



Telstar *Medical Components*

Operating Theatres





Telstar[®] Medical Components

Operating Theatres

During every surgical procedure infections can occur. Infections that happen during an operation are referred to as surgical infections. These infections have many different causes and consequently the cause of each must be addressed in a particular way. Methods used are: the structure and operation of the Operating Theatre; preparation of the patient; conduct of surgical staff, and; epidemiological surveillance (Dr. J. Vaqueal, 2002).

Surgical infections are of interest to surgeons, sanitary staff and sanitary authorities for their frequency, mortality, longer hospitalization of the patient and increased costs.

The actual level of surgical infections is between 4 and 15 %. In studies carried out in Spain (EPINE – EPINCAT) the results were 6.2% in 1990 and 4.4% in 2000.

Surgical Infections

Surgical infections occur during an operation, which means that etiologic agents (microscopic organisms such as bacteria or viruses, which can cause disease) find their way into the patient following a determined path.

The most common causes of infection are:

- **Atmosphere:** The air is contaminated primarily due to technical issues, such as; filter deficiency, poor design of surgical installations and irregular air flow between different rooms.
- **Staff hygiene:** Due to the presence of surgical staff in the Operating Theatre, secondary contamination of the air can occur. This is more severe than the primary contamination and more difficult to control. During surgical activities microorganisms can be liberated into the air by the staff present.
- **Patient:** The number one source of surgical infections is through microorganisms carried into the Operating Theatre by the patient and the staff.

Associated Costs by Aero-germ Infection

Results based on the following conditions:

- 125 hospitals with an average of 8 Operating Theatres.
- Occupied for 250 days.
- 7 operations per day per Operating Theatre.
- Average contamination by aero-germs of 3,5 %.

Increase of patient residency in Hospital and the use of antibiotics increases average costs by €3,600 per infected patient.

Total over one year: €180,000,000 *.

* Report Dutch Health-council fl. 290.000.000, (TNO report 99 BBI-R014).

Contamination Rate of the Operating Theatre

SURGERY SOURCE	Clean	Clean and contaminated	Contaminated and dirty
Air: Primary contamination	**	*	0
Air: Secondary contamination	***	**	*
Healthcare staff hands	***	***	**
Patient skin	***	*	**
Surgical waste	0	***	***

Note: (***) Very important potential source. (**) Important potential source. (*) Second level potential source. (0) Without significance.

Estimating the relative importance of the likely sources of contamination at the site of intervention by the degree of contamination of the surgery. Ruef C. and Troillet N. 2001



Photograph taken with I.R. camera showing the flow of turbulent air created by body heat.

New Concept of Operating Theatre Ventilation

TELSTAR offers ventilation-systems with vertical laminar flow that provides more physical comfort to the professionals through: noise reduction; variable temperature regulation; air humidification optimised to specific surgical needs, and; air volume tuned to the characteristics of the Operating Theatre.

The TELSTAR ventilation system minimizes the risk of infection caused by the air by using the intrinsic qualities of production and design in the laminar flow installation.

TELSTAR, recognizing the problems and the requirements of the market, has developed CG screens that provide total coverage and uniform homogeneous air for the working area. This ultra clean air flows laminar into the working area in order to avoid the penetration of contaminated air containing bacteria or viral particles. The air has a parabolic distribution through its velocity and minimal turbulence in the zone. Different temperatures in each zone ensure comfort for the professionals who work within the down flow.

Turnkey

During the process of construction or remodelling of an Operating Theatre, risks increase due to the wide range of variables that interact with the system. Executing in 'Turnkey' fashion minimizes these risks and assures the client of accomplishing the requirements, costs and quality.

TELSTAR solutions include:

- Engineering services
- Consultation and advice
- Management of purchase orders
- Project management
- Supply and installation of critical systems
- Control and automation
- Validation Master Plan
- Start-up
- Specialized training of staff

TELSTAR develops and sells a broad range of components and integral solutions worldwide which

As a consequence of the ultra filtration, the air has a high degree of purity, ISO 5 ultra clean, that accomplishes the standards of the Spanish norm UNE 100713 and several other norms and regulations (eg The Netherlands, Germany, Switzerland, etc.).

