HT GROUP

Fast-Track Isolation Ward and Analytical laboratory facility

Background:
Driven by the rapid increase of pandemic diseases, such as SARS, MERV and Corona, which nowadays affect worldwide all countries, there is a high demand for fast track solutions.
To handle such a situation, hospitals require a facility to isolate patients with high-infectious diseases and also need a analytic laboratory to identify the responsible agent. This additional facility must be designed in such a way that the existing operation could continue without any risk of cross-contamination of other patients and medical staff.

HT Group, a leader for total solutions in the field of health technology, care and research, can offer a turn-key fast track solution. A prefabricated Fast-Track Isolation Ward and Analytical laboratory facility can be completely manufactured in our production unit and transported on-site. The unique and flexible design concept allows an easy connection to an existing hospital building and avoids long time of construction for the erection of a shell in the classical practice.

Shell concept and completion of interior:
Choosing the right approach for the intended country the building shell based on steel framework with prefabricated concrete elements or a prefabricated containerized solution. The completion of the interior will be done by the best-proven modular design used already worldwide in analytical laboratories or high-infectious isolation wards.

Normative Background:
The Fast-Track Isolation Ward and analytical laboratory facility fulfills international standard and regulations, so an approval for different countries will be achieved without any difficulty.

The isolation ward fulfills "2007 Guideline for Isolation Precautions, Preventing Transmission of Infectious Agents in Healthcare Settings, last update July 2019" and also other international renowned references, such as "ASHAE manual 2003" and "AIA (American Institute of Architects) guideline for design and construction of health care facilities" and the "Australian guideline for the classification and design of isolation rooms in health care facilities" as well as "Guideline for Design and Operation of HVAC Hospitals (HEAS-02-2004) established by the Healthcare Engineering Association of Japan.

The analytical laboratory follows the BMBL Biosafety in Microbiological and Biomedical Laboratories, Centers of Disease Control and Prevention (CDC) & National Institutes of Health (NIH) 5th Edition 2007 as well as the Canadian Biosafety Standard 2nd edition. To ensure also a measurable tightness according to a stated guideline the design fulfills the brand new VDI 2083 page 19, Clean room technology – tightness of containments classification, planning and testing.

Isolation Ward area layout and logistic:
The facility concept includes independent isolation rooms with separate patient bath and toilet. The patient enters the facility though a patient testing room, so all contact to other patients in the hospital building can be avoided. The testing room has also the function of an active decontamination sluice, so after every use a decontamination process is possible. The two separate areas for entrance and exit of medical staff in the isolation ward ensure a circulation without cross-contamination; the staff area is equipped with toilets, storage and working areas for the personnel. For the material, the circulation system allows a contamination-free material logistic, all used material and waste are leaving the patient room and the area via an autoclave; also the decontamination and disinfection of the used bed or other large medical equipment is ensured in a dedicated room. To ensure a minimum of comfort for patients with suspicious cases, who could still perform a visit to the toilet/bathroom all the patient rooms are equipped with own bath rooms. The bath rooms allow to take a shower and are equipped with a bedpan washer. All effluent water will be treated by a thermal waste

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water inactivation system. To ensure a continuous observation of the patient, all taken samples could be directly handed over to the facility-own laboratory via a material sluice system.

Analytical laboratory area layout and logistic:
An isolation ward facility requires access to an analytical laboratory to maintain a monitoring of samples of patient. The sample transfer should be done under biosafety aspects and avoid any cross-contamination. The HT Fast-Track facility includes also a complete analytical laboratory. The laboratory operates strictly according to the two barrier safety concept. The first barrier is the combination of Personal Protective Equipment (PPE), such as lab clothing, gloves and respiratory protection as needed and the Biosafety Cabinet (BSC) to allow an open manipulation. The second barrier is the facility formed by the containment.

Ventilation Concept of the Fast-Track Isolation Ward and Analytical laboratory facility
Realizing a ventilation and HVAC concept for the facility two important issues must be taken into account. The ventilation systems must ensure suitable conditions (temperature and humidity) for patients and operational staff and also avoid any contamination. Dealing with agents with a potential aerosol transmission and having serious or lethal consequences require a contamination barrier avoiding an agent leaving the ward or the laboratory through the HVAC systems. The facility is divided into areas of different pressure levels to ensure a negative airflow, so that no contaminations can leave the area. All supply and exhaust air is HEPA filtered, filter class H14. The HEPA filter are ceiling integrated, so no contamination can leave the room area.

