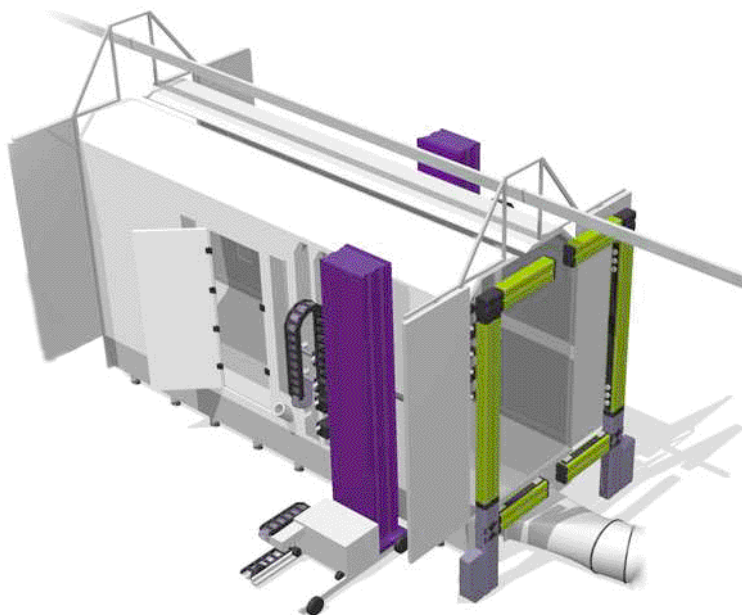




From February 1st, 2017 SAMES Technologies SAS becomes SAMES KREMLIN SAS
A partir du 1/02/17, SAMES Technologies SAS devient SAMES KREMLIN SAS



ES00369

User manual

PVV Automatic Powder Coating Booth

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The French version is deemed the official text and Sames will not be liable for the translations into other languages.

PVV Automatic Powder Coating Booth

1. Safety	4
1.1. <i>Supplementary documents</i>	4
1.2. <i>Safety rules</i>	4
1.3. <i>Residual risks</i>	6
2. Description	7
2.1. <i>General description</i>	7
3. Specifications	8
3.1. <i>Overall dimensions - Weight</i>	8
3.2. <i>Pneumatic specifications</i>	8
4. Diagrams	8
5. Operation	9
5.1. <i>Conveyance of parts</i>	9
5.2. <i>Powder coating</i>	9
5.3. <i>Cleaning stage</i>	9
6. Tools	9
7. Installation	10
7.1. <i>Booth support legs</i>	10
7.2. <i>Dual axis reciprocator</i>	11
7.3. <i>Blower nozzles</i>	11
7.4. <i>Doors</i>	11
7.4.1. <i>Side doors (optional)</i>	12
7.4.2. <i>Sliding doors</i>	13
7.4.3. <i>Limit-stop sensors and end stops</i>	14
7.5. <i>Suction duct</i>	15
7.6. <i>Booth equipment</i>	15
8. Maintenance	16
8.1. <i>Cleaning</i>	16
8.1.1. <i>Cleaning the booth walls</i>	16
8.1.2. <i>Cleaning the sprayer exteriors</i>	17
8.2. <i>Preventive maintenance</i>	18
8.2.1. <i>Cleaning the PVV booth</i>	18
9. Troubleshooting	19
10. Spare parts	20

1. Safety

1.1. Supplementary documents

Note: This document contains links to the following operating manuals:

For the GNM 100, [see RT Nr 6102](#)

For the "Mach-Jet Gun", [see RT Nr 6336](#)

For the "Auto Mach-Jet", [see RT Nr 6366](#)

See the supplier's documentation for the filtration box

See the supplier's documentation for explosion venting

See the supplier's documentation for recommendations on reducing the explosion hazard

See the supplier's documentation for the ΔP control module

See the supplier's documentation for the motor fan unit

See the supplier's documentation for the DPI sequencer

For the reclaiming assembly, [see RT Nr 6188](#)

For the PVV Easycolor facility, [see RT Nr 6224](#)

1.2. Safety rules



WARNING : All operators must, without fail, understand the residual risks involved in the use of the equipment ([see § 1.3 page 6](#)).

The rules listed below apply to the installation, maintenance and operation of the equipment.



