conair

CRYSTALLIZER

Instructions

Form: _____

Model: _____

Date: _____

FORM 520

CRYSTALLIZER INSTRUCTIONS

INTRODUCTION

Conair Crystallizer and High Heat Drying Systems allow the processors of polyester banding, industrial products and containers to purchase lower cost, amorphous material and prepare them, in plant, for molding or extrusion. The system also provides processors with the method of recrystallizing their regrind for recycling. The self-contained system includes a heat booster to maintain the necessary crystallizing temperatures and automatically monitors the crystallizing hopper to prevent uncrystallized material from leaving the system.

SAFETY

This crystallizer should not be installed, operated or worked upon without compliance with the warning signs affixed to it and a thorough understanding of these instructions.

WARNING

Before servicing crystallizer, be sure to switch main disconnect to off position. Do not attempt to alter voltage connections. Due to the high temperature of crystallizers it is important to always use insulated hoses on the equipment. Care should be taken to avoid direct skin contact to the heat booster during operation. Severe burns could occur.

INSTALLATION

1. Remove the crystallizer from its shipping skid and collect all associated parts in the installation area. Because of the size of the unit, it is necessary to ship components in separate containers.

2. Begin assembling the unit using Figures 1 through 3 as a guide. These figures represent a variety of installation possibilities and one of them should suit your crystallizing needs.

3. Additional electrical connections will be necessary once the crystallizer has been physically assembled. Provisions have been made for these connections, with adequate lengths of electrical sealtite and accompanying wiring diagrams.

   Electrical connections:

   A. Level switching must be provided in the receiving chamber below the crystallizing hopper. This chamber is usually the distribution box, included as part of your crystallizer assembly. Refer to the wiring diagram in the crystallizer control for specific terminal connections to the bindicator installed in the distribution box.

   B. The rotary valve drive motor beneath the crystallizing hopper must be connected to the control enclosure utilizing the crystallizer control wiring diagram.

Crystallizing for banding (strapping) production
Amorphous regrind from a pelletizer line, or storage, or amorphous virgin materials are automatically loaded into the Crystallizer. A Conair/Somos Dehumidifying Dryer is installed, in series with both the Crystallizer and drying hopper mounted over the extruder. This energy-saving arrangement utilizes return air flowing from the drying hopper (which is at, or above 200°F (93°C) to provide air for crystallizing (1). The air flowing through the heat booster is raised to crystallizing temperatures (2) and returns from the Crystallizer to the Dryer for dehumidification (3), then re-used to dry crystalline material in the drying hopper (4).

