Pre-installation Guidelines & Checklist

Dry Ice Manufacturing System - Pelletizers
PR120H | PR350H | PR750H

The Cold Jet Project Lead and Customer Project Lead who will oversee the successful installation of the pelletizer and maximize the performance of the new dry ice manufacturing system:

Cold Jet Project Lead	Telephone	Email

Customer Project Lead	Telephone	Email

Contents


Cold Jet
the force of nature

Introduction

Before any pelletizer can be installed, the owner/operator must prepare the site for installation and operation. It is the owner's responsibility to verify all the necessary preparations have been made at the installation site and meet the specifications and guidelines detailed in this publication. This may include but is not limited to:

- Providing an indoor space with standard industrial flooring.
- Installing a liquid CO_2 tank and supply pipeline system up to the connection point at the pelletizer.
- Installing a gaseous CO_2 exhaust pipeline from the pelletizer to free vent at a safe position.
- Installing a power supply that is sufficient and up to code.
- Providing proper room ventilation and other CO_2 safety measures.
- Determine which options and other manufacturing accessories to add/prepare for maximizing production performance and capabilities.

The owner is responsible for transmitting the specifications in this publication to other third-party contractors involved in the pre-installation preparations of the site. Failure to properly prepare the site may delay the installation and/or optimal performance of the pelletizer.

The graphics used in this manual may show pelletizer details and installation components that may be different than what is actually used. Components may have been removed for illustrative purposes or the continuing improvement of the pelletizer's design may cause changes that are not included in this publication.

The temperature in which the pelletizer is placed affects the output of the machine. If the pelletizer should be placed outside ambient temperatures, cold weather kit or warm weather kit should be installed. In places where the temperature can be high at times, and low at other times, it can be necessary to have both kits installed.

Average temperature (°C)	Average temperature (°F)	Accessories required
0°C - 10°C	32°F - 50°F	Cold weather Kit
10°C - 30°C	50°F - 86°F	
30°C - 45°C	86°F - 113°F	Warm weather Kit

Unpacking & Inspecting

This machine has been assembled and tested at Cold Jet's test center before being crated and shipped as one unit (excluding hydraulic oil). Follow the steps below to unpack and inspect the machine from the shipping container.

1. Examine the shipping container for any damages that may have occurred during transport.
2. Remove the machine, box(es) that contain accessories, and discard packing material, braces, and ties.
3. Examine the machine for any external damage that may have occurred during transport.
4. Open the cabinet doors of the machine and examine the machine for any internal damage that may have occurred during transport.
5. Open the front cabinet door and locate the box on the machine floor containing user documentation, discharge chute(s), optional spare part kit(s), and other accessories.
6. Confirm that all parts have been received according to purchase order.

Refer to the packing slip for a list of the components shipped with the machine. Document any damage that has occurred to the shipping container or the machine with photos and contact Cold Jet's project lead (refer to the "Cold Jet Project Lead" on the front page or the contact details of the appropriate office on the last page).

Transporting & Lifting

Always transport the machine in the upright position using a forklift. Pick up the machine from the side with the forks fully engaged and adjusted to the maximum width (refer to "Figure 1: Transporting and Lifting the Machine.").

Forklift Requirements	PR120H	PR350H	PR750H
Load Capacity	1000 kg (2205 lbs.)	1500 kg (3307 lbs.)	2000 kg (4409 lbs.)
Fork Length (Minimum)	0.8 m (31.5 in)	1.0 m (39.4 in)	1.5 m (59.1 in)

Always use lifting eyes to lift the machine (refer to "Figure 1: Transporting and Lifting the Machine."). The weights and dimensions of the machine are described in the following table:

Weights and Dimensions	PR120H	PR350H	PR750H
Shipping Weight Transport (Includes Pallet/Crate)	685 kg (1510 lbs.)	1410 kg (3109 lbs.)	1700 kg (3748 lbs.)
Shipping Crate Dimensions (L x W x H)	1250 x 850 x 2080 mm (49.2 x 33.5 x 81.9 in)	1610 x 1610 x 2180 mm (63.4 x 63.4 x 85.8 in)	1620 x 1620 x 2370mm (63.8 x 63.8 x 93.3 in)
Machine Weight (Includes Hydraulic Oil)	704 kg (1552 lbs.)	1515 kg (3340 lbs.)	1822 kg (4017 lbs.)
Machine Dimensions (L x W x H)	1150 x 650 x 1738 mm (45.3 x 25.6 x 68.4 in)	1500 x 1000 x 1800 mm (59 x 39 x 71 in)	1500 x 1500 x 1800 mm (59 x 59 x 71 in)