TELSTAR's range of products provides perfect ventilation for different sizes and types of Operating Theatre (Class A, B and C) through the laminar flow system:

- **Standard equipment for laminar flow** (with CG screen) for 1 zone.
- **Laminar flow systems with recirculation** (with CG screen and recirculation ventilation units).
- **Laminar flow systems with variable temperature** and airspeed regulation (with CG screen) for 2 zones.

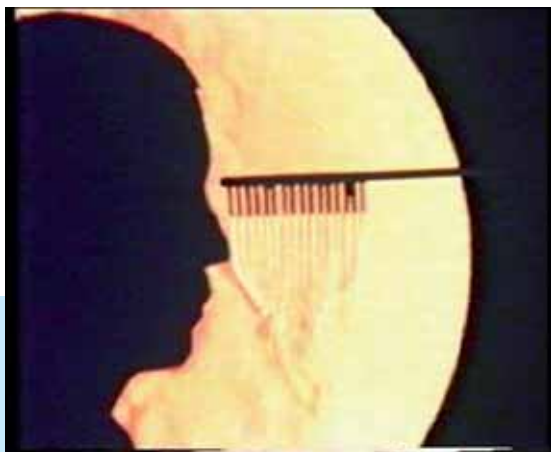
TELSTAR's focus on proper design and installation ensures optimal ventilation through a laminar flow in the Operating Theatre.

provide the client with flexibility and optimal use of available space.

TELSTAR achieves an Open Operating Theatre; a modular system that allows an Operating Theatre to be changed in size and be re-designed.

The main advantages are:

- Design and engineering of the HVAC.
- Walls, doors, floor and ceiling installed for a unique contract.
- Reduced assembly time (custom made components are delivered).
- Maximum guarantees of hygiene (minimal gap between panels, elimination of 90-degree corners between wall/wall and wall/ceiling in laminar flow ceiling).
- Optimised operating system.



Photograph taken with I.R. camera showing the effect of laminar flow.



Smoke test for the validation of the laminar flow.

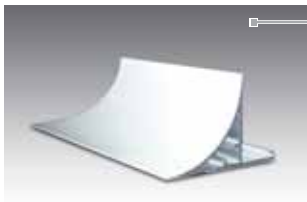
Featured design



CG-Screen: Covered with double film. Micro-fine fabric that produces the air laminarity.

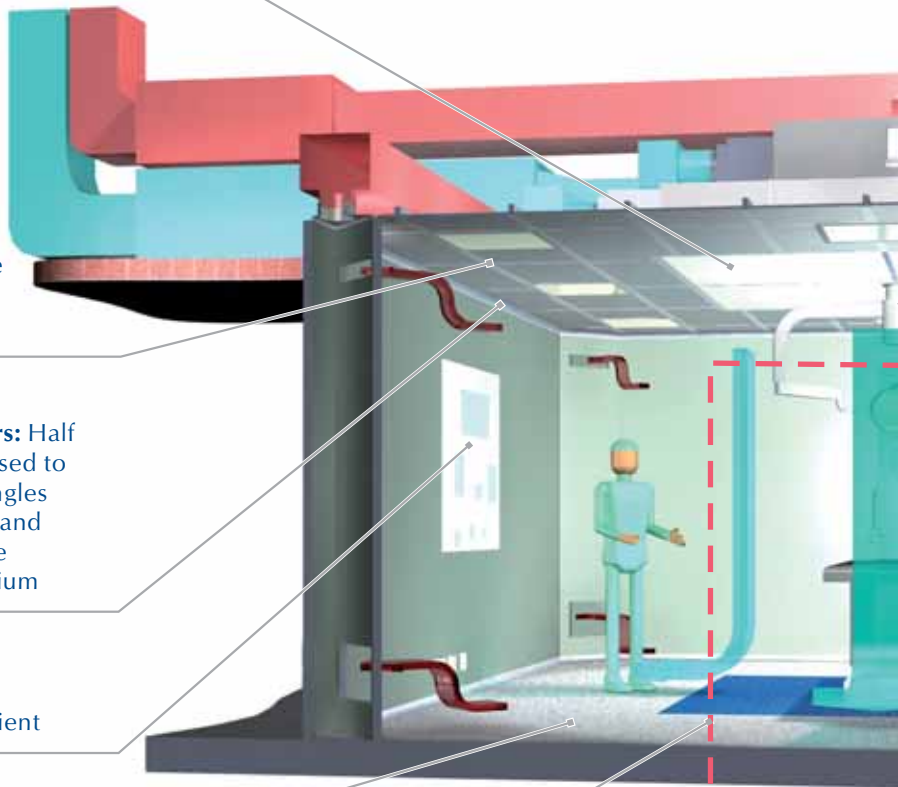


Grid Ceiling: The ceiling is formed with lacquered aluminium profile and antibacterial ceiling panels. These elements are completely integrated into the ceiling.



