



## **TRAINING MANUAL**

### **CLEAN SURFACE**

### **DRY ICE BLASTER SYSTEM CSL2000 (SMC Version)**



# System 2000 Operating Procedure

Element Name

Important Information.

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The following pages are meant as a **GUIDE** only and the main Operating Manual **MUST** be referred to at all times.

Step  
N°


Main step

Key Point

Reason





## System 2000 Operating Procedure

Element Name	PPE	Page 2 of 15			
		Step N°	Main step	Key Point	Reason
		1	The minimum level of PPE to be worn whilst operating this machine and handling the dry ice are as follows:  Gloves  Hearing Protection  Eye Protection  Coveralls  Safety Footwear  Dust Mask Additions (Hard Hat, High Vis Vest etc)	Non-absorbant and insulated.  Foam ear plugs to min. SNR 31 dB AND ear muffs to min. SNR 32 dB.  Safety glasses / goggles Use a full face mask if solid debris is released during blasting.  Ensure sleeves are over glove cuffs  Ensure trouser cuffs cover boot tops  Use at all times  Additional PPE may be required subject to site conditions.	Consult the site managers for advice.



## System 2000 Operating Procedure

Element Name	Pre Use Checks	Page 3 of 15			
		Step No	Main step	Key Point	Reason
 		1	Ensure that: Key Switch = OFF  Selector = ICE ONLY  Emergency Stop = IN  Air Isolator Valve = OFF  Air Supply Hose is NOT connected to the Compressed Air Main	Safety    Handle Vertical	To ensure that the machine is in a safe condition prior to connecting and switching on the air supply.



## System 2000 Operating Procedure

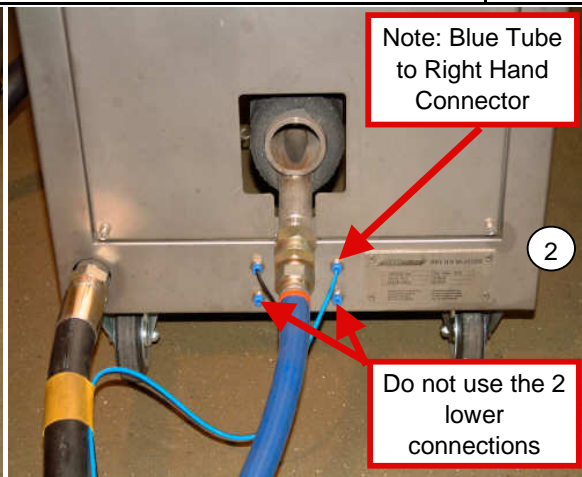
Element Name

Assembly

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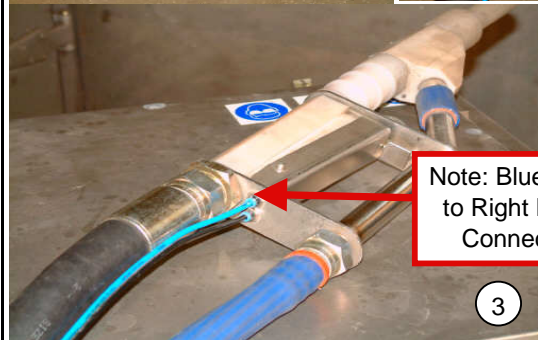
1



Note: Blue Tube to Right Hand Connector

2

Do not use the 2 lower connections



3

Note: Blue Tube to Right Hand Connector

Step No	Main step	Key Point	Reason
1	Connect the air supply hose to the front connection on the machine. Fully tighten.	1" BSP Connection	To establish an air supply to the machine.
2	Connect the blast hose assembly, as shown, to the rear of the machine. Fully tighten.	1" & 3/4" BSP Connection 2 x 4mm Push Fit Trigger Tubes	Connecting the blast hose assembly
<p><b>Note: Later models have colour coded bulkhead connectors on both the Blast Unit and the Nozzle. The left hand bulkhead is black.</b></p>			
3	Connect the anti-static electrical connector at blaster and nozzle ends	Push and turn clockwise to lock in place	To eliminate static build up at nozzle and workpiece
4	Connect the blast hose assembly to the nozzle, as shown. Fully tighten.	1" & 3/4" BSP Connection 2 x 4mm Push Fit Trigger Tubes	Connecting the nozzle
<p><b>Examine all hoses prior to connection. Any damage could result in air or ice leakage and/or injury to personnel due to hose failure. Repair or replace any damaged hoses prior to use.</b></p>			