WARNING : This electrostatic coating equipment must only be used by trained personnel who are fully aware of the following safety rules:

- 1 The work area must have antistatic flooring (bare concrete flooring is usually antistatic).
- 2 The earth terminal of the electro-pneumatic control module and all conductive structures located within or near the work area (flooring and walls of the powder coating station, ceilings, gates, parts to be painted, etc.) must be electrically connected to the electrical power ground protection system.
- 3 All grinding or welding of metal products performed within a distance of 5 metres of the booth is prohibited unless the following safety measures have been taken:
 - the booth must be protected by a tarpaulin made of non-flammable material,
 - someone equipped with a fire extinguisher must monitor the booth area during the work.
- 4 The booth must not support any load other than that of the equipment intended for installation on or around the booth.
- 5 Use only powder sprayers approved by SAMES in the booth.
- 6 The ground surface on which the booth rests must be perfectly horizontal.
- 7 The ground surface on which the booth rests must have a strength greater than 400 kN /m².
- 8 The temperature of any heat source in contact with the booth walls must not exceed 40° C.
- 9 The booth must only be used for electrostatic application of approved thermoplastic or thermosetting powdered paints.
- 10A warning sign written in a language understood by the operator which summarizes the safety rules set forth in this manual must be conspicuously displayed near the work station.
- 11The operator must make sure that the high voltage power supply has been cut off before working in the spray area, especially during cleaning operations.
- 12Operators must wear antistatic shoes which comply with ISO 2251 standards. Boot socks or shoe coverings are recommended for use inside the booth. If gloves are necessary, use only antistatic

- gloves or gloves from which the palms have been removed.
- 13 Due to the fire hazard, the use of inflammable products to clean the booth and equipment is strictly prohibited. We recommend that you use only cleaning products recommended by SAMES.
 - 14 Smoking or the use of any device producing a flame is strictly prohibited within a five metre distance of the booth.
 - 15 Each part to be coated must have a resistance of less than 1 Mohm. Consequently, the swing trays and hooks which support the parts must be stripped clean.
 - 16 Good ventilation must be provided during powder application. For that reason, the powder coating equipment will operate only in conjunction with the motor fan unit (i.e. powder spraying is only possible when the fan unit is in operation).
 - 17 Because of their considerable weight (about 30 kg/m²), booth doors must be installed or removed using appropriate lifting equipment ([see § 7.4 page 11](#)).
 - 18 Entering the booth through the sliding doors located on the suction duct side is strictly prohibited. Access to the booth interior is limited to personnel aware of the shock hazard related to the reciprocators. Access is only permitted when coating is not being performed and only for cleaning purposes.
 - 19 When the booth is installed in hole, jumping into the booth is strictly prohibited, solder breakings can appear.
 - 20 During periods of operation, cleaning and maintenance, only personnel aware of the shock and crushing hazards are allowed within the operational radius of the dual axis reciprocators.

1.3. Residual risks

All operators must be fully aware of the residual risks involved in the operation of the PVV booth. These risks are explained in the following table:

Risk	Degree of risk	Extent of injury	Exposure frequency and length	Methods used to limit damage
Noise hazard during cleaning operations (for noise level data sheet, see RT Nr 6224)	Serious	More than one person	0 to 10 times a day for 3 min.	Personal protection (helmet, ear-plugs, etc.)
Crushing hazard by reciprocators outside of the booth	Serious	One person	Constant	Protective grille for reciprocator
Crushing and shock hazard during maintenance operation on the doors	Serious	One person	Less than once a month	Operator awareness of the risks involved (see § 7.4 page 11)
Body crushing hazard during door closing	Minor	One person	Constant	Operator awareness of the risks involved (see § 7.4 page 11)
Crushing, shock, cutting hazards during booth installation	Serious	SAMES Personnel	One time	Installation by SAMES personnel who have been trained in this procedure
Crushing hazard from parts arriving on the conveyor during a procedure inside the booth	Serious	One person	0 to 10 time a day for 5 to 10 minutes	Interlocking the opening of the gate with the shutdown of the conveyor
Fall hazard during a procedure on the upper part of the booth	Serious	One person	Rare	Use a safe means of working at the heights involved (see § 7.4 page 11.).
Fall hazard for the operator at the manual powder coating station	Serious	One person	Constant	Advise the operator of the risk of fall.
Inadequate lighting of the manual stations	Minor	One person	Constant	Keep the booth walls and the transparent lighting panels clean
Inadequate lighting in general (during maintenance and cleaning operations)	Minor	One person	0 to 10 times a day for 5 to 10 min.	Keep the booth walls and the transparent lighting panels clean
Inhalation hazard for noxious fumes and dust	Serious	More than one person	During cleaning cycles	Do not enter the booth during the powder coating stage. Use a protective mask during cleaning cycles.

