ESCO ASTER

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COVID-19
ESCO ASTER MASS SCREENING SWAB BOOTH™

The Safe and Efficient Way to Enhanced Mass Diagnosing of COVID-19 PUIs

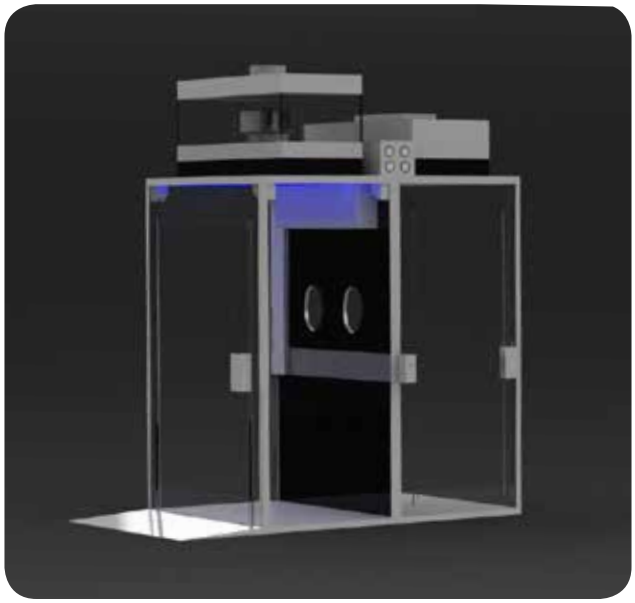
Mass Screening Swab Booth

This unit is designed for the mass swabbing of asymptomatic carriers of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus.

It provides enhanced protection for PUIs with some level of COVID-19 symptoms. MSSB is cost-effective and easy to deploy with a production cycle of minimum 10-50 units per week.

This booth increases the number of diagnosed patients with an estimate of 12-15 swabs per hour, with consideration to consultation time

Esco can provide four (4) units of this MSSB™ inside a 20ft container for an efficient mass testing. However, it does not have any additional working space and storage like medical refrigerators (See IDDSB™).



MSSB™ Design

- Healthcare worker (HCW) booth operates under positive pressure for worker protection (+15 Pa) to environment.
- Person under investigation (PUI) booth operates under negative pressure (-10 to -20 Pa) to environment.
- HCW can use their preferred glove size, and as there is no gauntlet or glove sleeve, there is less worrying in identifying pinhole leaks in gloves through glove leak testing validation or ensuring gloves are completely disinfected.
- Air curtain directly above glove ports provides maximum barrier to protect healthcare workers from droplet nuclei
- UV-C lighting for overnight sterilization of the internal booths.
  - » Booths are made of polycarbonate which absorbs UV-C such that they are not harmful to passersby. However, it is not recommended to constantly stare or intentionally get close to booth.
- Integrated hand disinfection stations for individual booths of the HCW and the PUI.
- 3 electrical outlets in the booth are provided for outdoor use such as:
  - » Portable air-cooler or heater (client to procure and provide own) to ensure HCW environment is suitable for the climate
  - » Digital device with Electronic Medical Record/Hospital Information System
  - » Label printer
  - » Scanner
  - » Portable cooler for storage of VTM and swabs
- Dimensions fixed at 1.2m x 1m for both PUI and HCW Booth with total footprint of 1.2 x 2m
- Material of construction stainless steel 304 frames with plastic polycarbonate panels.