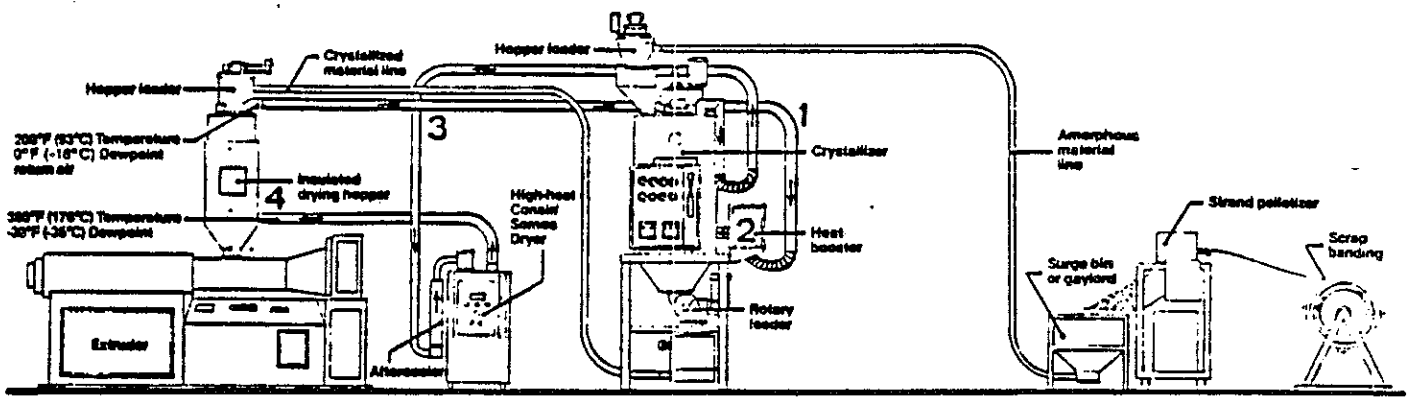

Figure 1

Warehousing crystallization for shipment to remote machines
When processing is done in remote locations which can't receive crystallized materials directly after crystallization, the materials can be stored in 1,000 lb containers or surge bins.

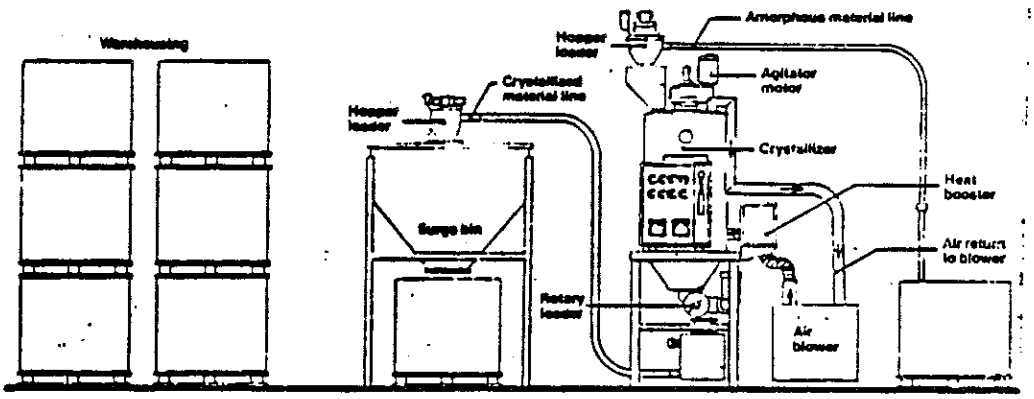

Figure 2

Central Crystallizing for several machines: A blower unit provides the air source for the Crystallizer and the heat booster provides all the heat necessary for crystallization. In this configuration, crystallizing can be done in a remote area and crystallized materials conveyed to a series of machines, as they are needed.