2. Description

Definition:

- 1 Sprayer: automatically activated powder coating apparatus (model "Auto Mach-Jet")
- 2 Manual spray gun: trigger-operated manual powder coating apparatus (model "Mach-Jet Gun")

2.1. General description

The powder coating booth is the enclosure in which the powder is applied.

Parts are conveyed through the coating booth. When they pass in front of the sprayers, they are coated with powder.

As an option, manual powder stations can be provided for prep or touch-up painting of parts.

When the colour is changed, the inside of the booth must be cleaned. During this cleaning stage, the automatic reclaiming system sucks in the excess powder which has been deposited in the coating booth, filters it and re-injects it into the powder container.

3. Specifications

3.1. Overall dimensions - Weight

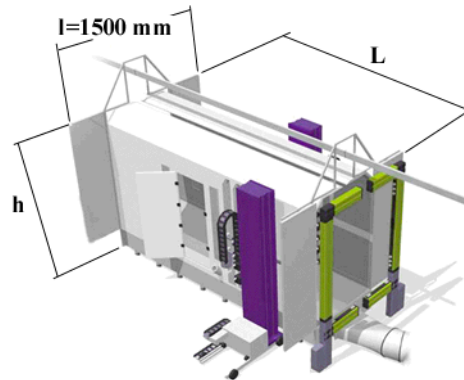


WARNING : Only SAMES is authorized to move the power coating booth.

- The standard width of a PVV booth is 1500 mm.
- Approximate booth weight as a function of dimensions:

Length Height	3 m	4.5 m	6 m
3 m	1200 kg	1600 kg	2000 kg
3.5 m	1400 kg	1800 kg	2200 kg
4 m	1600 kg	2000 kg	2400 kg

- Maximum dimensions of parts to be powder coated :
 - Height: 1200 mm.
 - Width: 700 mm or 900 mm (depending on the booth)



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3.2. Pneumatic specifications

Compressed air flows used by the cleaning devices:	
Blower ring (optional for manual cleaning of sprayers)	250 m ₀ ³ / h. (*)
Blower boom (for cleaning of booth interior)	75 m ₀ ³ / h (*)
Blower nozzles (automatic cleaning of sprayer exteriors)	20 m ₀ ³ / h per nozzle.
Compressed air specifications used for booth cleaning in accordance with the NF ISO 8573-1 standard:	
Maximum dew point at 6 bar (90 psi)	Class 4 or + 3° C (37° C)
Maximum particle size of solid pollutants	Class 3 or 5 microns
Maximum concentration in oil	Class 1 or 0,01mg / m ₀ ³ (*)
Maximum concentration in solid pollutants	Class 3 or 5 mg / m ₀ ³ (*)

* m₀³ : values given for a temperature of 20° C, at atmospheric pressure (1013 mbar).

For noise levels generated by booth equipment, refer to the noise level data sheet (in the operating manual for the facility).

4. Diagrams

Not applicable.

5. Operation

The booth rests on adjustable support legs which allow the booth flooring to be levelled.

5.1. Conveyance of parts

Sliding doors located at the entrance and exit of the coating booth and a ceiling slot allow the parts to pass through the booth.

A gantry-mounted parts detector system detects and measures parts as they enter the booth:

- When a part is detected, the powder coating operation is automatically activated.
- Measurement of the parts provides optimal control of the operation (since the reciprocator motions and the number of sprayers used are adapted to the part to be painted).

5.2. Powder coating

The powder sprayers enter the booth through vertical slots built into the side structural panels. They are supplied with powder by the supply unit and positioned by the dual axis reciprocators.

Optional manual powdering stations can be provided (with side doors in the side structural panels). When the spray guns are not being used, they should be housed in the circular openings provided for that purpose.

During spraying, the powder deposited in the booth is sucked out through the suction duct. The “boat” shaped outline of the booth flooring and the air deflector provide good air distribution.

5.3. Cleaning stage

Powder deposited on the booth’s inside panels is removed by the operator using a compressed air gun.

The powder sprayers are cleaned by blower booms.

Excess powder is then aspirated through the suction duct for reclaiming.

6. Tools

Not special tools required.

7. Installation

The powder coating booth must be installed by SAMES.

It is essential that all requests for modifications to the powder coating booth or the facility of which it is a part be addressed to SAMES.



WARNING : Always observe safety rules during equipment installation (see § 1 page 4).