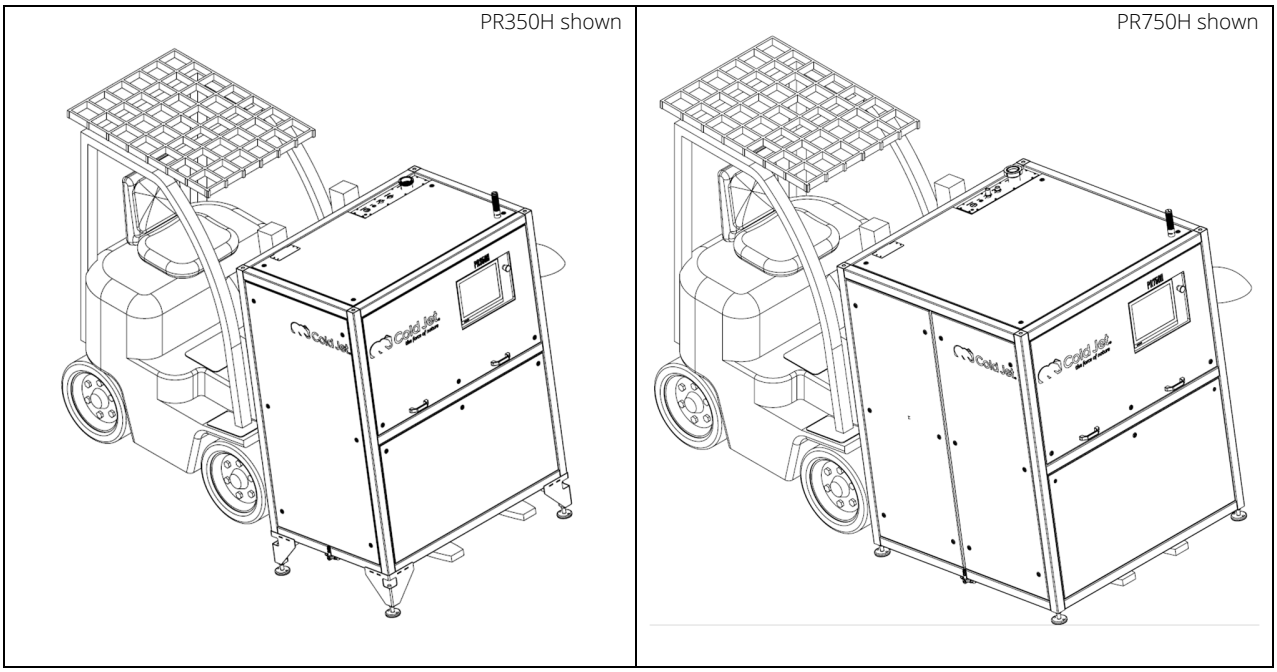


Figure 1: Transporting the Machine

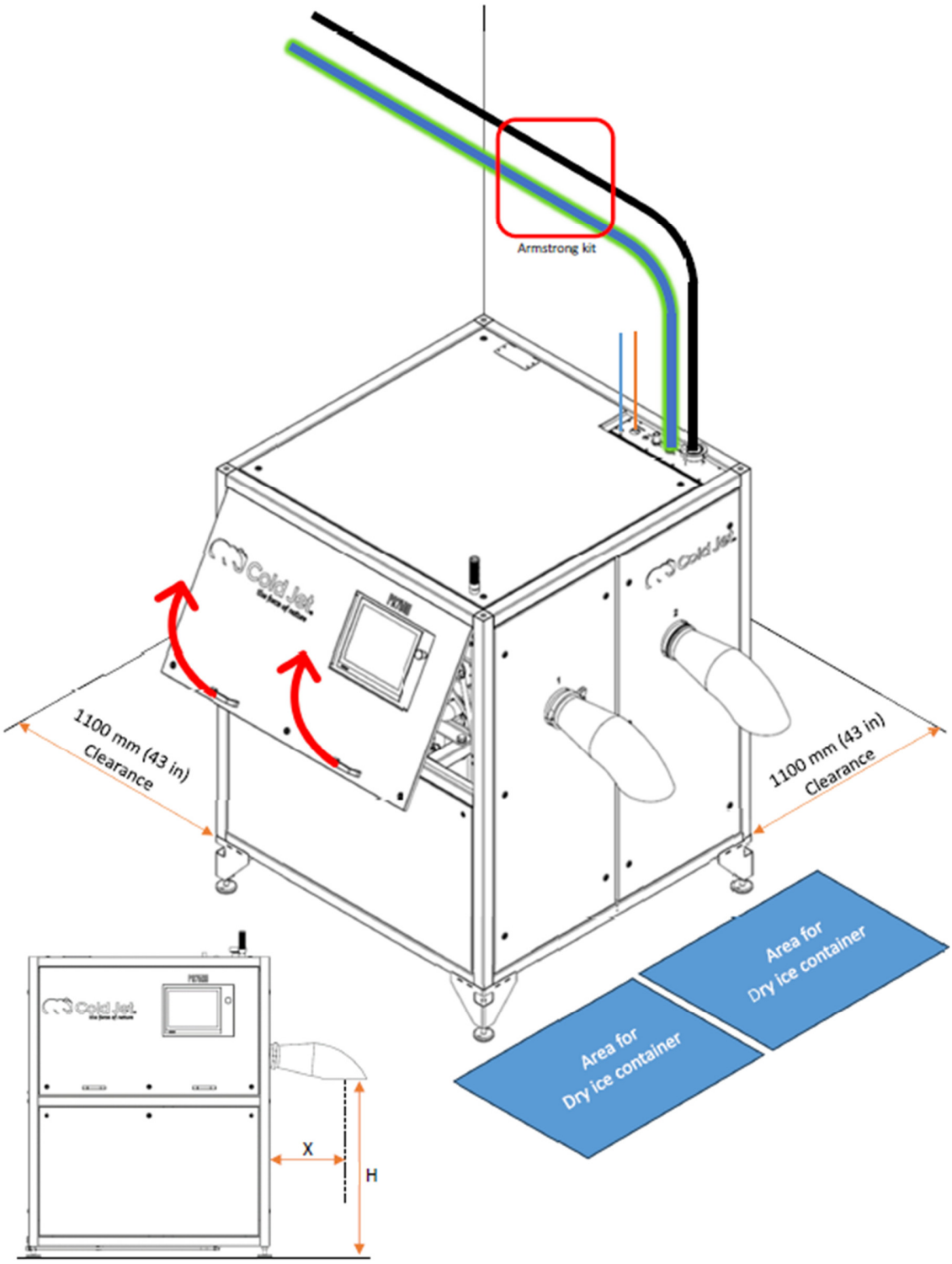
Pre-Installation by the Customer

Pre-Installation of the machine at the site must be carried out by the owner/operator. After that, a Cold Jet technician will arrive on-site for the final commissioning, start-up, and training. Machine owner/operators are responsible for the physical installation, utility connections, and CO_2 supply required to put a new machine into service.

For an overview of a typical dry ice production system, refer to "Dry Ice Production System" on page 6.

Production Space Requirements

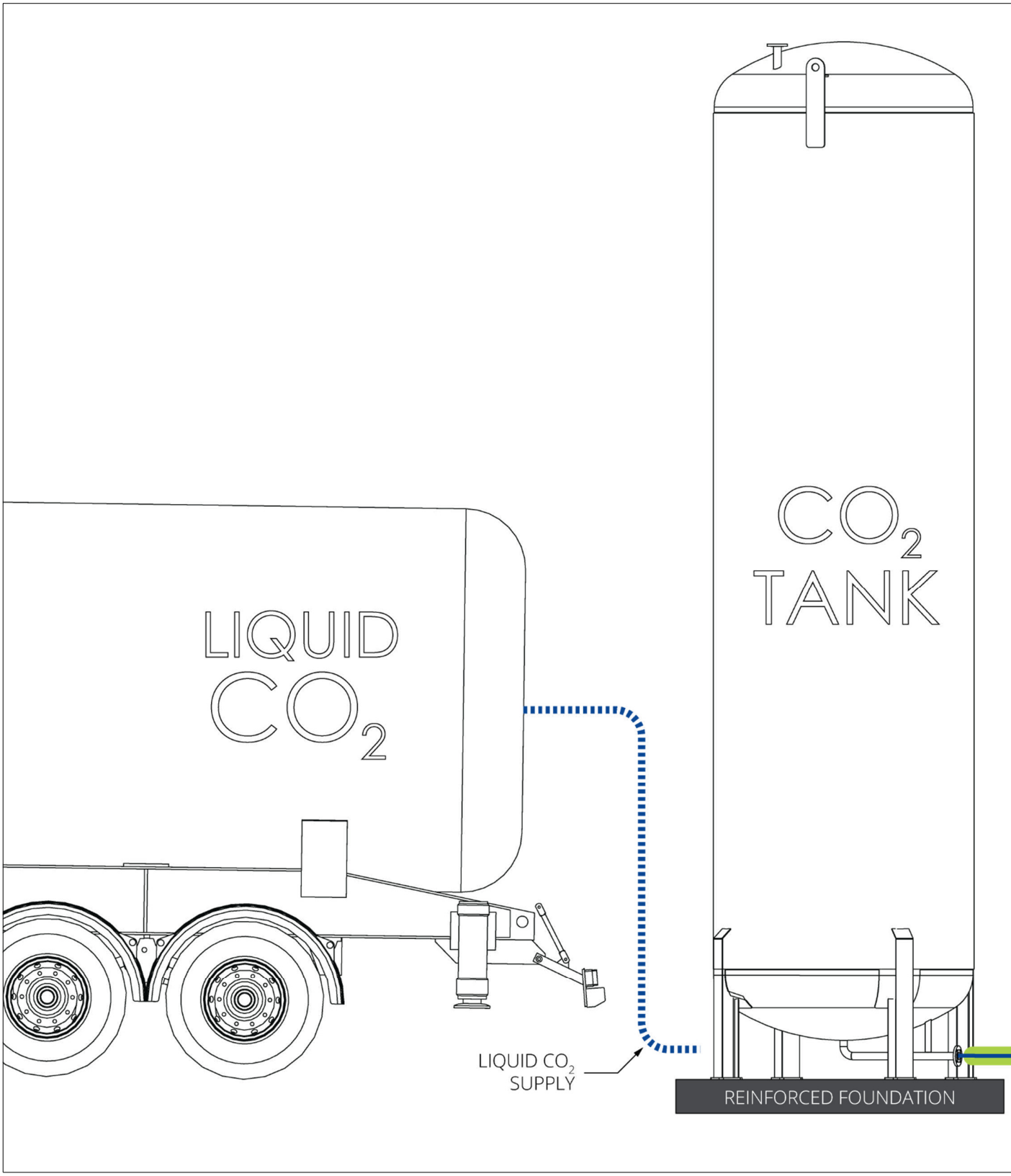
- Adequate ventilation, natural or forced, must be provided to prevent the build-up of CO_2 during production.
- A system to monitor CO_2 levels that will alert personnel when CO_2 levels become too high and pose a danger.
- The machine shall be sheltered from the wind and weather and operate in an environment with an ambient temperature between 10°C and 30°C (50°F and 86°F).
    - If the machine needs to operate in temperatures between 0°C and 10°C (32°F and 50°F) then a cold weather kit is needed.
    - If the machine needs to operate in temperatures between 30°C and 45°C (86°F and 113°F) then a warm weather kit is needed.
    - If the machine will operate in both cold and warm conditions, then both cold weather and warm weather kits are needed.
- The machine must be placed on a horizontal, concrete floor with adequate load-carrying capacity.
- The minimum clearance of 1100 mm (43.3 in.) on all sides must be observed so that the cabinet doors can be opened, and the machine can be serviced. The height of this machine from the floor to the top of the shutter is 2030 mm (80 in.) must also be considered. Allow for a minimum clearance of 500 mm above the machine for any overhead piping and cabling (refer to "Figure 2: Minimum clearances" on page 5).