MSSB-JB-10-M-7

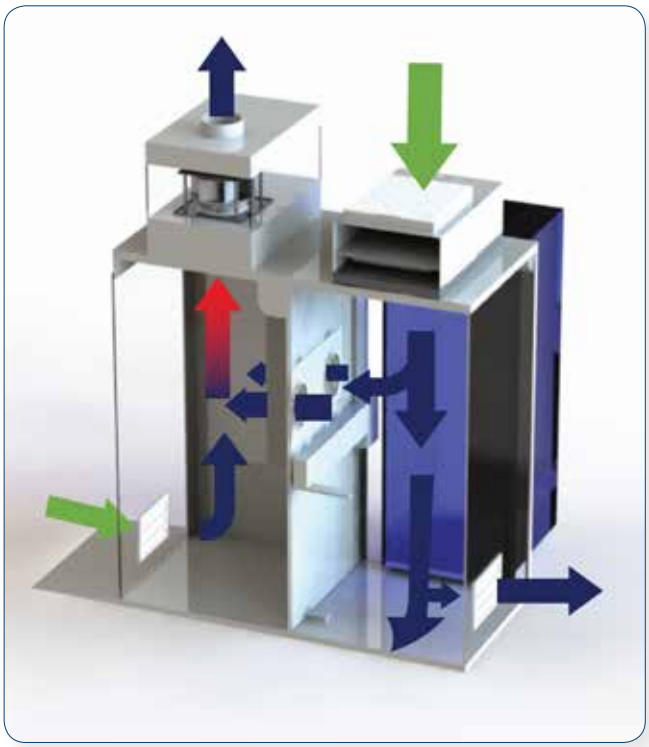
Model		Modules		Pressure		Disinfection System		Detachable Gloveports		Door		Electrical Code
MSSB	SP	Single PUI	N	Negative	1	With	1	With	M	Manual	7	100VAC, 50/60Hz
	SH	Single HW	P	Positive	0	Without	0	Without	A	Auto door	8	220-240VAC, 50/60Hz
	J	Joint PUI+HW	B	Joint together							9	110-130VAC, 60Hz

Options:

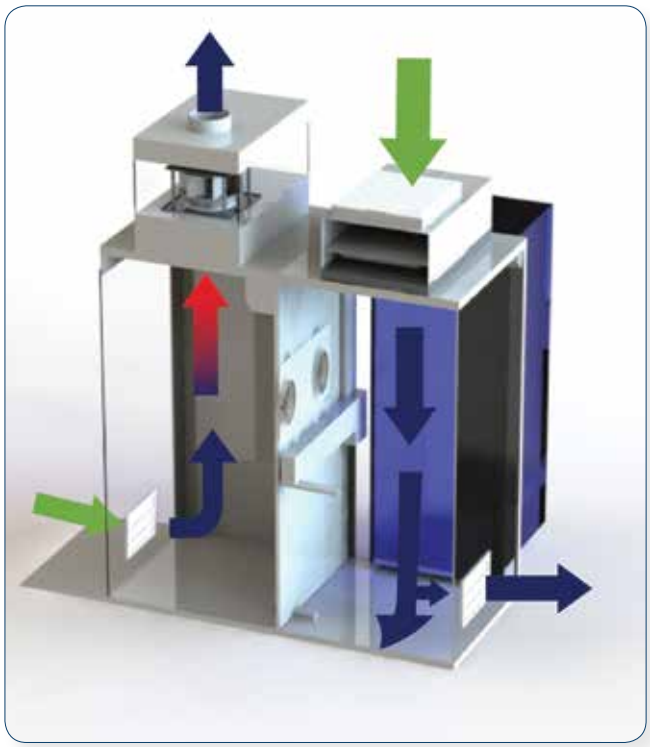
- *Temperature Station*
- *Double Door Medical Ref*
- *Portable Medical Ref*
- *20ft container with medical refs, PPE Storage*

Filtration System

MSSB™ Airflow (without Glove Port option)



MSSB™ Airflow (with Detachable Glove Port option)



Room Air/ Ambient Air *Contaminated Air/ Unfiltered Air* *Filtered Air*

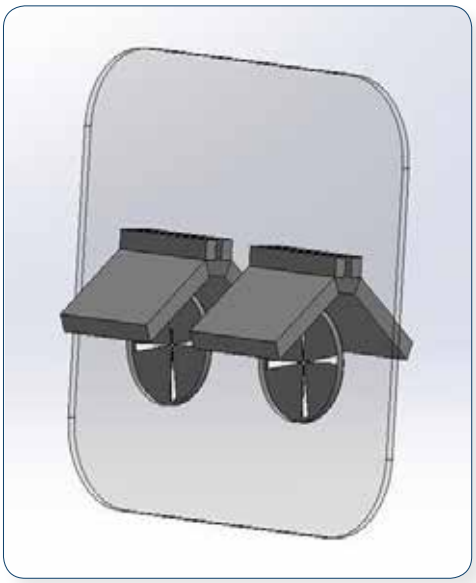
The **Mass Screening Swab Booth™** is made up of two chambers: one for the healthcare worker (right side of the image) and another for the patient under investigation (left side).