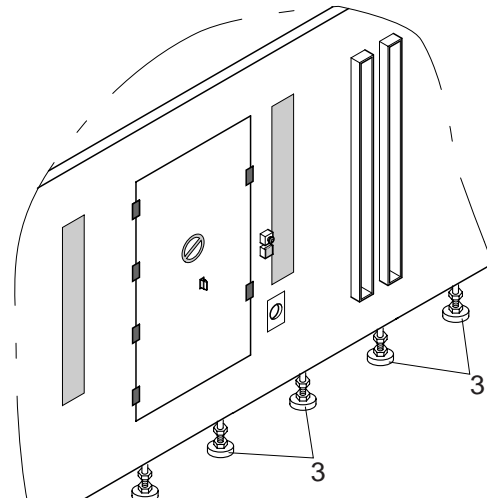
The installation of the powder coating booth is the responsibility of SAMES. Nevertheless, for maintenance reasons, the customer may on occasion have reason to take down and then reinstall or adjust certain parts of the powder coating booth, in particular:

- the booth's support legs (see § 7.1 page 10),
- the booth's sliding doors (see § 7.4 page 11), the door opening limit sensors and the end stop; this adjustment depends on the desired degree of opening,
- the dual axis reciprocators (see § 7.2 page 11),

7.1. Booth support legs

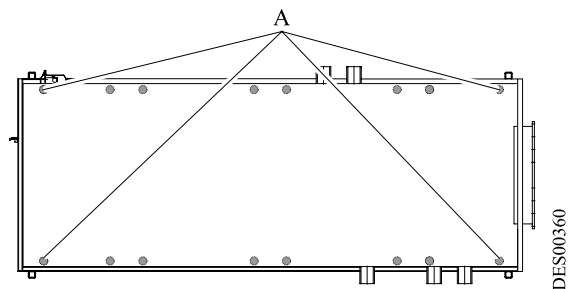
To provide a proper foundation for the booth, it is equipped with height adjustable (over approximately 50 mm) support legs. The number of support legs depends on the length of the booth (4 legs per booth module of 1500 mm in length).

3	Support leg
---	-------------



It is essential to properly adjust the height of the powder coating booth so that the suction duct doesn't exert undo stress on the booth (see § 7.5 page 15) during installation and during operation.

First adjust the four outside support legs (labelled A below), then unscrew the remaining support legs until they contact the ground.



7.2. Dual axis reciprocator



WARNING : Fasten the sprayers with 2 lockwashers: one located between the sprayer and the support arm, and the other between the support arm and the sprayer crown nut. Properly attach the cables and sprayer powder supply tubing to the reciprocator arm. Access to the dual axis reciprocators is prevented by protective grilles. These protective grilles should only be removed for maintenance operations and only after the electric and pneumatic power supplies have been disconnected.

The dual axis reciprocators can be equipped with a maximum of 3 banks of 4 powder sprayers each. The reciprocators are positioned on the ground so that the powder sprayers pass through the slots which have been provided in the booth for that purpose. They are controlled by the equipment's computer control unit and provide oscillating (up and down) motion and forward/backward (in/out) motion for the sprayers. Refer to the powder sprayer operating manual for information on installing and connecting the sprayers.

7.3. Blower nozzles

The powder coating booth is equipped with blower nozzles on both sides of the sprayers path. 2 blower nozzles are needed to clean the exterior of a sprayer (installed on the dual axis reciprocator).

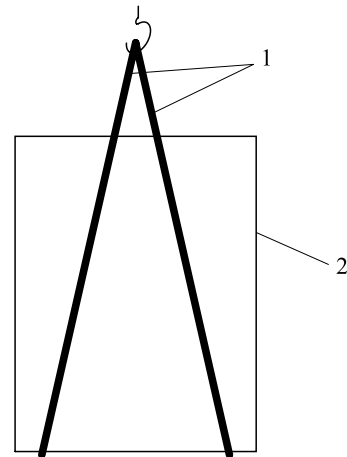
For the cleaning procedure, [see § 8.1.1 page 16](#) and [see § 8.1.2 page 17](#).

7.4. Doors



WARNING : Since the doors are heavy (about 30 kg/m²), it is important to use appropriate means (slings, lift truck, etc.) to lift the doors safely (see the diagram below).