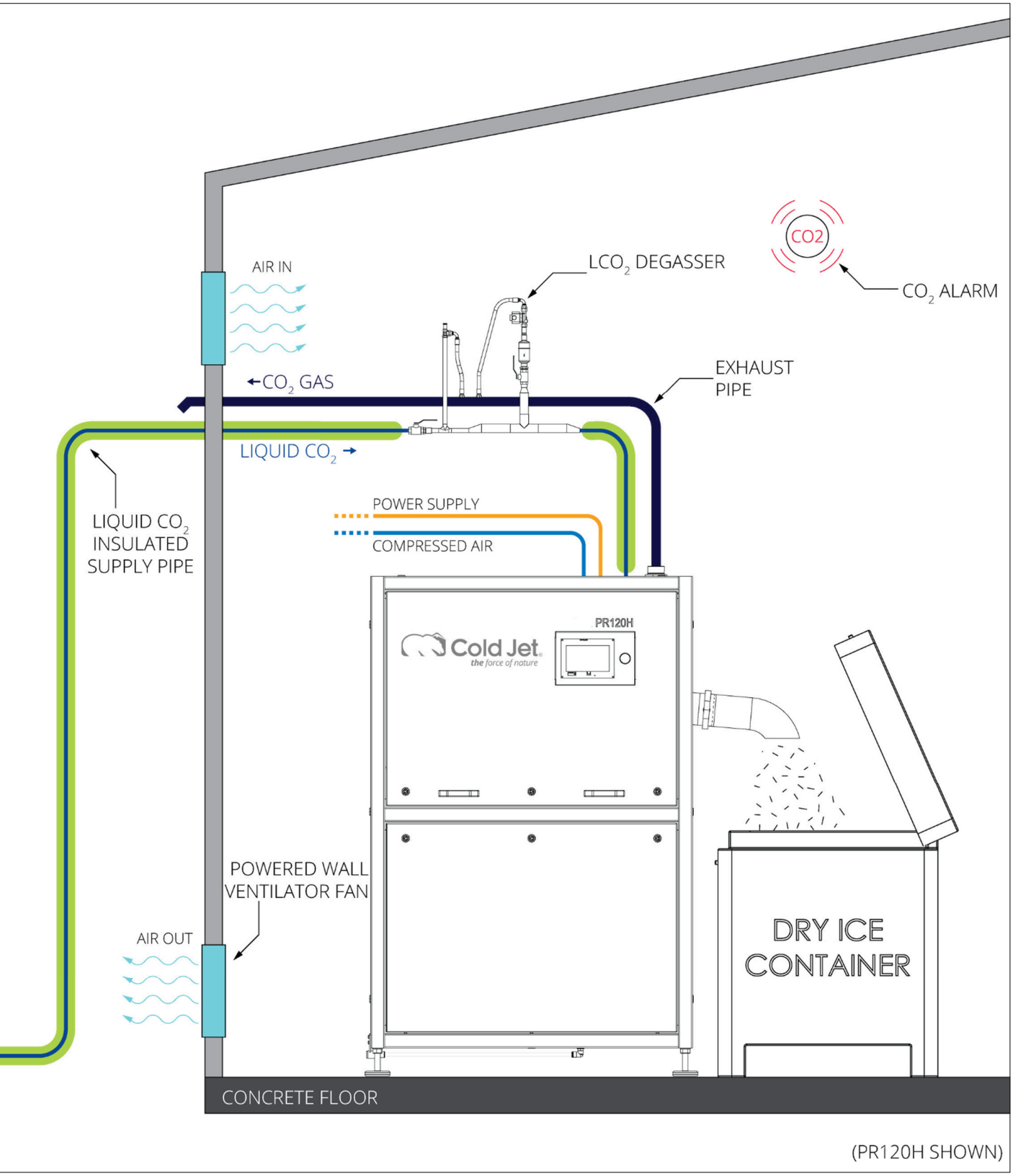


Pelletizer	H	X
PR120H	1208 mm (47.56 in)	300 mm (11.81 in)
PR350H / PR750H	1140 mm (44.80 in)	500 mm (19.69 in)

Figure 2: Minimum clearances

Dry Ice Production System





(PR120H SHOWN)

Liquid CO_2 Supply System

Cold Jet recommends the supply line for the liquid CO_2 from the storage tank to the pelletizer to be direct (with limited bends) and well insulated. This will help prevent the formation of gas and maintain the temperature of the liquid CO_2 thus improving the performance of the pelletizer.

It is the responsibility of the installer of the liquid CO_2 supply system to determine the best supply line route and the insulation needed. Use the data guidelines below to design and install the liquid CO_2 supply system:

Liquid CO_2 Supply System	**PR120H**	**PR350H**	**PR750H**
Supply Pressure (Min-Max)	13-18 bar -30°C to -20°C (189-261 psi -22°F to -4°F) Optimum performance range 15-16 bar and -24°C to -26° C (218-232 psi and -11°F to -15°F)		
Supply Pressure Range	+/- 1.0 bar (14.5 psi)		
Supply Pressure (Recommended PBU Setting)	16.5 bar (240 psi)		
Flow Rate - Minimum	900 kg/hr (1984 lb/hr)	2200 kg/hr (4850 lb/hr)	2200 kg/hr (4850 lb/hr)
Max volume withdrawal (PBU-Dimensioning)	264 kg/hr (582 lb/hr)	770 kg/hr (1698 lb/hr)	1650 kg/hr (3638 lb/hr)
Pelletizer Design Pressure / PRV setting	27.6 bar (400 psi)		
Liquid CO_2 Line Size Recommended ID	20 mm (0.75 in)	25 mm (1.0 in)	25 mm (1.0 in)
Liquid CO_2 Connection at Pelletizer	EU: 3/4-inch BSP / US: 3/4-inch NPT		
Liquid CO_2 Line Insulation	Min. 75mm (3.0 in) Industrial Insulation - (Urethane Foam - PVC/Alu jacket)		