The HCW booth operates under positive pressure to the room (+15 Pa) to guarantee personnel protection. Ambient air will flow from the top of the HCW booth and go through G4 pre-filters and HEPA (H14) filters to provide an ISO Class 5 environment inside.

Then, since the PUI booth operates at a negative pressure of about -10 to -20 Pa, air will flow towards it from the HCW booth via glove port openings. Additionally, there is an adjustable grille with G4 prefilters located at the bottom side of the PUI booth as a supplementary air inlet. This configuration guarantees HCW protection.

Air will then be exhausted out from the MSSB™ through the following ways:

- **HCW booth:** G4 prefilters located at the bottom rear of the booth
- **PUI booth:** HEPA filters located on top of the booth



MSSB™ design without the detachable glove port option.

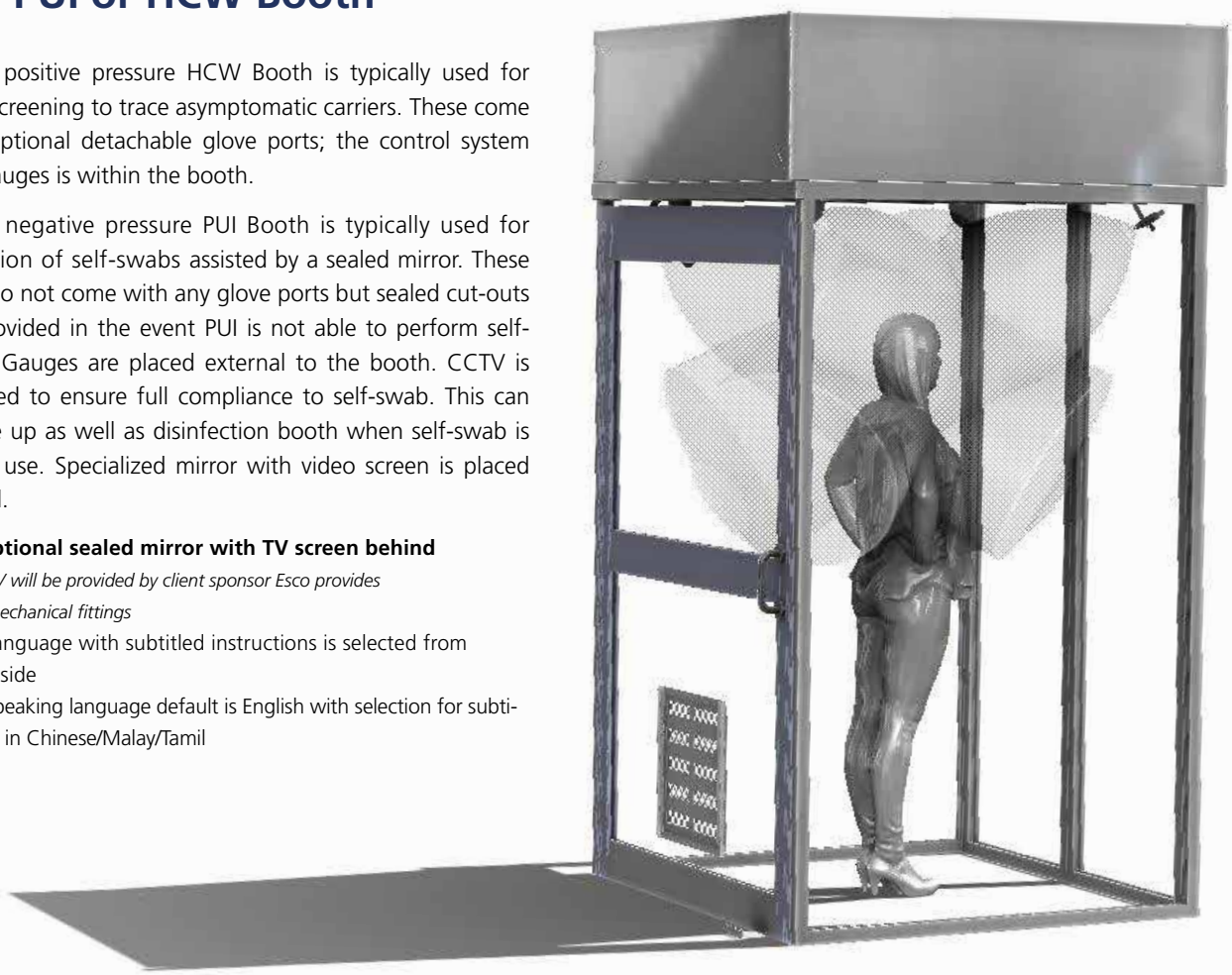
Single PUI or HCW Booth

- Single positive pressure HCW Booth is typically used for mass screening to trace asymptomatic carriers. These come with optional detachable glove ports; the control system and gauges is within the booth.
- Single negative pressure PUI Booth is typically used for collection of self-swabs assisted by a sealed mirror. These units do not come with any glove ports but sealed cut-outs are provided in the event PUI is not able to perform self-swab. Gauges are placed external to the booth. CCTV is provided to ensure full compliance to self-swab. This can double up as well as disinfection booth when self-swab is not in use. Specialized mirror with video screen is placed behind.