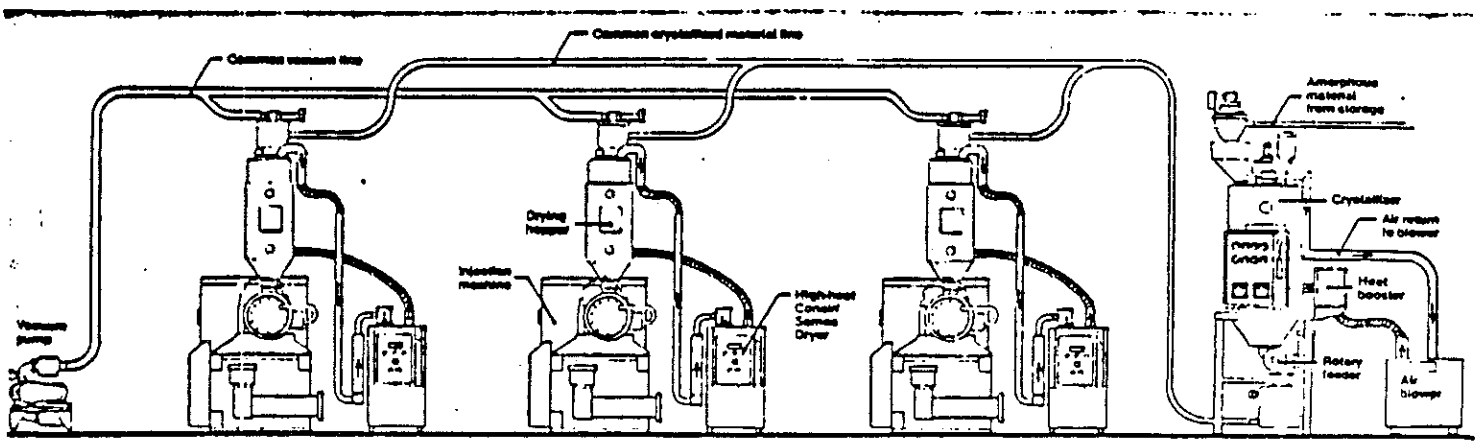

Figure 3

C. Level sensing in the crystallizing hopper is achieved by connecting the bindicator located on the top of the hopper to the loader in place of its own level sensing device. This connection is necessary in order to maintain a workable amount of material in the hopper without overfilling. Refer to the wiring diagram for the hopper loader. This connection will usually require the addition of a 110 volt electrical signal from the loader to the bindicator, in order to run the small motor utilized for the bindicator sensing.

D. Thermocouple connections from the receptacles on top of the control panel to the appropriate monitor areas must be made with the accompanying thermocouple cord sets in the following fashion:

1) From the front receptacle on top of the control to the hot air inlet of the crystallizing hopper. This inlet is located near the base of the hopper and consists of small compression type fitting that will receive the thermocouple probe.

2) From the rear receptacle on top of the control to the side of the crystallizing hopper about a foot down from the top of the hopper.

E. The connection of an auxiliary contact on the process blower starter is necessary to complete the interface of the crystallizer with its air source. This air source may be a Conair Somos type dehumidifying dryer, a Conair blower, or any other type of positive pressure air blower. The electrical contact for this connection is included in the crystallizer control enclosure and fits as a N.O. contact on the process blower starter of a Conair dryer or the motor starter of a Conair blower. For interfacing the crystallizer with anything other than Conair equipment, it is necessary to provide a N.O. contact that operates with the blower motor starter so that the crystallizer heaters will not be energized without air flow through the hopper. This connection may be made using the crystallizer control and dryer or blower wiring diagrams, and should be a permanent installation using sealtite connecting the air source and the crystallizer control enclosure.

F. The final electrical connection to be made, upon completion of the entire installation, should be the connection of the inlet power to the control enclosure disconnect switch in accordance with electrical codes applicable to your area and within the electrical parameters listed on the crystallizer serial number tag.

Many of the connections listed above, with the exception of the main power and auxiliary contact, may already have been completed prior to shipment, but should be checked to be sure. Shipping requirements often dictate exactly how the unit has been disassembled prior to shipping and what connections have been disconnected.

4. The next step in the installation process should be the checking of the agitator and rotary valve gear box lubrication levels in accordance with the accompanying literature, relative to each component.

5. The butterfly valves located on the return line and drain port of the crystallizing hopper must be in the correct positions for proper operation. The return line butterfly should be completely open to allow full air flow, and the drain port butterfly should be completely closed.

6. Proper rotation of the agitator and rotary valve must be checked prior to operation. These are three phase motors, and their rotation may be reversed by switching any two legs of their electrical connections. Proper rotation of the agitator motor is clockwise as viewed from the top, and the rotation of the rotary valve is marked on its housing.

   CAUTION: Due to the high temperatures of crystallizing, it is important to always use insulated hoses on the equipment either coming from the dryer to the heat booster or from the heat booster to the inlet of the crystallizer. Care should also be taken to avoid direct skin contact to the heat booster during operation. Severe burns could occur.

   Do not allow either of the flexible hoses coming from or to the crystallizer to crimp or kink. If these hoses are too long, cut them to fit. Also, it is advisable to support long sections of hose, where possible, by tying to overhead structural members.