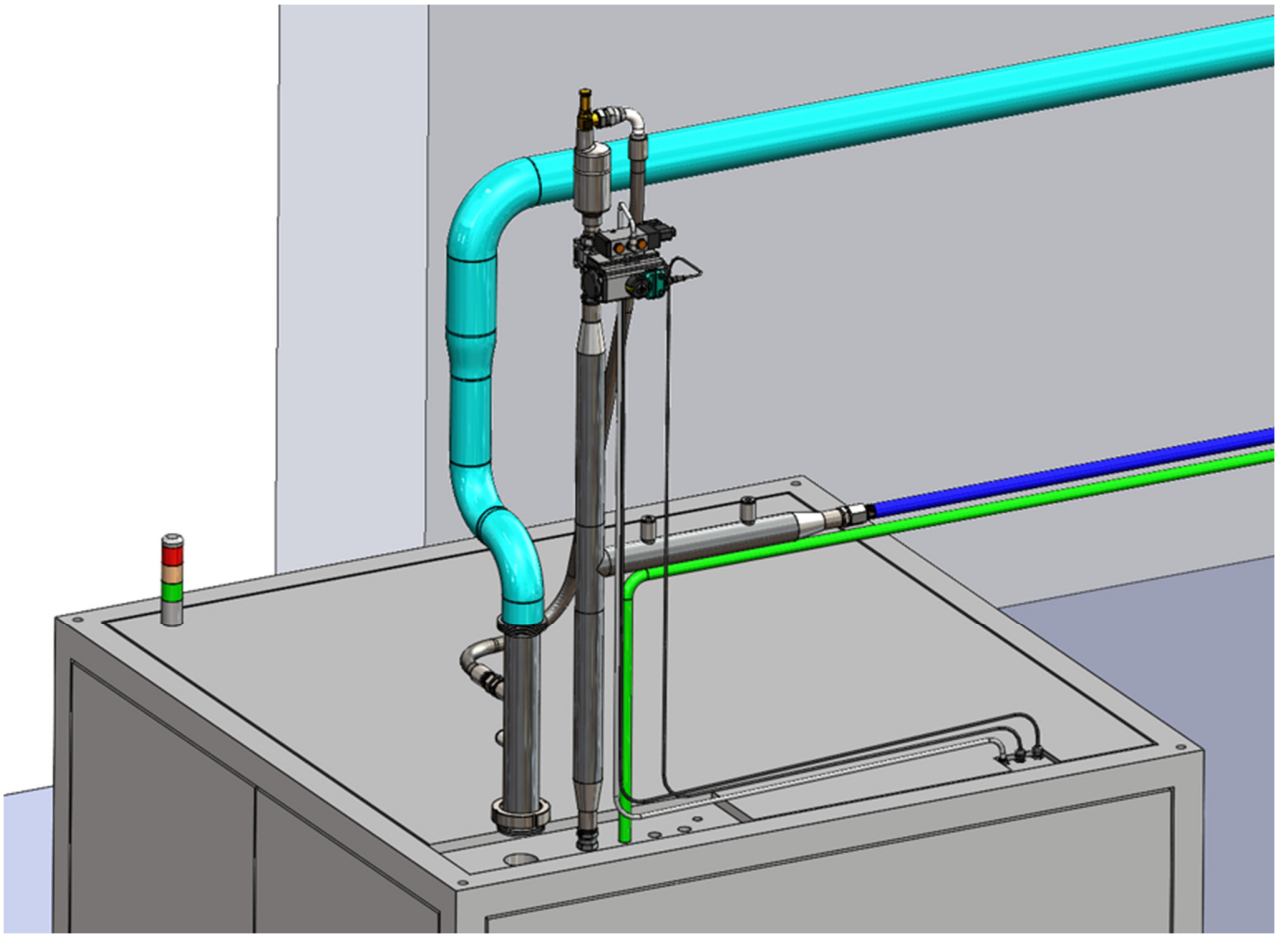
NOTE: If the liquid CO_2 supply line is serving more than one pelletizer, other CO_2 consuming machinery, or is longer than 30 m (100 ft) the owner should consult with the CO_2 piping contractor for an optimal design for a stable and gas-free liquid CO_2 supply to the pelletizer.

NOTE: For CO_2 tank installation and the liquid CO_2 supplier the recommended supply pressure settings are 15-16 bar and -24°C to -26°C (218-232 psi and -11**°F** to -15°F) for optimized output performance and quality. The liquid CO_2 quality in use must meet general purity requirement of commercial industrial/food grade specifications and must be free of oil and have a purity of minimum 99.9%. For optimum performance and high-density pellets quality the water (H_2O) content should not exceed 35 ppmv and not be less than 5 ppmv - or equivalent to a dew point temperature of -66°C to -51°C (-86.8°F to -59.8°F). If only very dry CO_2 is present please contact Cold Jet for optimal special extrusion process design and settings.

Liquid CO_2 Degassing System

In order to achieve a consistent, high-quality supply of liquid CO_2 to the pelletizer (especially the low-capacity pelletizer PR120H), Cold Jet recommends the installation of an automatic gas venting system, such as the liquid degassing system. Installing an automatic gas venting system will improve the performance of the pelletizer and increase dry ice production.

The liquid degassing system will need to be integrated into the production system by the customer's piping contractor. The piping sizes are to be determined by the piping contractor. For the effective working of the degassing system.
Contact Cold Jet for further discussion on which liquid degassing system solution would fit your installation.



Gas CO_2 Exhaust System

An exhaust pipeline with an internal diameter greater than 2.5 inches is installed to facilitate the exhaust CO_2 gas from the dry ice production process. The exhaust CO_2 gas must be vented at a safe location outside of the building with a weatherproof outlet that prevents rainwater or other contaminants from blocking or creating back-pressure to the pelletizer.

Additionally, the CO_2 exhaust could have a temperature as low as -27°C (-16.6°F) which may generate condensation. Cold Jet recommends installing an Armaflex insulation or similar product to prevent this condensation from dripping down onto the machine or production room floor.

Gas CO_2 Exhaust System	**PR120H**	**PR350H**	**PR750H**
Gas CO_2 Exhaust Volume	132 kg/hr (291 lb/hr)	385 kg/hr (489 lb/hr)	825 kg/hr (1819 lb/hr)
Gas CO_2 Exhaust Volume (Standard Conditions)	77 N·m³/hr	224 N·m³/hr	481 N·m³/hr
Operating Design Gas CO_2 Pressure (PRV)	1 bar (14.5 psi)		
Max Allowable Back-Pressure	< 1.0 bar (< 14.5 psi)		
Gas CO_2 Line Size Minimum ID	50 mm (2 in)	63.5 mm (2.5 in)	63.5 mm (2.5 in)
Gas CO_2 Connection at Pelletizer (Welding Stud)	50 mm (2 in)	63.5 mm (2.5 in)	63.5 mm (2.5 in)
Gas CO_2 Line Size minimum if connected to recovery system	50 mm (2 in)	76.2 mm (3.0 in)	76.2 mm (3.0 in)

NOTE: If the pelletizer is or is planned for future to be set-up with a recovery unit, an insulation valve should be installed. The degas piping from pelletizer should be 3" to the main header pipe to mitigate backpressure to the pelletizer and loss of either capacity or ice quality with recovery unit/-s. For further information contact Cold Jet.

Electrical Service & Supply

The Pelletizer requires a three-phase power supply. The power source must be grounded:

- For machines in the US: use a Solidly Grounded WYE Source Only.
- For machines outside US: use a TN-S grounding acc. to IEC 60364.
- All phases must be balanced, and voltages must be within ±10%.

The customer is responsible for the electrical installation of the pelletizer. This includes the power cable and upstream fuse/circuit breaker which meet the specifications below. The main circuit must be suitable for proper lock out / tag out in accordance with international and national standards and requirements.

Before startup, verify the direction of rotation is the same as indicated on the motor for the hydraulic pump and on the motor for the oil cooler pump, if applicable.

Electrical Service & Supply	**PR120H**	**PR350H**	**PR750H**
Voltage AC/ Frequency (EU 50Hz)	3 x 400 VAC/50Hz		
Voltage AC/ Frequency (US 60 Hz)	3 x 480 VAC/60Hz		
Avg. Power Consumption, no options	12 A	21,72 A	21,72 A
Avg. Power Consumption, W/ Warm Weather Kit	N/A	23,42 A	23,42 A
Avg. Power Consumption, W/ Cold Weather Kit	14,5 A	22,8 A	22,8 A
Avg. Power Consumption, W/ Warm and Cold Weather Kit	N/A	24,5 A	24,5 A
Upstream Fuse/CB (max)	16 A	32 A	32 A
Upstream Fuse/Class CC or J	20 A	30 A	30 A
IEC Short Circuit Ratings	Ik min 0,5 kA, Ik max 10 kA		

PR120H, North America

- Suitable for use on a grid capable of delivering not more than 10k rms symmetrical amperes, 480V maximum when protected by Class CC or J fuses having an interrupting rating not less than 10,000 rms symmetrical amperes, 480 volts maximum.

