<td></td>
</tr>
<tr>
<td>- Laminated safety glass optional (shatterproof)</td>
<td></td>
</tr>
<tr>
<td><strong>Operation/maintenance</strong></td>
<td>On the room side</td>
</tr>
<tr>
<td><strong>Housing colour</strong></td>
<td>RAL 9016 or as specified</td>
</tr>
<tr>
<td><strong>Light colour (standard)</strong></td>
<td>Neutral white ≈ 840</td>
</tr>
<tr>
<td>- Selective RGB colour spectrum optional</td>
<td></td>
</tr>
<tr>
<td><strong>Colour temperature (standard)</strong></td>
<td>4,000 K</td>
</tr>
<tr>
<td><strong>Dimensions (L x W x H)</strong></td>
<td></td>
</tr>
<tr>
<td>- 1,200 x 300 x 55 mm for strip light installation</td>
<td></td>
</tr>
<tr>
<td>- 600 x 600 x 55 mm</td>
<td></td>
</tr>
<tr>
<td>- 625 x 625 x 55 mm</td>
<td></td>
</tr>
<tr>
<td>- Further dimensions on request</td>
<td></td>
</tr>
<tr>
<td><strong>Wattage</strong></td>
<td></td>
</tr>
<tr>
<td>- Project-specific LED design</td>
<td></td>
</tr>
<tr>
<td>- Conventional lighting system</td>
<td></td>
</tr>
</tbody>
</table>

Optional extras

- Emergency lamp and dimmer function
- Choice of different colours in RGB spectrum
- LED-H surface light
- DALI standard
- Top-mounted controls
- MRT room capability
We fit all the areas of the operating theatre with the necessary ventilation system components, from low-turbulence displacement flow panels and adjustable ceiling vents for incoming and outgoing air, right through to software-controlled filter fan units and laminar airflow grates for the wall installation. As general contractors, we take charge of the entire process of planning and installing the ventilation and air conditioning system.

**Whatever your requirements:**
- Different materials and sizes
- CFD simulation for flow optimisation
- Measurements of particles and microbes during inspection and acceptance procedure
- Customised solutions for all fields of application
In cooperation with strong business partners, state-of-the-art low-turbulence displacement flow systems are designed and installed to your specifications. All the national norms and international standards relating to new ventilation and air conditioning systems are duly observed in any given project. Decades of experience in air conditioning technology provide a guarantee of a safe and reliable supply of clean air for your surgical areas – all over the world.

Benefits of Low-Turbulence Displacement Flow Systems at a glance:
- Suitable for integration in Lindner operating theatre ceiling systems to hygiene-compliant standards
- Low-turbulence air circulation unit with variable frame system
- Low sound pressure level
- Low-turbulence displacement flow panel and CFD flow optimisation simulation from one source
CFD Simulation

Fluid dynamics are used, if necessary, to simulate flow in an operating theatre. The calculations take air movements into account, such as inward and outward flows of air, cross flows, or possible sources of heat (machines, people, wall heating). It is possible in this way to identify areas which have insufficient ventilation or which are subject to dangerous vortices and transverse flows before starting the construction. The simulation guarantees a better design and finish of operating theatres. It also allows improvements to be made to the heating and ventilation systems or to other installations before embarking on the work.

Benefits of CFD simulation at a glance
- Detailed depiction of flows and particles, with analyses based on both time and place
- Evaluation of different layouts (positions of personnel, operating table and other furniture)
- Prediction of particle movements and deposition
- Design confirmed by DIN 1946-4 standard on ventilation and air conditioning in medical applications
Exhaust Air Chute with inspection opening

The exhaust air chute consists of a built-in cabinet flush with the wall and an inspection hatch. It can be fitted with one or two fibresept lint trap filters as optional extras. These trap filters are fitted flush with two side pivots for tool-free installation and removal. The inspection hatch has integrated hinges for ease of opening and closing. The exhaust air chute is specially designed for operating theatres in conformity with VDI 2167 and DIN 1946.