START-UP

The temperature controller should be set for the desired crystallizing temperature. The range of crystallizing temperatures varies from approximately 320° to 400° F. The exact crystallizing temperature should be determined after consulting the material supplier and the equipment supplier. If there is a great amount of fines present in the system, then a cyclone separator is recommended from the outlet of the crystallizer to the inlet of the drying hopper. This may be something that is only noticed once the system has been permitted to run several days. If you are sure before the system is started that these fines are present, then it is recommended that you install the cyclone separator prior to start-up.

RETURN AIRLINE TEMPERATURE

It is important that the return air temperature from the crystallizer going to the dehumidifying dryer (if applicable) should not exceed 125° to 135° F. If this temperature is in excess of this, arrangements should be made to install an aftercooler to decrease the temperature to this range prior to going back into the dehumidifying dryer. (See Dehumidifying Dryer Instructions, Form 521.) If an air source is supplied, designed for high temperature operation, this requirement does not apply.

BASIC OPERATION

On initial start-up, a supply of 50 lbs or more crystalline material is required at the very bottom of the crystallizer in the area where there is no agitation occurring. Amorphous material to be crystallized could then be

loaded into the hopper to complete filling the crystallizer. The material is loaded by the use of a high temperature loader which is mounted on the top of the crystallizer. Once the crystallizer has been fully charged, the heat source can be energized, delivering the necessary heat to crystallize the material.

Agitation is continuous at 2 RPM. the agitation is supplied by rotating paddles moving horizontally through the bed of the material. The paddles were designed with a slight tilt in order to lift the material and avoid compacting and compressing the material downward.

The crystallizer is equipped with a clean-out door for ease in cleaning.

The crystallizer is also equipped with two temperature controllers/monitors. One controls the inlet, or processing temperature of the material, and the second one monitors the temperature at the top of the crystallizer. This energizes a green light on the control console, indicating that material has been adequately crystallized and can now be pulled from the crystallizer by pushing the rotary valve control button. Essentially, the second controller is assuring the proper temperature profile across the bed of material so that the material has the proper heat history in order to accomplish crystallizing.

The throughput capacity of this unit is based on polyester (50 lbs/cu ft). This may vary somewhat depending on the characteristics of different materials (eg. regrind). See specifications and capacities chart (figure 4).

Model	CR-500	CR-1000	CR-1500
Throughput - lbs (kg)/hr	500 (227)	1000 (454)	1500 (680)
Dimensions - Inches L x W x H* - (mm)	37 x 37 x 141 (940 x 940 x 3580)	42 x 42 x 158 (1070 x 1070 x 4013)	42 x 42 x 173 (1070 x 1070 x 4395)
Electrical (Connected load) - 240/3/60	88 amps	84 amps	119 amps
- 480/3/60	44 amps	@480V	@480V
-380/3/50	46 amps	106 amps	150 amps
- 415/3/50	50 amps	97 amps	138 amps
Control Circuit	120/1/60	120/1/60	120/1/60
KW (Total)	35	68	98
Net Weight - lbs (kg)	1400 (635)	1800 (817)	2100 (952)
Approx. Shipping Wt. - lbs (kg)	2000 (907)	2500 (1134)	2700 (1224)

*Height includes floor stand, hopper loader and 6" (153mm) clearance for opening loader cover.

Figure 4

SEQUENCE OF OPERATION

Set process temperature (1C) to desired processing temperature (approximately 320° - 400°F., depending on throughput demand and material supplier recommendations). Set process protection (2C) controller to predetermined temperature (200°-250°F). CR1000 and CR1500 are equipped with a selector switch to vary the actual amount of KW being utilized. (See "Proper Selector Switch Position" and Adjustment of Temperature Controller" for detailed information) Start air source. Start agitator motor by pushing (2PB). Let run until predetermined return temperature has been reached (approximately 200°-250°F) along with minimum of 2 hours residence time on initial start-up with amorphous material. At

this point a signal from the process protection controller (2C, which monitors return temperature) will light a green light indicating a ready condition for starting material removal from the crystallizer.