PR350H / PR750H, North America

- Suitable for use on a grid capable of delivering not more than 25k rms symmetrical amperes, 480V maximum when protected by Class J fuses having an interrupting rating not less than 25,000 rms symmetrical amperes, 480 volts maximum.

Instrument Process Air Supply

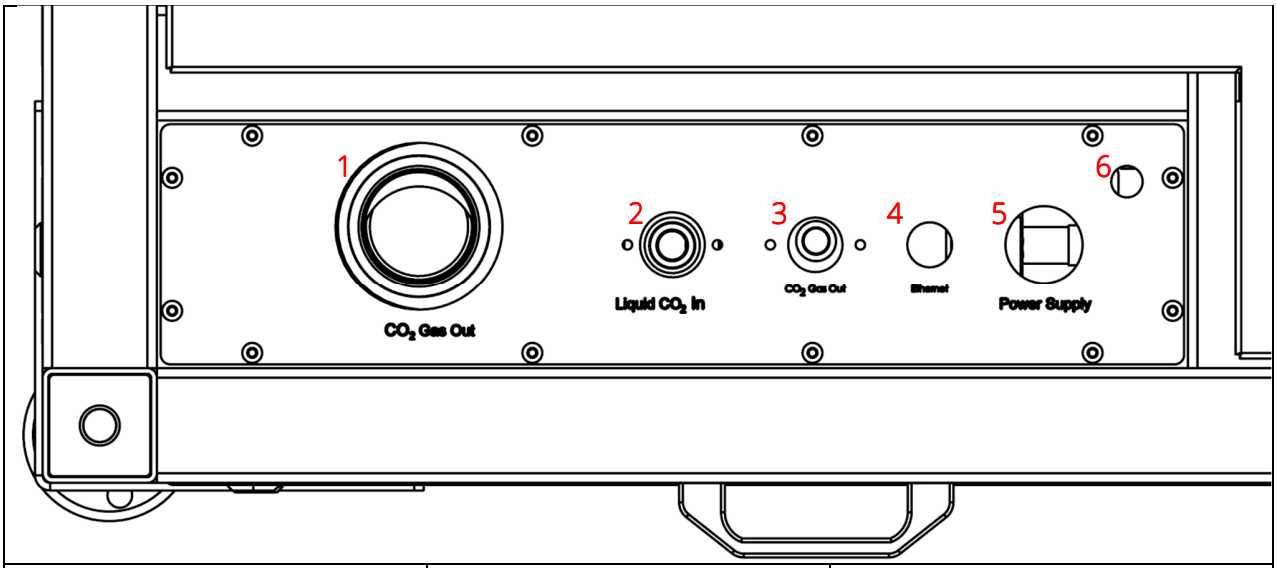
The pelletizer requires instrument air/CO_2 gas at a minimum pressure of 8 bar (116 psi) as the input to the pressure regulator in the machine.

The customer is responsible for the pneumatic installation of the pelletizer. A valve must be installed to ensure proper safe lock-out/tag-out of the machine with reference to relevant machine safety standards.

Instrument Process Air Supply	**PR120H**	**PR350H**	**PR750H**
Compressed Air Quality	ISO 8573-1, Minimum class 3		
Supply Pressure (MIN-MAX)	8-10 bar (116-145 psi)		
Flow minimum (normal liter)	150 l/min (5.3 cfm)		
Air Connection at Pelletizer	ID 12.7 mm (0.5 in) / 1/2-inch BSP - 1/2-inch NPT		

Utility Connections

The utility connections are located on top of the pelletizers (refer to "Figure 4: Utility Connections").



1. CO2 Gas Out	2. Liquid CO2 In	3. CO2 Gas Out
4. Ethernet	5. Power Supply	6. Instrument Air

Figure 4: Utility Connections

Cold Jet Connect™ Internet Connection

Cold Jet Connect™ is your access to quick and effective remote technical support. Via the internet, a Cold Jet technician can view the machine data in real time and support the owner/ operator in for continued optimized machine performance or quick diagnostic of other uptime related issues.

The customer is responsible for the internet connection and the machine, Beckhoff PLC, is connected to internet either directly through an Ethernet ISP or by using a mobile 3G/4G connection. The connection is established with a network cable RJ45 plug.

Figure 5: Internet Connection

Hydraulic Oil (Initial Filling)

The machine will be delivered without hydraulic oil in accordance with the ADR Dangerous Goods by Road regulations or similar for sea and air transportation. The owner/operator is responsible for retaining a local supplier and having the oil on-site prior to the commissioning of the machine.

Instruction for the initial filling are below. The owner/operator can fill the tank or have the Cold Jet technician fill the tank prior to the commissioning and start up of the machine.

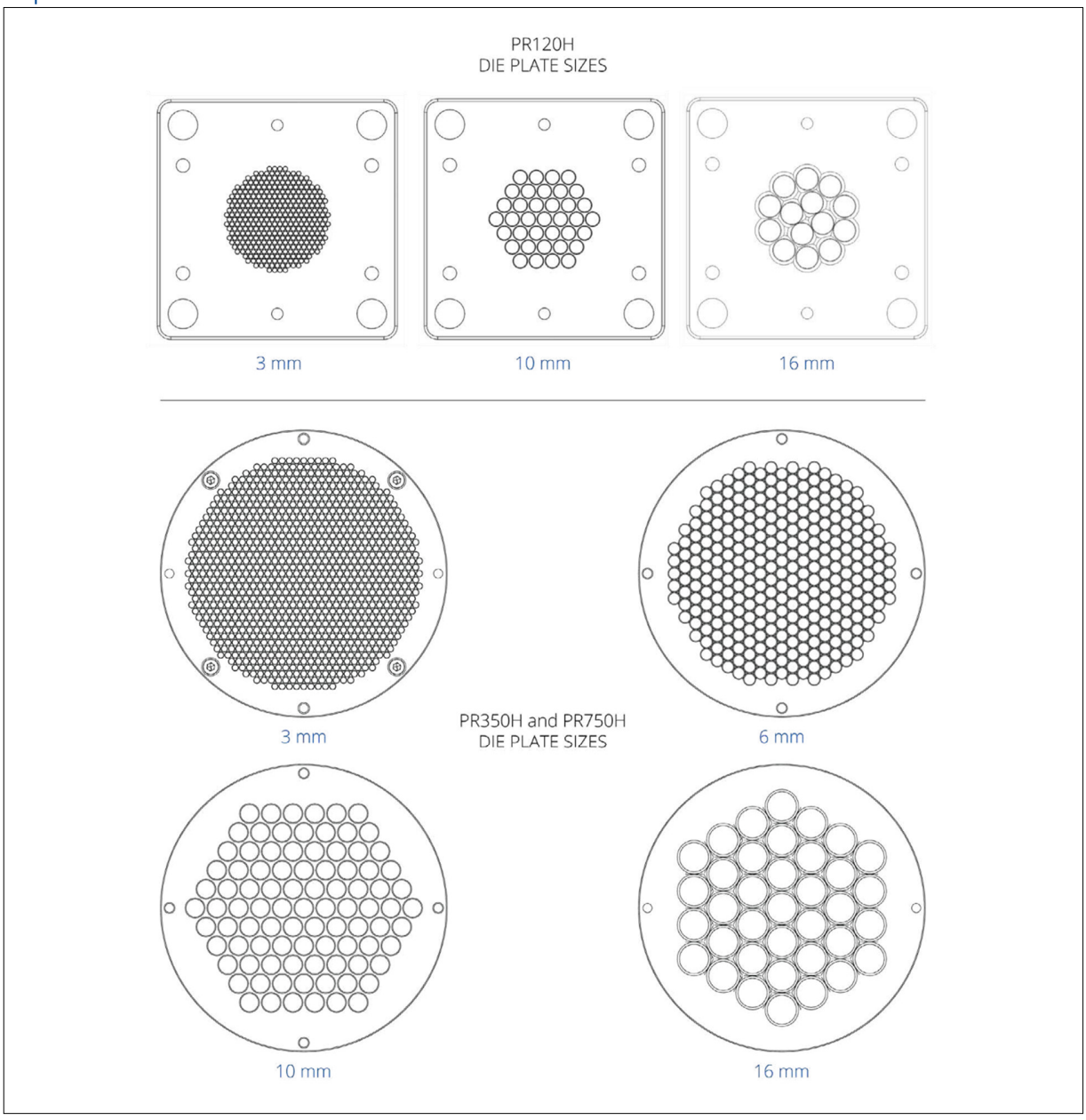
The approximate volume and oil type is listed in the table below:

Hydraulic Oil (Initial Filling)	**PR120H**	**PR350H**	**PR750H**
Hydraulic Reservoir Capacity (Max Filling)	80 l (21.1 gal)	180 l (47.6 gal)	232 l (61.3 gal)
Oil Grade/Type - Standard Technical	Mobile DTE 10 Excel 46		
Oil Grade/Type - Food Grade / FDA	Mobil DTE FM 46		

Filling the Oil Tank

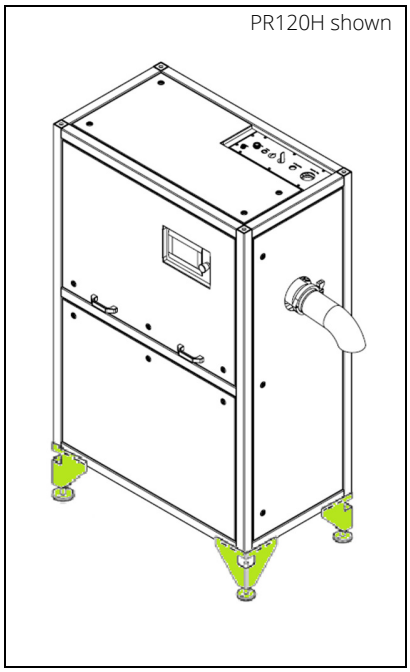
1. Remove the air filter by unscrewing it from the hydraulic tank to access the oil filling port.
2. Remove the oil filter by unscrewing it.
3. Fill the tank with the appropriate type of oil until max level is observed on the tank level indicator.
4. Reinstall the oil filter and air filter onto the oil filing port .

Options & Accessories



	3 mm	6 mm	10 mm	16 mm
PR120H	*Item No.* ***2D0613***	*Not Available*	*Item No.* ***512692***	*Item No.* ***514759***
PR350H	*Item No.* ***2D0606***	*Item No.* ***515650***	*Item No.* ***501327***	*Item No.* ***514103***
PR750H	*Item No.* ***2D0606***	*Item No.* ***515650***	*Item No.* ***501327***	*Item No.* ***514103***

Note: *Other sizes available upon request.*



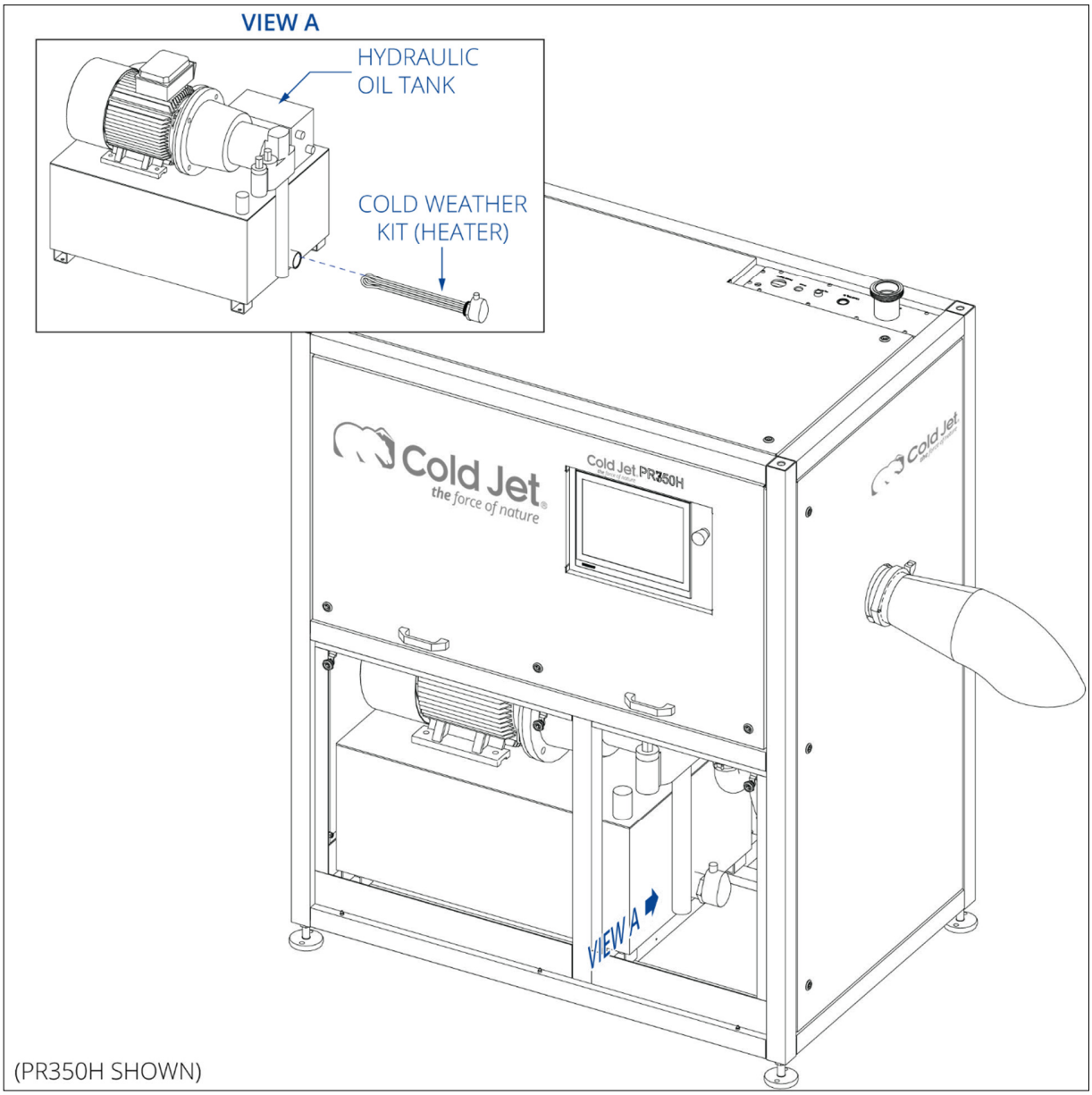
Riser Legs (Set of 4)

PR120H Riser Legs (Set of 4), Item ***513814***

The riser legs raise the pelletizer discharge height to allow for the direct feeding of different types of taller dry ice transport container/totes. The riser legs raise the pelletizer by 200 mm (7.87 in). This option is recommended if the dry ice container/tote being used is taller than 800 mm (31.5 in).

- Distance from the floor to the discharge chute without raised legs are 1208 mm (47.56 in).
- Distance from the floor to the discharge chute with raised legs are 1408 mm (55.43 in).

For PR350H and PR750H this is standard equipment. For PR120H this is an option.