» **Optional sealed mirror with TV screen behind**

**TV will be provided by client sponsor Esco provides mechanical fittings*

- Language with subtitled instructions is selected from outside
- Speaking language default is English with selection for subtitles in Chinese/Malay/Tamil

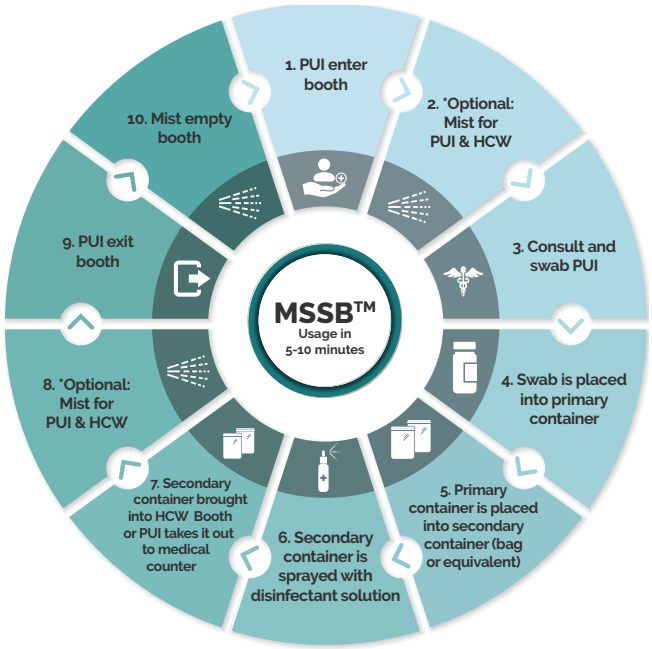


Standard Operating Procedure for MSSB™

- Healthcare Workers (HCWs) can wear their own glove size that fits their hand size and self-disinfect between swabs, however, as this is dependent on SOP, HCW must be well-trained to ensure complete disinfection and that they do not accidentally spread the virus. Clients are free to reuse gloves, but they must do their own validation and justification to prove they can be reused.
- In case of an adverse event if someone sneezes or coughs, HCWs can disinfect their hands through external auto-hand sanitizer before bringing their hands back into their booth.
- It is recommended that HCWs to change gloves between swabs, when they accidentally meet body fluids or the PUI sneezes/coughs.
- Many COVID-19 "Booths" are either static with no validated pressure differential. There are certain cases where PPE does not need to be changed and rely on manual disinfection. PPE does not need to be changed, however, they rely on manual disinfection and all it takes is 1 contaminated glove to cause accidental secondary / tertiary infection. It is also not yet validated if viral load can be completely removed due to high usage.