## System 2000 Operating Procedure

Element Name	Air Supply	Page 5 of 15			
		Step No	Main step	Key Point	Reason
		1	Ensure that an isolating ball valve is fitted upstream of outlet connection point and that the valve is in the OFF position prior to connecting the air supply hose.	The air supply could come in the form of either a mobile compressor or site air. It should have a connection point of at least 1" bsp and the pipe size should be a minimum of 1" bore.	
		2	Connect the air supply hose to the outlet connection and fully tighten.		
		3	Open the isolating valve and check for leaks along the full length of hose.		





## System 2000 Operating Procedure

Element Name

Air On

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	Step No	Main step	Key Point	Reason
<div style="border: 1px solid red; padding: 2px; display: inline-block; margin-bottom: 10px;">Air Isolator Valve = OPEN</div>  <div style="border: 1px solid red; padding: 2px; display: inline-block; margin-left: 150px; margin-bottom: 10px;">Blast Air Gauge</div>  <div style="text-align: center; margin-top: 10px;">②</div>	1	Open the supply air valve and check for leaks along the hose length and at the connectors.	Safety	This supplies pressure up to the air isolator valve on the machine.
	2	Open the air isolator valve on the machine and ensure that the blast air gauge reads roughly the same as the supply air output.	Safety <b>Handle Horizontal</b> When moving the air isolator valve handle from closed to open there will be a release of air when the handle is in the halfway position. This is not a fault.	If this gauge does not read the same, contact CSL for assistance.  The halfway position is a vent position to allow safe shut down of the blaster. See "Shut Down".



## System 2000 Operating Procedure

Element Name

Ice Feed Adjust

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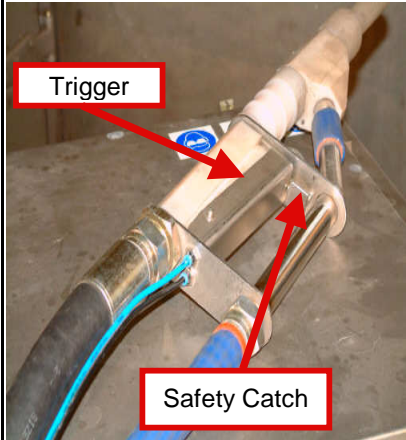
1



Key Switch = ON

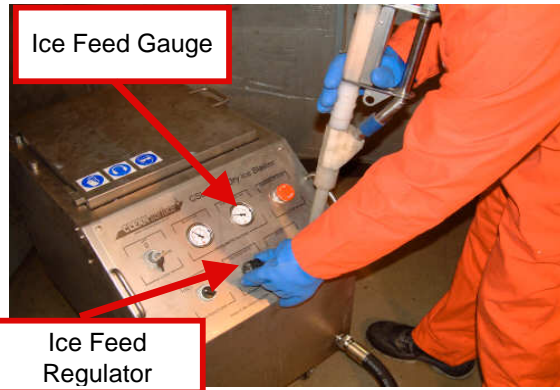
Reset Button

Emergency Stop



Trigger

Safety Catch



Ice Feed Gauge

Ice Feed Regulator

Step No

Main step

Key Point

Reason

1

Pick up the nozzle and blast hose assembly. Drape the hose over the right shoulder so that the nozzle can be held in the right hand with the nozzle pointing towards the ground.

2

Move the key switch to the ON position, reset the emergency stop button. Press the Reset button. Release the safety catch on the nozzle and squeeze the trigger. Ensure auger rotates as indicated by a knocking sound from the percussion arm. Adjust the ice feed as required using regulator on the front panel. Release the trigger and push the emergency stop.