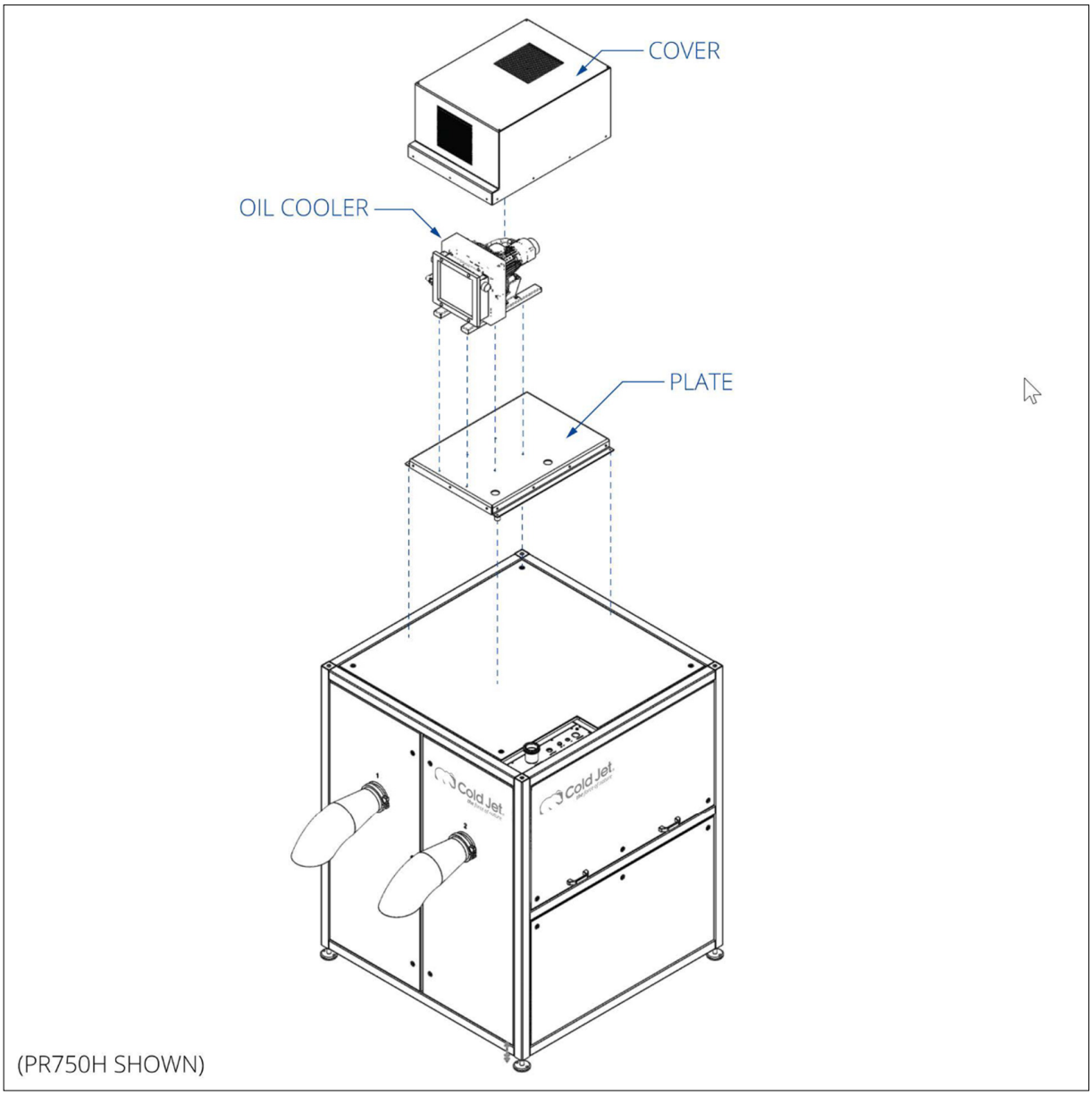


Cold Weather Kit

PR350H Cold Weather Kit, item ***515682***
PR750H Cold Weather Kit, Item ***515680***
PR120H (400V) Cold Weather Kit, item ***514558***
PR120H (220V) Cold Weather Kit, item ***514559***

The cold weather kit heats the hydraulic oil and maintains a minimum temperature of 5°C. This kit is recommended for pelletizers operational in locations where the ambient temperature is between 0°C and 10°C (32°F and 50°F).

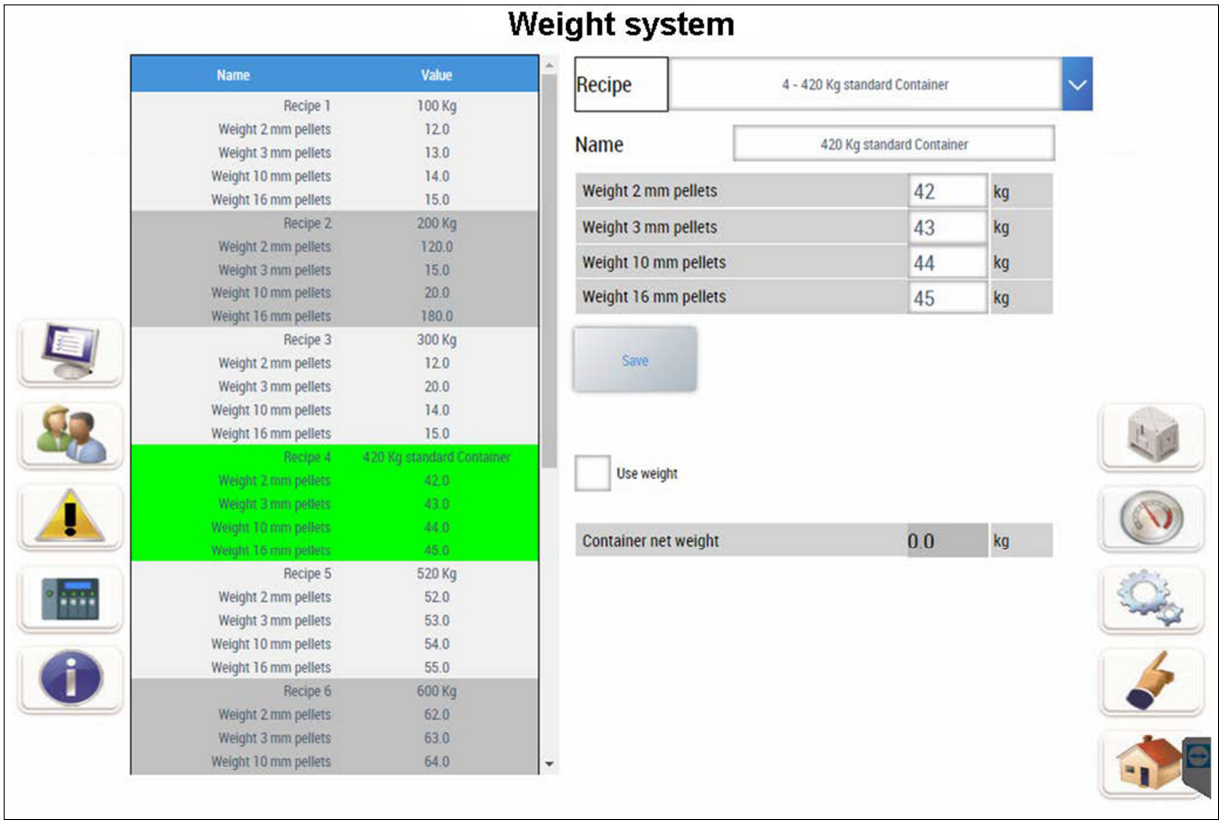
For PR120H the Cold Weather Kit must be mounted from production of the machine.