SOP without Detachable Gloveports (with air curtain for additional protection)

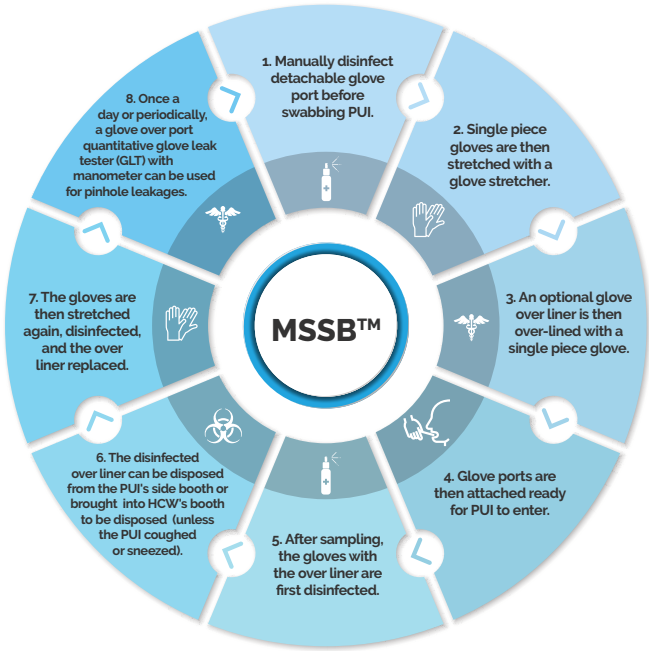
Steps 1-6 (5-10mins)



Note: *Additional steps for decontamination, if needed: BioAtom gun or BioVap Suitcase to manually biodecontaminate PUI booth with HCW wearing PPE to wipe down all surfaces (additional 7 mins).*

****Disclaimer:*** *In some countries (point 2 & 8) personnel are not recommended to be misted, please check with local Ministry of Health (MOH) guidelines.*

SOP with Detachable Gloveports



Note: *It is recommended that the clients do their own cost-benefit analysis for this MSSB™ unit with detachable glove port, against glove static enclosures.*



Additional Enhanced Features for PUI with some amount of COVID-19 like symptoms.

- Disinfection system utilizing anolyte, 0.1% sodium hypochlorite (NaOCl) or 1% hydrogen peroxide (H_2O_2) is provided for PUI negative pressure booth
  Note: When the booth is not used for diagnostic swabs, it can be used for routine disinfection
- Optional disinfection in HCW booth.
- If disinfection options are taken a stainless-steel base pan, there will be a provision of silicone sealed drain pipe.
- Optional detachable static sealed glove port attachment
  » After disinfection this allows HCW to detach the ports and bring them into HCW's booth for thorough disinfection
- In the event that optional detachable glove ports are bought, an intercom and glove leak tester (GLT) will also be provided