Modular room technology:
The isolations ward area and the analytical area has to achieve an overall tightness according to VDI 2083 Part 19, tightness of Containments, class 4, Test pressure is 500 Pa. The interior is formed by using a modular room technology. The interior will be constructed of laboratory grade non-absorptive building materials suitable for frequent cleaning, sanitizing, and gas decontamination. Flooring consists of a PVC floor. A substructure, incl. all necessary fastening materials, is installed as support for the single panelled wall and ceiling covering. The substructure is made of galvanized steel sheet profiles. All openings like doors, windows, ventilation, base profile and all other built in components must be considered. The substructure is capable of absorbing static pressures of +/- 500 Pa and for a short-time up to pressures of +/- 750 Pa. Wall panels must provide a seamless interior and will have sealed coved corners. Wall panels provide a long service life, and withstand frequent cleaning and decontamination with H2O2 and formalin for room decontamination and a good resistance against surface decontamination agents. Material should be for the laboratory area stainless steel, AISI 316, minimum thickness of metal in panels is 1.5 mm and for the isolation area gastight foliated steel with joint system for the modular system walls and ceiling, permanently elastic jointing with clean room silicone. Provision of hygiene certificate for sealing materials, certificate proofing resistance against hydrogen peroxide and formaldehyde. Ceiling cover for Rooms made of stainless steel, material 316. All doors for should be designed as follows. Gastight hinged door, stainless steel door element, gas-tight, hinged, single-leaf, Integration into wall with threshold, for utilization in gastight areas, resistant to H_2O_2

Design of interior

Patient bathroom

Patient bathroom

Patient room

3-D-View patient room with patient bath

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gassing and mechanical as well as chemical stress. Door consisting of stainless steel frame, stainless steel door leaf and fittings. Gastight door TÜV tested with the following leakage rates Test pressure [Pa] leakage rate [dm³/h]

Test pressure [Pa]	leakage rate [dm³/h]
- 600	0,70
- 550	0,66
- 500	0,60
- 260	0,29
- 159	0,14
0	0,00
+313	0,18
+458	0,36
+650	0,42

All penetration, made of non-shrinking material.
Gastight ventilation penetration welded in ceiling panel or to connect piping. Penetration made of stainless steel material 316. The penetration will be welded gastight in ceiling panel.

Cables:
Each room should have minimum one cable penetration, gastight cable feeds. Rectangular feed-through to insert data, control and supply lines into the room system. Gastight integration into a panel of the room system by means of a flange. A reserve of 30% needs to be provided.

Piping:
Gastight penetration in ceiling panel or to connect piping size from size DN 15 to DN 80. Penetration made of stainless steel material 316.

Transport of Fast-Track facility

Fast-Track facility in container design suitable for lifting with crane and transport with HGV or ship