Warm Weather Kit

PR350H Warm Weather Kit, item ***515536***
PR750H Warm Weather Kit, item ***515533***

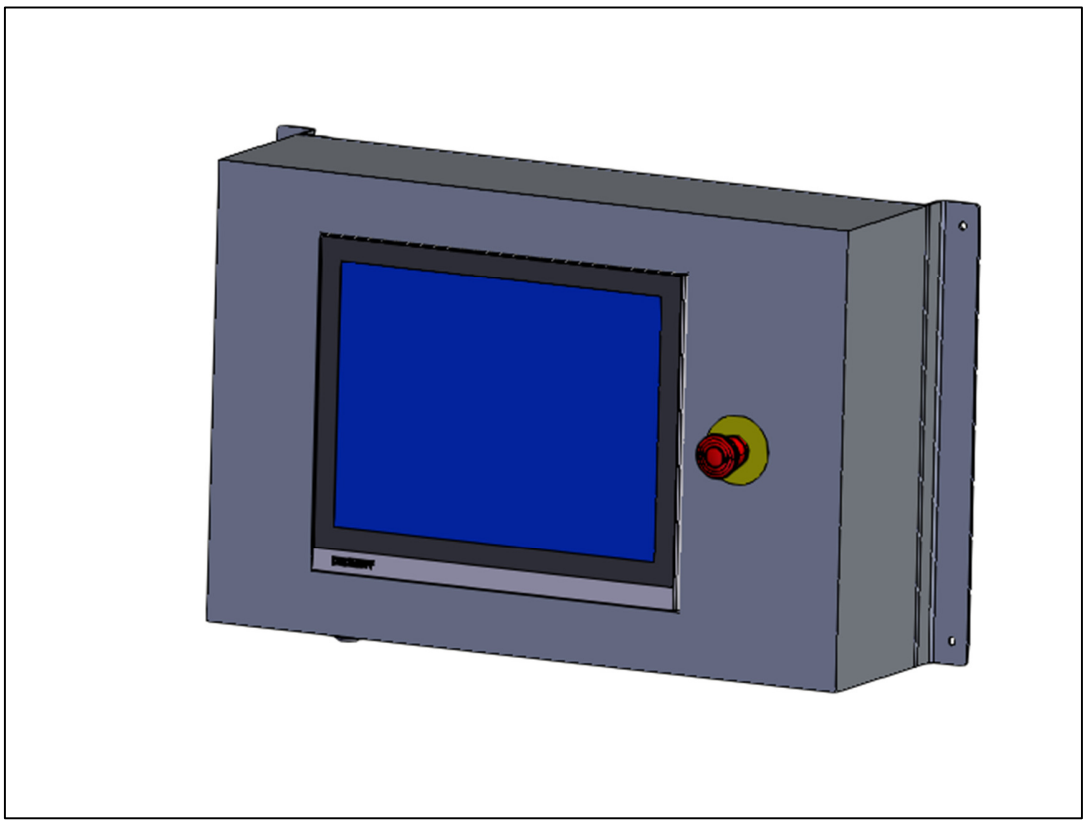
The warm weather kit cools the hydraulic oil and maintains an optimal working temperature of the hydraulic oil below 50°C. This kit is recommended for pelletizers operational in locations where the ambient temperature is between 30°C and 45°C (86°F and 113°F) or the pelletizer will be producing non- stop in 24/7 mode.



Filling Recipe and Automatic Stop System

Item ***504856***

This option includes a software recipe module wherein the user can preset the standard dry ice container sizes and their net max filling weight. At each container exchange, the user selects the container size and the pelletizer goes into standby/stop mode when the preset volume is reached. The system reduces the dependence on operator surveillance and potential overfilling and waste of dry ice. The system is based on the calculated produced volume per stroke of the pelletizer and is not based on a gravimetric weighing scale. The system can manage up to six difference container sized/production recipes.



External screen

PR350H and PR750H external screen, item ***2K0643***

For installations where the pelletizer should be operated from a distance an external screen could be an option. This screen comes with 25m cable and can be placed 20m from the pelletizer.

Safety

Carbon Dioxide (CO_2) and Dry Ice Properties

At a temperature of -15°C (5°F) under normal atmospheric pressure, carbon dioxide has a density of 1.87 kg/m^3 (0.12 lb/ft^3) and is 1.5 times heavier than air. It is a colorless and odorless gas with a slightly pungent odor at higher concentrations and spreads along the ground. Carbon dioxide gas will collect in low-lying areas such as pits and cellars.

Dry Ice Production Process

The expansion of liquid carbon dioxide at pressures between 15-18 bar (217.6-261.1 psi) to atmospheric pressure is how the pelletizers produce CO_2-snow at a temperature of -78.5°C (-109.3°F). The CO_2-snow is then compressed to form high-density dry ice pellets.

Safety Hazards

Dry ice is extremely cold and may cause severe frost bite or tissue damage when in direct contact with exposed skin. Always wear protective gloves and clothing when handling dry ice.

CO_2 is classified as a non-flammable and non-toxic gas. It is normally present in the atmospheric air at a level of approximately 0.04%. It is a normal product of metabolism being held in bodily fluids and tissues where it forms part of the bodies normal chemical environment. Higher concentrations can cause suffocation.

Operate the pelletizer in a well-ventilated work area with continuous CO_2-level monitoring. The effects of CO_2 are entirely independent of the effects of oxygen deficiency. Therefore, CO_2 concentrations at 3-5% causes headaches, fast breathing and discomfort while higher concentrations may cause unconsciousness, suffocation or respiratory arrest. The legal exposure limit set by OSHA is a 0.5% average over an 8-hour workday and the acute (15 minute) exposure limit set is 3.0%.

Always use a CO_2 monitoring/alarm system when working with machinery that emits CO_2 in a confined room/space.

Operation and maintenance should only be performed by authorized and trained personnel. Below are some basic safety guidelines:

- Follow local governing codes to ensure a minimum standard of safety.
- Wear protective gloves, safety glasses, and ear plugs.
- Operate the pelletizer in a well-ventilated work area with a CO_2 monitoring/alarm system.

Pre-Installation Checklist

The owner should use the checklist below to prepare for the installation of their pelletizer. It is the owner's responsibility to verify all the necessary preparations have been made to the installation site and meet the specifications and guidelines detailed in this publication.

Check off each item in the checklist as pre-installation preparations are completed. Once the checklist is complete, the owner or responsible party will sign and date the Pre-Installation Confirmation form and return it to Cold Jet.

Completed	Task
☐	The installation site of the pelletizer is indoors, well-ventilated, with sufficient clearances on all sides (including the top).
☐	The installation of the CO_2 supply tank is complete and has been filled by the owner-selected CO_2 supplier (refer to "Liquid CO_2 Supply System" on page 8).
☐	The supply pipeline has been installed and meets the specifications described in "Liquid CO2 Supply System" on page 8.
☐	The exhaust pipeline has been installed and meets the specifications described in "Gas CO2 Exhaust System" on page 9.
☐	The electrical connections are in compliance with the regional specifications described in "Electrical Service & Supply" on page 10.
☐	The instrument air or CO2 gas supply for the pelletizer's pneumatic system has been installed and meets the specifications described in "Instrument Process Air Supply" on page 10.
☐	The appropriate type and amount of hydraulic oil is on site and available for use in the pelletizer's hydraulic oil tank.
☐	Images have been provided to Cold Jet of the above-mentioned points.
☐	Internet connection enabling remote technical support.

Pre-Installation Conformation Form

I hereby verify the pre-installation preparations listed above have been completed.

Customer: _____

Order: _____

Owner/Contact: _____

Signature _____

Date: _____

Notes/Remarks to Cold Jet: _____

Email the signed form to the to the Cold Jet project lead named on the front page

Contact Information

Find the customer support and technical services contact information for your region in the table below.

USA – Cold jet
(World Headquarters)
6283 Tri Ridge Blvd
Loveland, Ohio 45140, USA
Phone (US): +1-866-874-9876
Phone (After hours): +1(513)440-3619
Email: service@coldjet.com

Canada - Cold jet Canada
1727 Industrial Road, Unit 1
Cambridge, Ontario N3H 5G7
Phone: +1-800-337-9423
Phone (After hours): +1(513)440-3619
Email: service@coldjet.com

Latin America, Cold Jet Latinoamérica
Calle Sinaloa, 901-3.
Colonia: Nuevo Repueblo
Monterrey, NL, Mexico
CP: 64700
Phone: +52 (81) 1097-0445
Phone (After hours): +1(513)440-3619
Email: soporte@coldjet.com

Belgium – Cold jet bvba
(European Headquarters)
Zona 1 Researchpark 330
B-1731 Zellik
Phone: +32 (0) 13 53 95 47
Phone (After hours): +1(513)440-3619
Email: service.eu@coldjet.com

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