Grid Ceiling Covers: Half round covers are used to avoid 90-degree angles between wall/wall and wall/ceiling and are available in aluminium and PVC.

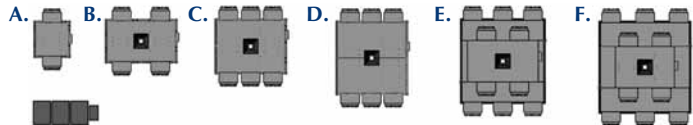
Technical Panel: Custom made to client specifications.



Floor: Conductive floor in PVC.

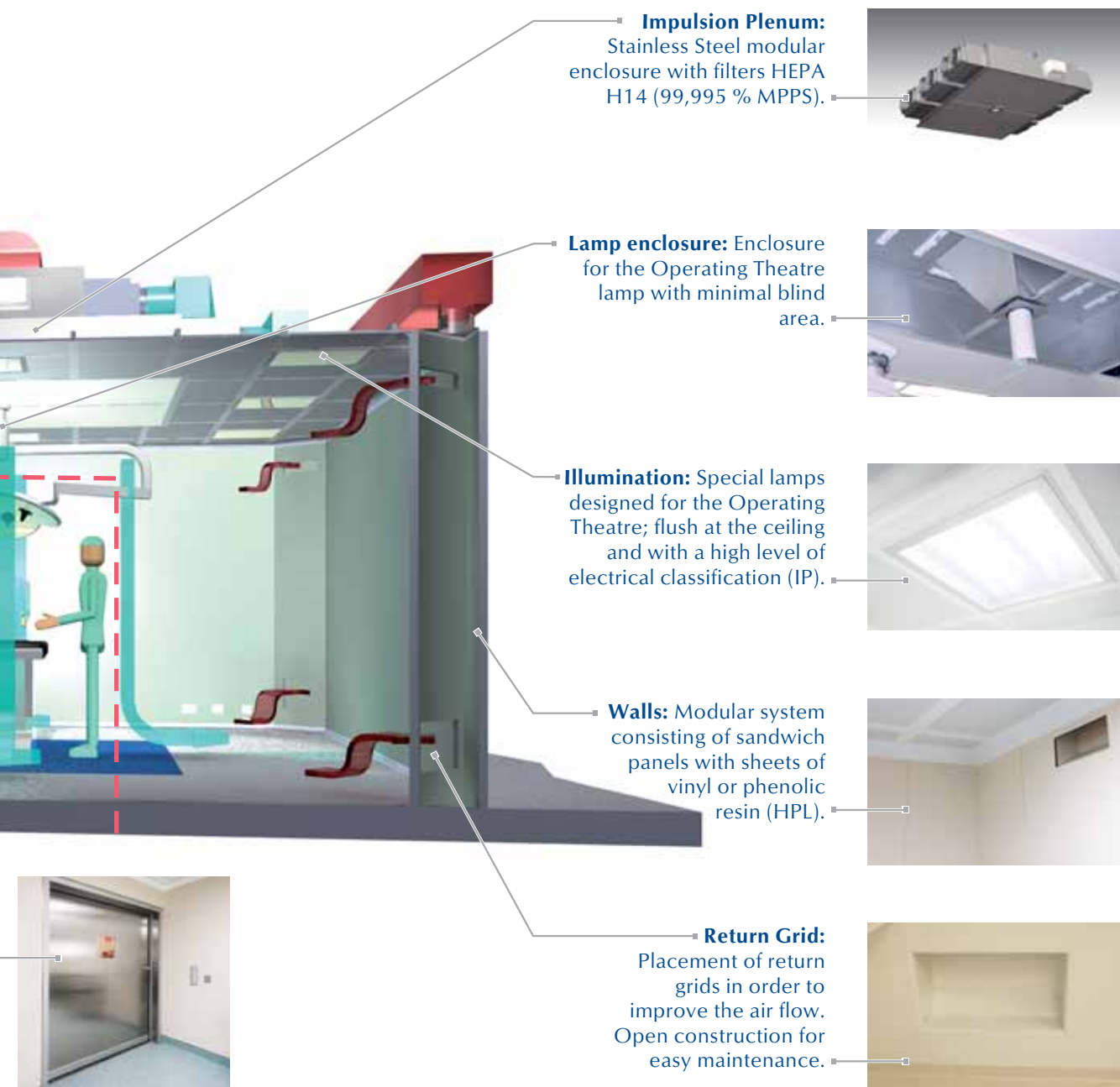
Door: Automatic or manual, finished in phenolic resin (HPL).