1	Slings
2	Door



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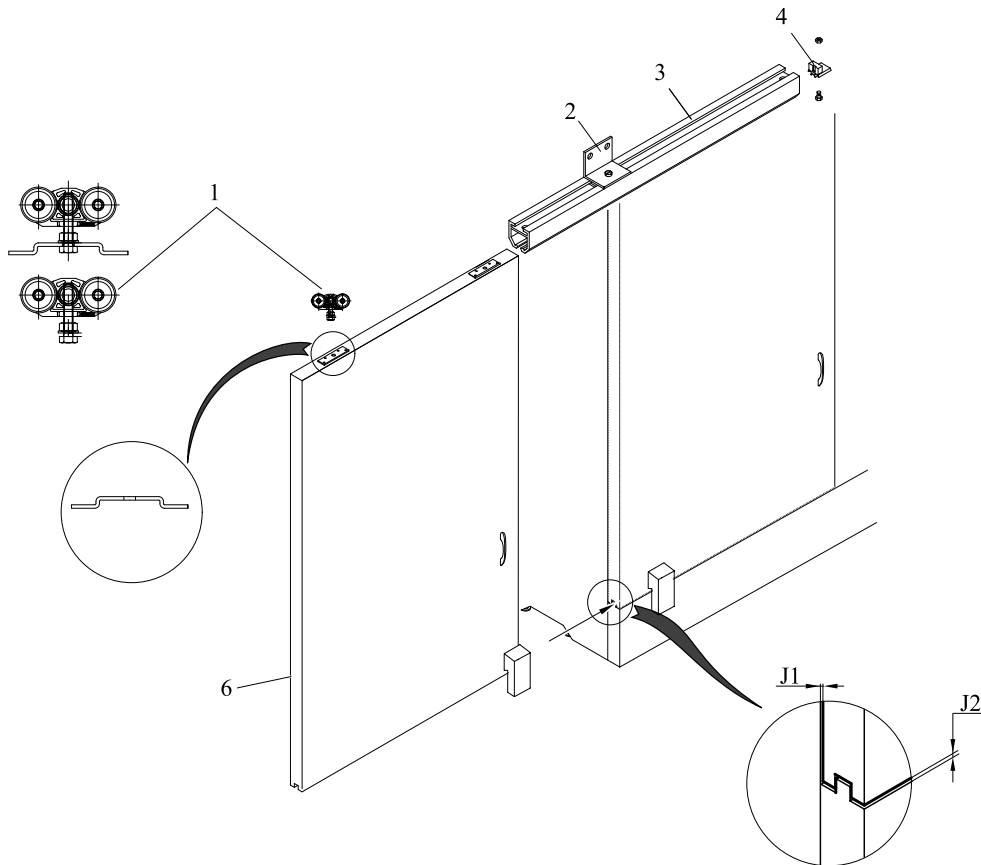
7.4.1. Side doors (optional)

These doors are installed on hinges. No adjustment is necessary.

The side doors for the manual stations can be held in the open position by a door brace.



WARNING : It is strictly prohibited to enter the booth through these doors.



1	Carriage
2	Support bracket for the limit stop sensor
3	Standard equipped rail
4	Door end stop
5	Rail support
6	Sliding door
J1	Horizontal clearance of the door with the booth structure \approx 5 mm
J2	Vertical clearance of the door with the booth structure \approx 6 mm

7.4.2. Sliding doors

Installation

The 4 sliding doors (two on each side) must be installed as shown in the Illustration below.

- Attach the two skids to the sliding door.
- Put the sliding door in place by sliding the skids onto the rail.

When the two skids on the sliding door slide on the rail attached to the structural panels, the groove on the bottom of the door must slide on the booth's structure.



WARNING : Once installed, always use the handle to operate a sliding door.

Clearance 1 adjustment:

For the proper vertical adjustment of the sliding door on the booth, some clearance should be left between the booth structure and the sliding door.

To adjust the amount of clearance, it is not necessary to remove the sliding door from the rail.

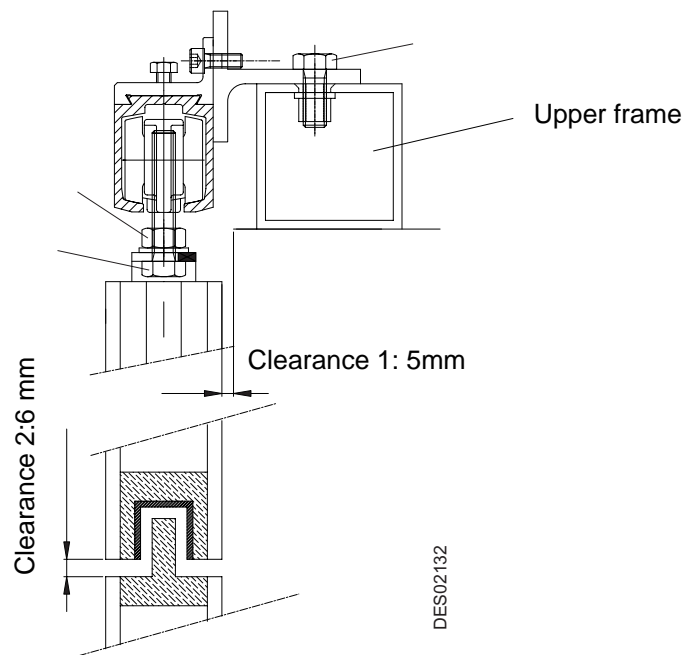
The vertical alignment can be adjusted using the rail fasteners.