Benefits at a glance
- Ventilation and filter system, easy to maintain
- Choice of RAL or NCS colours
- Flush-fitting system
- Easy opening and closing action
Technical data

<table>
<thead>
<tr>
<th></th>
<th><strong>Hook-on</strong></th>
<th><strong>Free-standing</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Logic-OT/Life-OT partition systems</td>
<td>All partition systems</td>
</tr>
<tr>
<td>Max. exterior width</td>
<td>1,190 mm</td>
<td>1,210 mm</td>
</tr>
<tr>
<td>Max. interior width</td>
<td>1,120 mm</td>
<td>1,200 mm</td>
</tr>
<tr>
<td>Min./max. depth</td>
<td>120/450 mm</td>
<td>120/480 mm</td>
</tr>
<tr>
<td>Max. cross section</td>
<td>0.20 m²</td>
<td>0.23 m²</td>
</tr>
<tr>
<td>Height max.</td>
<td>5.8 m</td>
<td>5.8 m</td>
</tr>
<tr>
<td>Max. air flow</td>
<td>6,000 m³/h</td>
<td>6,000 m³/h</td>
</tr>
</tbody>
</table>

Surface finishes and materials

- Electrostatically applied powder coating
- Ground and brushed stainless steel

Exhaust air chute with inspection opening in combination with fibresept ventilation grille

Exhaust air chute open to allow straightforward cleaning
The operating theatre ventilation grilles can be integrated both in exhaust air units and in cross flow units between two rooms and flush-fitted on both sides of swing doors and sliding doors. The stainless steel structure is built specifically for operating theatres in accordance with VDI 2167 and DIN 1946, and in line with hygiene standards under DIN 6812, and can be removed without tools. Powder coating is available as an optional finish.

Benefits at a glance
- Meets hygiene requirements
- Choice of RAL or NCS colours
- No tools required for disassembly and servicing
- Possible integration in door systems
- Various possible areas of application
Surface finishes and materials
- Electrostatically applied powder coating
- Ground and brushed stainless steel

Technical data

<table>
<thead>
<tr>
<th></th>
<th>antisept</th>
<th>fibresept</th>
<th>radiasorb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. surface area</td>
<td>1.0 m²</td>
<td>0.5 m²</td>
<td>1.2 m²</td>
</tr>
<tr>
<td>Max. air flow</td>
<td>11,500 m³/h</td>
<td>4,500 m³/h</td>
<td>4,100 m³/h</td>
</tr>
<tr>
<td>Free section</td>
<td>Up to 80 %</td>
<td>Approx. 40 %</td>
<td>25 %</td>
</tr>
<tr>
<td>Lead equivalent</td>
<td>---</td>
<td>---</td>
<td>Up to 2.0 mm</td>
</tr>
</tbody>
</table>

Ventilation grille fibresept
Ventilation grille radiasorb with powder-coated finish; an optional lint filter can be fitted at the back.

Paracelsus Hospital, Langenhagen
Surfaces

**Powder coating**

Electrostatically charged polyester-based powder particles are blasted onto an earthed substrate and then cross-linked by heating. The surface is smooth, extremely hard-wearing and resistant to a large number of cleaning agents and disinfectants. The powder coating does not contain any materials which evaporate or emit particles. Choice of any RAL\(^1\) or NCS\(^2\) colour. The test report LI 1004-521-1/2 issued by the Fraunhofer Institute for Manufacturing Engineering and Automation relating to our surfaces includes the following tests:
- Chemical resistance on steel sheet with powder coating and steel sheet with coil coating
- Microbe reduction of surfaces on steel sheet with powder coating, steel sheet with coil coating, brushed stainless steel and ground stainless steel
- Microbial metabolic potential on steel sheet with powder coating and steel sheet with coil coating

**High-pressure laminates (HPL)**

HPL is a composite material made of paper and resin. It is extremely impact-resistant and resistant to a large number of cleaning agents and disinfectants. The exceedingly tough composite can be supplied in many different colours and has stood the test of time over decades in areas subject to strict hygiene controls.

**Stainless steel**

Stainless steel is excellent in terms of its ability to satisfy hygiene requirements and its supreme levels of resistance to aggressive, liquid or gaseous substances. It may be ground and brushed or alternatively powder-coated.

**Glass**

The smooth finish of glass makes it very easy to clean. Glass is resistant to most cleaning and disinfectant agents and offers many design and lighting possibilities.