Double check that the selector switch is still in the "Ice Only" position.

1bar to 1.2 bar.

Ensure you are as comfortable as possible before proceeding further. If you are left handed you may prefer to use the left shoulder with the left hand holding the nozzle.

Pushing the emergency stop disarms the trigger on the nozzle.





## System 2000 Operating Procedure

**Element Name**

**Hopper Moisture Check**

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Selector = RUN

Step  
N°

Main step

Key Point

Reason

①

Check the dry ice hopper

Ensure the hopper, the auger and auger tube are dry before loading dry ice.

If there is moisture in the system it will freeze on contact with the dry ice and block the dry ice flow.

If moisture is detected it can be removed by blasting dry with compressed air.


②

Drying the hopper.  
Set the selector to RUN, release the emergency stop, press the reset and activate the trigger with the nozzle directed into the hopper.  
Blast until all traces of moisture are gone.

Be prepared for a reaction force on the nozzle and for wet air blow back from inside the hopper.



## System 2000 Operating Procedure

Element Name	Loading with Dry Ice	Page 9 of 15			
		Step N°	Main step	Key Point	Reason
		1	When removing dry ice from the container only take the amount needed to do the job, up to a maximum of 20 kg at any one time. Only use the ice that is contained in the bag	Use a plastic scoop and bucket to transfer dry ice from the container. Do not handle or use wet utensils.  One full bucket is about 10 kg.	Maximum hopper capacity = 20 kg. Other ice outside of the bag could contain water ice and lead to machine blockage or damage to the area being cleaned.
		2	When leaning over the open dry ice container <b>DO NOT BREATHE IN</b>	Safety	High concentrations of carbon dioxide gas are contained within the container which could cause asphyxiation.
		3	Open the lid and pour in required amount of ice. Close the lid immediately.	Observe the ice as it falls into the hopper. Paying particular attention not to introduce any water ice into the system.	






## System 2000 Operating Procedure

Element Name

Blasting

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 <p style="text-align: center;">1</p>	 <p style="text-align: center;">2</p>	<table border="1"> <thead> <tr> <th>Step No</th> <th>Main step</th> <th>Key Point</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>With the blast hose and nozzle assembly draped over the shoulder, move the selector switch to the "Run" position, reset the emergency stop button and press the reset button.</td> <td>Preparing to blast</td> <td>This configures the machine so that the trigger is armed and the machine is ready to start blasting.</td> </tr> <tr> <td>2</td> <td>Take up a stance, adjacent to the area to be cleaned, with the left foot forward and right foot rearward. Lift up the nozzle and hold in a comfortable position. Point the nozzle at the area to be cleaned at a distance of approximately 60mm from the surface</td> <td>Always blast in an open well ventilated area. Use a CO2 detector when ever in doubt.</td> <td>Dependent upon how delicate the surface being cleaned is will determine the blasting distance. Start from about 150mm away and move closer to avoid any damage to the surface.</td> </tr> <tr> <td>3</td> <td>Brace yourself, release the safety catch and pull the trigger. After a few seconds ice will start to flow and the cleaning process will begin.</td> <td>NEVER blast in a closed area without forced ventilation and a CO2 detector. NEVER blast in a closed vessel without using a full flow breathing air face mask.</td> <td></td> </tr> </tbody> </table>	Step No	Main step	Key Point	Reason	1	With the blast hose and nozzle assembly draped over the shoulder, move the selector switch to the "Run" position, reset the emergency stop button and press the reset button.	Preparing to blast	This configures the machine so that the trigger is armed and the machine is ready to start blasting.	2	Take up a stance, adjacent to the area to be cleaned, with the left foot forward and right foot rearward. Lift up the nozzle and hold in a comfortable position. Point the nozzle at the area to be cleaned at a distance of approximately 60mm from the surface	Always blast in an open well ventilated area. Use a CO2 detector when ever in doubt.	Dependent upon how delicate the surface being cleaned is will determine the blasting distance. Start from about 150mm away and move closer to avoid any damage to the surface.	3	Brace yourself, release the safety catch and pull the trigger. After a few seconds ice will start to flow and the cleaning process will begin.	NEVER blast in a closed area without forced ventilation and a CO2 detector. NEVER blast in a closed vessel without using a full flow breathing air face mask.	
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## System 2000 Operating Procedure