- To make this adjustment:
 - Provide access to the top part of the booth,
 - Unscrew the fixing screws (item 1) located on the upper frame,
 - Position the rail so that there is a clearance of 5 mm parallel to the border of the booth.
 - Lock the screws.

Clearance 2 adjustment:

A uniform clearance of 5 mm should be left along the entire width of the sliding door between the booth structure and the bottom of the door.

- To make this adjustment:
 - Access to the top of the door,
 - Tighten or unscrew the screws (item 3) so that there is a constant clearance of 6 mm for the first door,
 - For the second door, proceed the same way to adjust, making sure that the 2 doors join correctly.
 - Lock the nuts (item 2) keeping the screws (item 3).



7.4.3. Limit-stop sensors and end stops



WARNING : The limit-stop sensors must only be adjusted by **SAMES**.
Use a safe means (scaffolding, etc.) for working at the booth ceiling level. The door opening limit-stop sensor is a safety device. It allows powder spraying to be stopped if the doors are not open wide enough when an entering part is detected by the gantry-mounted detectors. This adjustment must be made very precisely.

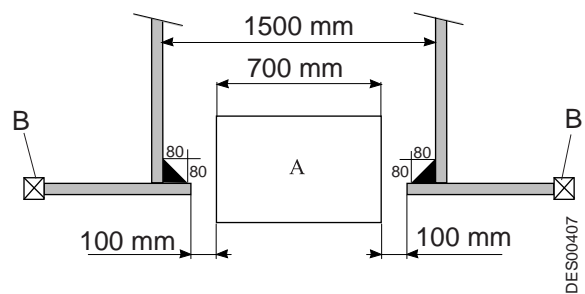
The limit-stop sensor is attached to the bracket located on top of the rail. It detects when the sliding door is fully open.

The position of the limit-stop sensor is adjustable by moving the bracket.

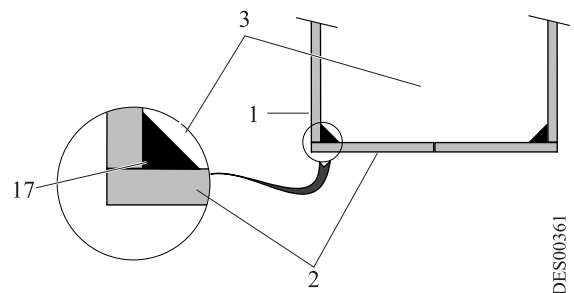
The door end stops should be positioned so that a part of the maximum defined width (700 mm, for example) can pass through them, with the maximum width being defined on the facility's floor plan and allowing for a margin of 100 mm on either side of the part (see the diagram below).



WARNING : Adjusting the door-opening width differently from the adjustment which has been pre-set by **SAMES** can result in powder being ejected from the booth due to insufficient air speed through the openings.

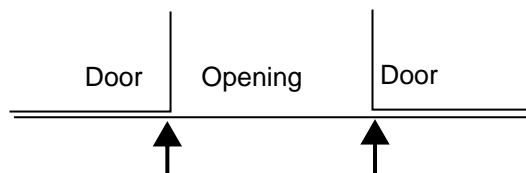


1	Structural panel
2	Sliding door
3	Interior of the powder coating booth
17	Air deflector



Doors opening, entrance and exit door, is determined according to the parts to be painted, flow and ventilation are calculated according to the openings and powder concentration.

As a consequence, opening thus determined must absolutely be respected and marked by self-adhesive arrows stuck at booth entrance and exit.