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1) RAL  Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (German Institute for Quality Assurance and Certification)
2) NCS  Natural Colour System

KRH Hospital, Nordstadt
Sealing wall and ceiling joints in sterile zones, especially in operating theatres, is crucial for patient safety because of possible exposure to germs and bacteria. In contrast to ceiling joints, which are mostly sealed with clean room silicone, sealing vertical and horizontal wall joints usually poses the question whether to use "wet or dry sealant". Naturally there are advantages and disadvantages associated with both types of jointing. An excerpt from guidelines published by the Robert Koch Institute on this subject says “[…] compression seals frequently only feign a perfect transition of building elements. It is important to ensure a perfect sealing of transitions of building materials in terms of hygiene.”

**Dry sealing**

In practice it can make sense to use a cap seal or beading method to seal a joint, depending on the field of application. From a hygiene point of view, however, this only applies in areas not subject to frequent cleaning and disinfection as the moisture this generates can seep into the joints by capillary action despite the sealing.

One major advantage of dry seals, on the other hand, is that they can be replaced quickly and simply, and therefore economically. This saves time when inspection work needs to be done in the wall cavity and keeps down the cost of such work.

**Wet sealing**

Wet seals with clean room silicone are especially suitable for high-risk areas, such as operating theatres, from the point of view of hygiene – and therefore also for reasons of patient safety. This method of sealing has major advantages when it comes to cleaning and disinfection because moisture cannot penetrate the joints.
You have the vision – Lindner has the perfect package to make it a reality and can advise you on construction, function, technology and design. From public spaces, cafeterias, hospital rooms and operating theatres right through to the facade, we can give your hospital a ‘facelift’, planning the work and acting as your general contractor. Interfaces will be optimised and minimised in the process because we will have everything covered.

Benefits at a glance

- Completion of all areas including hybrid operating rooms
- Ventilation and air conditioning technology
- Technical building equipment
- Instrumentation and control equipment
- Electrics and network engineering
- Sanitary facilities
- Peripheral audio and video equipment
- Customised solutions

We provide a one-stop shop for individual services or integrated all-in-one solutions, meeting the precise requirements relating to your project.

And then? Your long-term satisfaction with your building is important to us, therefore our expert servicing and maintenance team will still be at your service after handing the keys over to you.
Our health system is in a state of flux. Hospitals which were once devoted purely to medical care are evolving into health centres with a degree of emphasis on the comfort factor. Practical concerns and hygiene issues used to be the only criteria taken into account when building premises but nowadays additional aspects are coming into play, such as comfort, enjoyment and well-being. The aim is to provide a pleasant atmosphere for patients, visitors and nursing staff similar to that typically found in a hotel. With the right lighting and carefully designed furnishing, hospital rooms can be transformed into multi-purpose rooms which enable patients to relax and amuse themselves, but also to receive the best possible treatment and to recover as quickly as possible.

The Lindner Reinraumtechnik develops special solutions to individual project specifications, featuring new interior designs, air conditioning systems, colour schemes, audio systems and lighting designs for the patient room of the future.
Reference Projects

Berlin Military Hospital
Berlin, Germany
2007 - 2009

Dortmund Hospital
Dortmund, Germany
2009 - 2013

Großhadern Hospital
Munich, Germany
2011 - 2014
Siloah Hospital, Hanover
Hanover, Germany
2011 - 2015

Großhadern Hospital (LMU)
Munich, Germany
2012 - 2014

Hamad Medical Hospital
Doha, Katar
2013 - 2016
Reference projects

Paracelsus Hospital, Henstedt-Ulzburg
Henstedt-Ulzburg, Germany
2010

Park-Klinik Manhagen Hospital
Großhansdorf, Germany
2009 - 2010

Sana Kliniken Düsseldorf Hospital
Düsseldorf, Germany
2011 - 2012
We can do it all for you.

Lindner Concepts:
- Airports and Railways
- Clean Rooms and Operating Theatres
- Cruise Liner and Ship Fit-out
- General Contracting
- Hotels and Resorts
- Insulation and Industrial Service
- Interior Fit-out and Furnishings
- Special-Purpose Constructions and Stadiums
- Studios and Concert Halls
- System Buildings

Lindner Products:
- Ceiling Systems
- Doors
- Dry Lining Systems
- Facades
- Floor Systems
- Heating and Cooling Technologies
- Lights and Lighting Systems
- Partition Systems
- Roofing Systems
- Steel & Glass

Lindner Service:
- Clearance of Harmful Substances
- Construction Management and Project Development
- Deconstruction and Interior Demolition
- General Planning
- Global Product Supplies
- Green Building
- Industrial Scaffolding
- Installation and Building Services
- Research and Development

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