Element Name	Blasting. Continued.		Page 11 of 15		
		Step No	Main step	Key Point	Reason
		①	If at any point during the blasting operation the nozzle has to be put down, eg Hopper refill, hand over to additional operator etc, the emergency stop button <b>MUST</b> be depressed.		This prevents inadvertent operation of the blaster when the nozzle is picked up.
		②	To resume blasting, reset the emergency stop and press the reset button.		
		③	If the blaster is to be left unattended it <b>MUST</b> be made safe in accordance with "Shut Down"		



## System 2000 Operating Procedure

Element Name

Clearing a Blockage. Step 1.

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Ice overflow due to blockage



Tap here with blunt object

2

Step No

Main step

Key Point

Reason

1

Upon discovering a blockage stop blasting immediately. Press the emergency stop button to disarm the trigger.

Blockage indicators are usually a lack of ice flow from the nozzle and an overflow of ice from the back of the machine.

90% of blockages occur inside the nozzle due to either a high moisture content in the supply air or high humidity levels in the working environment.

2

Investigate the cause of the blockage. If the blockage is in the nozzle, tap the nozzle, where shown, with a blunt instrument, shake out the obstruction.

Do not assume that a lack of ice flow is always due to a blockage.

Some blockages can occur as a result of introducing water ice or other foreign objects into the hopper or by kinking the ice feed hose during blasting, which causes dry ice to compact within the hose.

3

If the blockage is compacted ice in the feed hose, break up the ice by repeatedly bending the hose. If the blockage is a foreign object in the feed hose, the hose will have to be removed and the foreign object removed before continuing.

Check the hopper first, you may have used all the ice.

ALWAYS shut down and make safe PRIOR to disconnecting ANY hoses.

See "Shut Down"



## System 2000 Operating Procedure

**Element Name**

**Clearing a Blockage. Step 2.**

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Step  
N°

Main step

Key Point

Reason

①

If the blockage has been caused by a kinked ice feed hose, straighten out the hose to remove the kink and clear out the ice from the tube at the back of the machine using a screwdriver or other suitable instrument.

②

If a blockage cannot be cleared to a level where blasting can continue, (using the methods stated previously) this can be aided by following the procedure on the next page



## System 2000 Operating Procedure

**Element Name**

**Clearing a Blockage. Step 3.**

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Step  
Nº

Main step

Key Point

Reason

①

Ensure that the area around the back of the machine (Min 3m<sup>2</sup>) is clear of all personnel and equipment likely to be damaged by dry ice or foreign object.

②

Move the selector switch to the Blast Only position. Pick up the nozzle, reset the emergency stop and push the reset button.

③

Adopt the standard blasting stance and point the nozzle at a flat surface (floor or flat panel etc) at a distance of no more than 1mm.

④

Brace yourself, release the safety catch and pull the trigger. Continue blasting in this mode until you are happy that the blockage is clear.


It may be necessary to adopt a kneeling stance to carry out this operation.

Ice pellets and/or the foreign object will be ejected from the rear of the machine.

This has the effect of diverting the blast air in the opposite direction down the ice feed hose, subsequently clearing the blockage.



## System 2000 Operating Procedure

Element Name	Shut Down	Page 15 of 15			
		Step No	Main step	Key Point	Reason
		1	When the cleaning job is complete, shut down the machine and make-safe as follows:  Emergency Stop = IN  Selector = ICE ONLY  Key Switch = OFF  Main Air Supply = OFF  Air Isolator = VENT  Air Isolator = OFF	BEFORE NEXT STEP	To vent compressed air trapped in supply hose
		2	Remove keys and store as required.		