Technical data



Reference	Dia gram	External dimensions (mm)			Dimensions (mm)		Laminar flow area (m ²)	Approx. flow (m ³ /h)	Total ΔP (Pa)	Applications
		width	length	height	Laminar flow width	length				
1212045	A	1230	1230	450	1160	1160	1,3	1211	146	Material preparation, delivery rooms, ambulatory surgery.
1424045	B	1470	2430	450	1400	2360	3,3	2974	174	General outpatient surgery.
1824045	C	1860	2430	450	1790	2360	4,2	3802	152	General surgery, trauma surgery, neurosurgery...
2424045	D	2490	2430	450	2420	2360	5,7	5140	196	General surgery, trauma surgery, neurosurgery...
2828085	E	2870	2870	850/550*	2800	2800	7,8	7056	166	Thoracic surgery, cardiac and vascular surgery, organ transplant...
3131085	F	3120	3120	850/550*	3050	3050	9,3	8372	192	Thoracic surgery, cardiac and vascular surgery, organ transplant...

* Special model. Other dimensions on demand.



Operation room	Value	Unit	Calculation	Comments
Volume	100	m ³	1200 m ³ /hour to be divided by 100 m ³	12 air changes/hour: Every 5 minutes all air in the Operating Room is changed.
Height	3	m		
Area	33,3	m ²		
X	5	m		
Y	6,7	m		
Minimum fresh air	1200	m ³ /h		
Laminar flow effect			3800 m ³ /hour to be divided by 13 m ³	292 movements/hour, 12 seconds of vertical movement. ISO-5 over operating table.
Laminar flow surface	1,8x2,4	m		
Height of room	3	m		
Volume of protected zone	13	m ³		
Air speed	0,25	m/seg		
Downflow	3.800	m ³ /h		
Turbulent flow			2100 m ³ /hour to be divided by 105 m ³	20 movements/hour.
Surface area of room	5x7	m		
Height of room	3	m		
Volume of room	105	m ³		
Downflow	2.100	m ³ /h		

Options and accessories

Validation of the vertical laminar flow ventilation in the Operating Theatre

The tests included in the Validation Master Plan (VMP) are detailed below:

- Hepa-filter integrity (Test DOP).
- Determine Airflow and refresh rate.
- Particle count.
- Pressure measurements (over and under pressure).
- Visualization test of air flow.
- Temperature test.
- Humidity test.
- Luminosity test.
- Noise level test.
- Microbiological check.
- Airflow regulation (combined action with certified and approved installer).

Plenum

- Material: Stainless steel.
- Standard illumination inside/outside the laminar flow module that gives > 1,000 lux in the central zone (fig.1).
- Illumination level adjustable (10-100%) placed inside/outside the laminar flow module (fig.2).
- Steel cover for the operating Theatre lamp column (fig.3).

Colour lights

Possibility to install coloured lights for endoscopy and laparoscopy use.



Other materials

- Variable speed Fan in order to keep the air flow constant.
- Air treatment: stand alone air handling enclosures equipped with cold/warm coils.
- Custom made recirculation enclosures or exhaust-columns in order to improve the efficiency of the Operating Theatre.



SPAIN
Josep Tapiolas, 120
08226 Terrassa (Spain)
T. +34 937 361 600
F. +34 937 859 342

Benisoda, 3
28042 Madrid (Spain)
T. +34 913 717 525
F. +34 917 477 530

www.telstar-lifesciences.com

GERMANY
Berner Str. 119
60 437 Frankfurt / Main (Germany)
T. +49 69 90 50 586 00
F. +49 69 90 50 586 10

HOLLAND
Tolweg 10, 3741 LK Baarn
Amsterdam (Holland)
T. +31 (0) 355 415 551
F. +31 (0) 355 417 112