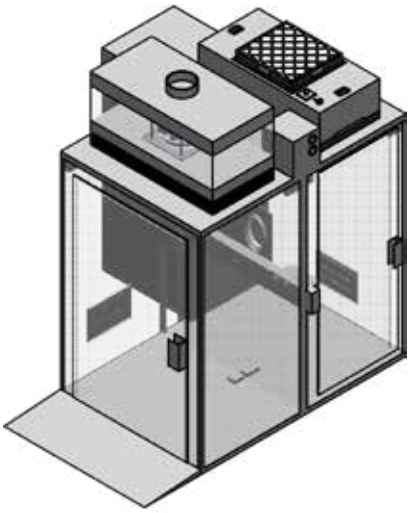
Limitations

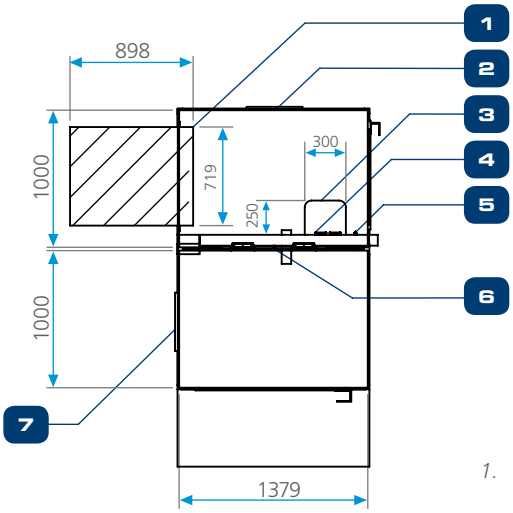
- As per WHO COVID-19 guidelines, sputum/lavage needs to follow biosafety handling as the sample is potentially highly infectious (Refer to Esco Aster infectious Disease Diagnostic Sampling Booths).
- Healthcare worker outside swab booth may still need to wear full PPE. (i.e. Healthcare Worker, depending on risk assessment, if coming from inside the booth to outside, or as stepping into high potential contaminated area, runs risk of being infected unless wearing full PPE).
- Non-biosafety rated III enclosure, not pressure decay tested; gloves are not pressure decay leak tested.
- As MSSB has a single supply and exhaust HEPA filter, this is not recommended for collecting swabs from PUI with COVID-19 like symptoms or COVID-19 positive patients, unless the healthcare worker inside booth is wearing full PPE. This is because the unit draws in external air which may potentially contain an infectious virus.
- Recommended background environment for MSSB should be biosafety level 2 (BSL-2) minimum if not BSL-2+, BSL-3 or BSL-4, depending on risk assessment and location placed. Clients that want to place MSSB in a non BSL-2 environment can do so at their own risk.
- Cannot be integrated into pressure tested Mobile Dx Labs.
- No closed manner for handling Dx Samples (in event that enhanced detachable glove ports are taken, an opening below glove ports will be provided).

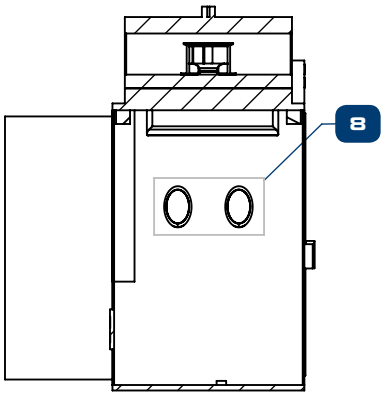
Use Post Screening

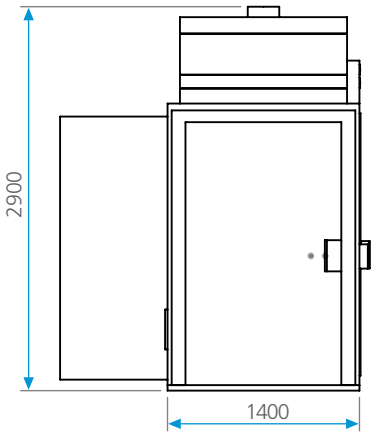
- Disinfection for PPE Booths can be repurposed by adding bars, shelving and heaters (~70°C Celsius), and UV-C to hang PPE (and validated that PPE can be re-used).
- Repurposed in hospitals and clinics where healthcare workers, and pharmacists are mostly at risk.
- MSSB™ can be placed in areas that require individual registration to still promote good hygiene and prevent cross-contamination.
- Kept for next pandemic or outbreak.
- Repurpose for sunscreen tanning booths.
- Repurpose for misting water booths for cooling down on hot day.
- Repurpose and donated to other countries that require such units.
- Sold off to other countries at bulk discount.