Construction of building

Direct connection to an existing building is possible without any problems

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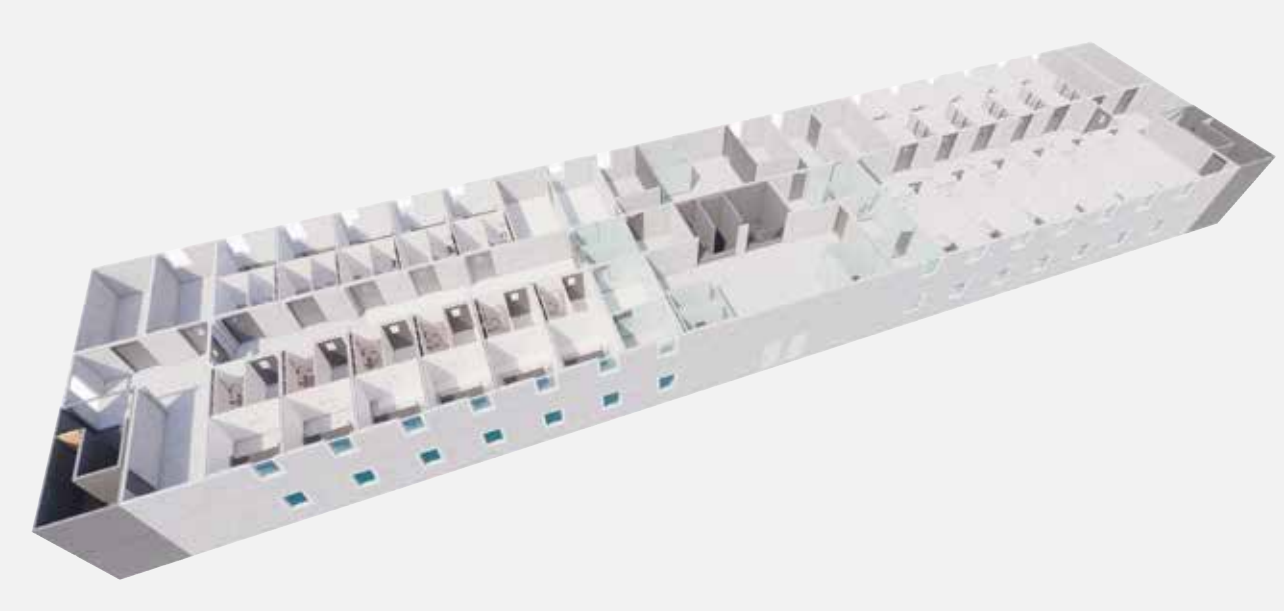
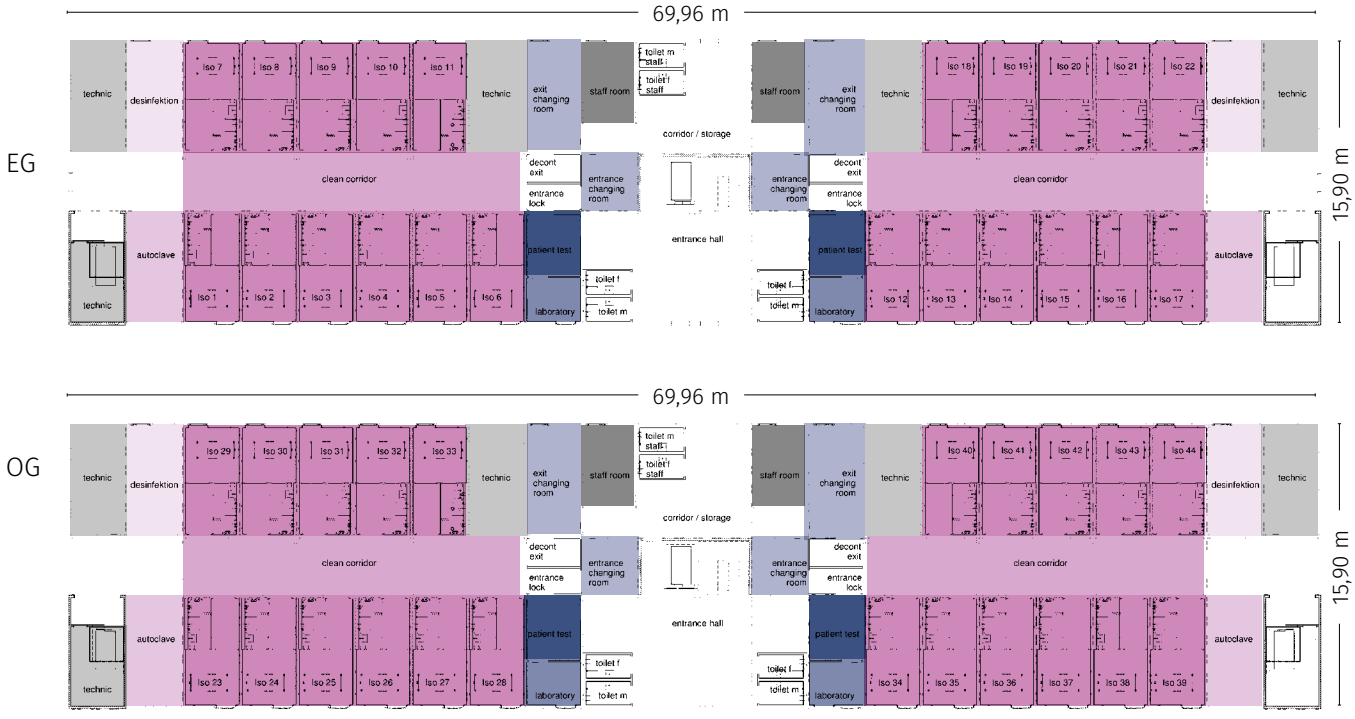
3-D Layout



Ground view



desinfektion

clean corridor

Technical room

autoclave

patient room

patient test

staff room

entrance/exit changing room

laboratory

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