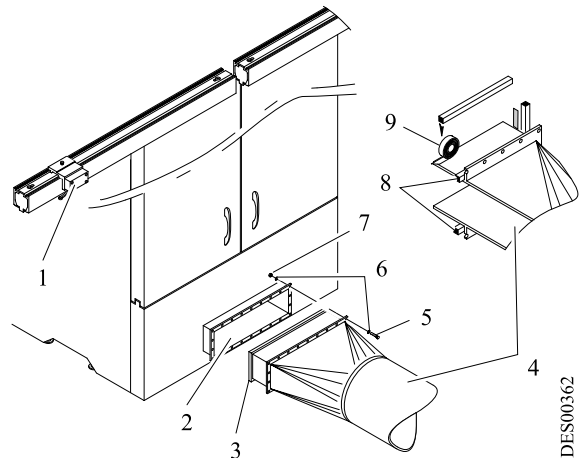
WARNING : These openings are specific for each installation, they are indicated on the lay out drawing for each project.

7.5. Suction duct



WARNING : The suction duct must be installed by a SAMES technician.

1	Limit stop sensor
2	Collector
3 & 5	Square seal
4	Suction duct
6	Double coated transfer tape



The suction duct (4) and the cyclone separator to which it is connected function as a single unit to prevent powder from accumulating on the tubing connections.

The suction duct (4) is also equipped with two sealing joints (3 & 5) located at its input end connection with the collector to prevent powder accumulation.

Suction duct installation:

- Stick a piece of double coated transfer tape (6) at each end of the suction duct, entering the booth collector.
- Stick the square seal (3 & 5) on the transfer tape.
- Present the suction duct (4) face to the collector (2) located on the powdering booth.
- Introduce the suction duct into the powdering booth collector .

7.6. Booth equipment

- Fluorescent tube interior lighting .
- Stop limit sensors (1) which interrupt powder coating if the doors are not opened wide enough to allow the part to enter the booth.
- Emergency stop push buttons on each manual powder spray station.
- Protective gate located at the sliding doors equipped with a cut-off switch which interrupts the spraying and the robot movement, if the gate should open.
- Mains power outlet, which supplies power for the control modules for the powder spray guns.
- Cleaning system made up of blower nozzles for the sprayer exteriors.
- Smoke detectors attached to the booth ceiling (optional).
- Protective grilles for reciprocators.

8. Maintenance

8.1. Cleaning



WARNING : The equipment should only be operated by trained personnel who have received training in SAMES recommended operating procedures.

For information on starting, operating and adjusting the powder coating booth, refer to the facility's user manual - [see RT Nr 6224](#).

8.1.1. Cleaning the booth walls



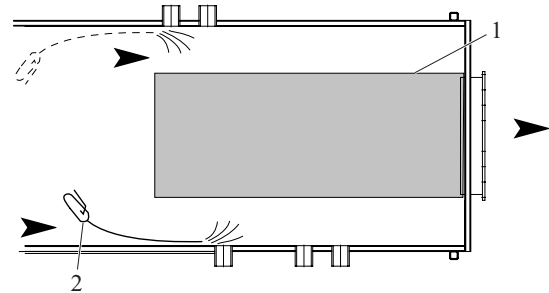
WARNING : Observe the safety rules [see § 1 page 4](#) .

Cleaning should be performed only when the air evacuation system is operational.

Do not step on the air deflector.

- Proceed from one side of the booth to the other, finishing up on the side from which air is evacuated.

1	Deflector
2	Compressed air boom



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- Enter the booth with the compressed air boom; close the doors behind you.
- Blow air on the walls from top to bottom with the compressed air boom (2). The compressed air boom should be moved at a low angle to the booth walls, especially in the area containing the sprayer slots. The end of the compressed air boom should serve as a guide by touching the walls. It will not damage the walls.
- When the powder deposited on the walls has been removed, remove the air deflector (1) then clean it using a compressed air spray gun. The air deflector (1) weighs 37 kg.
- Re-insert the air deflector into the front of the suction duct.
- The powder which has fallen to the ground is sucked into the suction duct and conveyed to the cyclone separator for reclaiming.

8.1.2. Cleaning the sprayer exteriors



WARNING : Observe all safety rules (see § 1 page 4).

8.1.2.1. Automatic cleaning

When the booth is operated under automatic pilot (as it is the case for the PVV EASYCOLOR facility), cleaning of the sprayer exteriors is performed automatically.

The sprayers are positioned inside the booth.

The cleaning procedure using the air blower nozzles is triggered automatically.