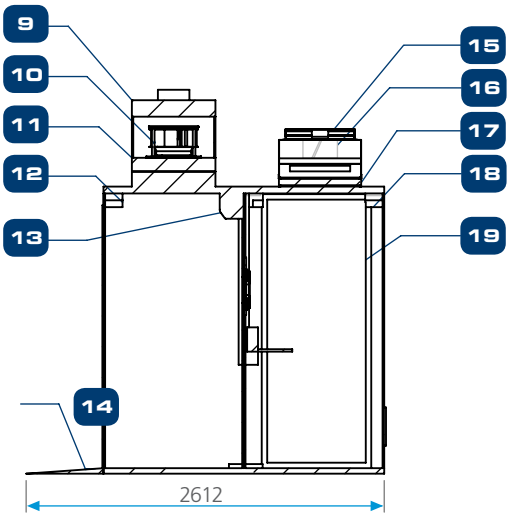
GA Drawing

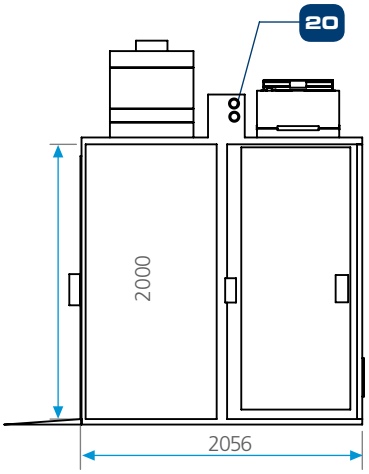












1. *DOUBLE DOOR REFRIGERATOR (OPTIONAL)*
2. *EXHAUST PREFILTER WITH ADJUSTABLE GRILLE*
3. *SHELF (OPTIONAL)*
4. *OUTLET X 2*
5. *DISINFECTION SPRAY*
6. *DISINFECTION SPRAY*
7. *INLET PREFILTER WITH ADJUSTABLE GRILLE*
8. *REMOVABLE CLOSED PORTS WITH SINGLE PIECE GLOVES (OPTIONAL)*
9. *EXHAUST COLLAR*
10. *EXHAUST BLOWER*
11. *H14 EXHAUST FILTER*
12. *MISTING NOZZLES (OPTIONAL)*
13. *AIR CURTAIN*
14. *WHEEL CHAIR RAMP*
15. *PRE-FILTER*
16. *BLOWER*
17. *H14 INLET FILTER*
18. *MISTING NOZZLES (OPTIONAL)*
19. *DOUBLE DOOR REFRIGERATOR (OPTIONAL)*
20. *PRESSURE GAUGES*

GENERAL SPECIFICATION		
Model		The Mass Screening Swab Booth™
Nominal Size		1400
External Dimension (WxDxH)		1400 x 2612 x 2900 mm
Internal Dimension (WxDxH)		1376 x 2056 x 2000 mm
Cabinet Construction	Main Body	Stainless Steel Grade 304 frames with Plastic Polycarbonte Panels
	Floor	Stainless Steel Grade 304
	Door	Stainless Steel Grade 304 frames with Plastic Polycarbonate Panels
Power Consumption		Contact Esco for more information
Cabinet Full Load Amps (FLA)		Contact Esco for more information
LED Lamp Intensity		Contact Esco for more information
Net Weight		Contact Esco for more information
Shipping Weight		Contact Esco for more information
Shipping Dimension, Maximum (WxDxH)		Contact Esco for more information

Additional Options

- Integrated automated temperature sensor to self-measure temperature can be added (longer lead time +4 weeks)
- Optional double door fridge connected to HCW Booth (longer lead time +4 weeks)
- Optional portable fridges (longer lead time +4 weeks)
- Stethoscope mount

Validation

- Occupational exposure is ongoing validation with modified SF6 Tracer gas showing pressure differential and air curtain is effective.

Esco is committed to flatten the curve of the COVID-19 pandemic through its 'trace, test, and treat' platform which promotes worldwide eradication of the virus.

In its trace stage, Esco designed and created two COVID-19 booths: **Infectious Disease Diagnostic Sampling Booth™** (IDDSB™) and the **Mass Screening Swab Booth™** (MSSB™). The IDDSB™ is a pressure-tested booth that can be integrated with a hydrogen peroxide biodecontamination system for the main purpose of mass testing symptomatic person under investigation (PUI) and person under monitoring (PUM) with COVID-19 like symptoms, it can also be used for repeat testing of COVID-19 positive patients, including sputum/lavage (saliva), thus ensuring protection of the HCW and the environment. On the other-hand, MSSB™ is a non-pressure decay tested booth designed to diagnose asymptomatic person under investigation (PUI) and person under monitoring (PUM) in a short span of time while eliminating the risk of front-liners contracting the virus.

With the booths' programmed pressurization (MSSB™: +ve for HCW and -ve for PUI booth; and for IDDSB™: -ve), strict airflow regime, and partnered with stringent SOPs, Esco guarantees a safe and efficient mass testing in each community to trace and diagnose all asymptomatic carriers and Person Under Investigation with COVID-19 like symptoms, to prevent further spread of the virus.

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