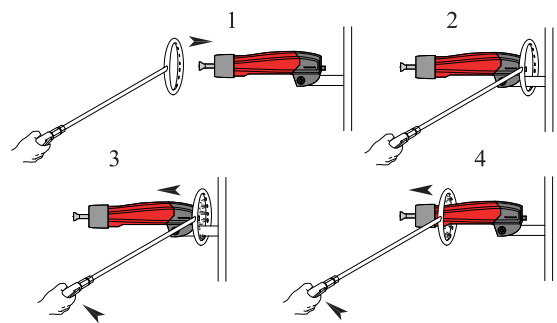
The reciprocator backs up at slow speed until the sprayers exit from the booth and moves the sprayer support arms up and down to insure that the exterior of the sprayers receive a thorough cleaning.

8.1.2.2. Manual cleaning (option)

Clean the exterior of the sprayers only when the air evacuation system is operational and the sprayers are positioned inside the booth.

A blower ring is used to manually clean the sprayer exteriors:

- Position the blower ring around the sprayer until it rests against the coating booth (see stages 1 and 2).
- Switch on the compressed air (stage 3), then clean the entire sprayer by backing up towards the inside of the coating booth (stage 4).



8.2. Preventive maintenance



WARNING : All cleaning operations must be carried out using compressed air only or cleaning products specifically recommended by **SAMES Technologies**.

It is strictly forbidden to use flammable products with a flash point less than the ambient temperature + 5°C for cleaning the booth (the booth has a PVC coating, which increases the risk of a build-up of electrostatic charges that may lead to production of sparks and possible explosion of the solvent).

8.2.1. Cleaning the PVV booth

We advise to clean the interior of the booth once a month and the exterior every three months using the cleaning product PS 1098 (P/N:100000037) recommended by **SAMES Technologies**. Follow the procedures described below.

Required equipment

- Clean non fluffy cloths
- Cleaning product PS 1098.
- Stepladder equipped with rubber feet to avoid damaging the plastic floor.
- Butyl rubber gloves
- Safety goggles
- Protective mask.



WARNING : Refer to safety instructions [see § 1 page 4](#) before any operation.

Procedure for an internal cleaning:

- Clean the interior of the booth in the same way as for a change of colour, using the cleaning rod provided for the purpose, [see § 8.1.1 page 16](#)
- Rub down the whole inside surface of the booth with a clean, dry cloth.
- Progressively clean the inside surface of the booth with a cloth soaked in the cleaning product describing circles of approximately 1 square metre in diameter. Wipe with a clean, dry cloth and repeat the operation until the entire surface has been covered. Clean from the top to bottom, insisting particularly on stubborn stains.
- Switch on booth ventilation system.
- Let dry during about 24 hours without powder spraying.



WARNING : Do not spray cleaning product in the booth with the ventilation ON.

Procedure for an external cleaning:

- Wipe down the entire outside surface of the booth with a clean, dry cloth to remove dust.
- Progressively clean the outside surface of the booth with a cloth soaked in the cleaning product describing circles of approximately 1 square metre in diameter. Wipe with a clean, dry cloth and repeat the operation until the entire surface has been covered. Clean from the top to bottom, insisting particularly on stubborn stains.
- Let dry during about 24 hours without powder spraying.



WARNING : It is essential to ensure that the cleaning product does not enter in the ventilation duct (product traces in the duct may generate powder deposits) like on the applicators.

9. Troubleshooting

Problem	Probable cause	Solution
Door does not slide smoothly	Faulty carriage roller.	Replace the carriage and re-adjust the door (see § 7.4.2 page 13).
	Poor adjustment of the door carriages.	Re-adjust the door (see § 7.4.2 page 13).
Poor distribution of evacuation air	Air deflector not properly inserted.	Correctly insert the air deflector into the suction duct.
	Damaged air deflector.	Replace the air deflector.
Sprayer not cleaned.	Air supply lacking.	Re-establish the compressed air supply.
	Non-functioning air vent.	Replace the air vent.
Poor cleaning of booth walls.	Unsuitable cleaning product.	Use cleaning products recommended by SAMES.

10. Spare parts

Refer to the illustrations in the user manual

P/N	Description	Qty	Sale Unit
E5NSEC217AT	Safety switch	1	1
E5NBFC216AT	Positioning sensor	4	1
E5NUPB060	Emergency stop	1	1
Q1FFER338	Outer latch	2/door	1
Q1RCAM081	Screwed hinge	4/door	1
R3PVR167	Sprayer blowing valve	1	1
R3VELM292AT	Solenoid valve for sprayer blowing	1	1
K7LPAG489	Sliding door carriage	4	1
910000084	Compressed air spray gun for PVV booth, lg: 1300	1	1
910000085	Compressed air spray gun for PVV booth lg: 1700	1	1
100000037	Cleaning product PS 1098 (bottle of 1 liter)	1	1