Start rotary valve at this point to discharge material into collection box (or drying hopper). The level switch (1LS) on the collection box adaptor (or drying hopper) will be wired in series with the rotary valve starter to stop the valve if the collection box is full. Material will be pulled from the bottom of the collection box by way of a loader on the top of the drying hopper (if applicable). If the drying hopper stops pulling material from the collection box, 1LS will stop the rotary valve once the collection box and collection box adaptor are loaded. This will prevent any shearing inside the rotary valve due to backup of material in the collection box. Once the loader on the drying hopper calls for material from the collection box again, the level of material in the collection box will drop and 1LS will permit the rotary valve to start again discharging material from the crystallizer. If the process protection controller (2C) detects a reduction in temperature (below an acceptable level) it will stop the rotary valve and sound an audible alarm. At this time the reason for under-temperature condition must be determined and corrected before starting rotary valve again.

One condition which would activate the alarm would be that of pulling too much material through the crystallizer. This means you have exceeded the capacity of the crystallizer for some reason. You may be branching off to two drying hoppers which would demand too much material. Another reason for the alarm signal may be that of burned out heaters.

The crystallizing and drying system can be arranged in several different configurations. See Figures 1 thru 3 on Page 2. Figure 1 indicates the crystallizer being used in series with the dehumidifying dryer and a drying hopper. Air passes from the dehumidifying dryer to the inlet of the drying hopper at approximately 350°F. Going through the bed of material in the drying hopper, out the top, through the heat booster where it is elevated to a temperature of approximately 320°F - 400°F, through the crystallizer, out the top, through an aftercooler, and back into the dehumidifying dryer again. This is the most energy efficient arrangement.

Figure 2 shows the crystallizer being used with an air source separated from the dehumidifying dryer. In this case the air source (blower) works with the heat booster to deliver the 320°-400°F temperature to the base of the crystallizer hopper. The dehumidifying dryer then works separately to deliver hot dry air to the base of the drying hopper.

PROPER KW SELECTOR SWITCH POSITION

A selector switch on the front of the control panel indicates various KW levels. For applications requiring relatively low temperatures the lowest position could be selected on the selector switch and for those applications in the mid temperature range, middle and high position can be selected for the higher temperature ranges. In order to determine what range you should be in, a simple procedure to follow would be: set temperature controller at desired temperature. Start out with the lowest selector switch position and watch

the deviation needle on the temperature controller. If this needle comes up to set point, then you have enough KW to handle this particular application. If the deviation needle does not come in line with the set point, go to the next setting on the selector switch, which in this case would be the mid range. Here again, if this is not enough KW, you can change to the higher position to utilize both heater banks for this application.

ADJUSTMENT OF TEMPERATURE CONTROL SET POINT (when necessary)

The temperature controller has been factory adjusted so that the auxiliary set point* is approximately 5-10 degrees above the primary set point. This is so that the secondary heater bank is not switching on and off at the same time as the primary heater bank, thus minimizing the load which you are switching. Should it become necessary in the field to readjust or check the temperature controller, the following is the procedure to follow:

Turn the selector switch to the highest position and turn the temperature controller to a setting of 150°. At this point the light which monitors the primary process heaters should go out. At the same time, the secondary process heaters, which are monitored by another light, should stay energized and you should be able to see the deviation needle 5-10 degrees above the primary set point (150°F). If the deviation needle is not above the 150°, the adjustment screw inside the front of the controller should be turned clockwise in order to increase the differential between the primary set point and the secondary set point. Care should be taken that you do not exceed the 10° setting above the primary setpoint. If the indicator light for the primary process heaters did not go out, the primary process heaters are shut off. At this point you must determine the differential between the primary set point and the deviation needle. Follow the same procedure as above to adjust.

* The auxiliary set point is used only with the highest KW position on the selector switch. In this position it is necessary to utilize the secondary heater bank in order to maintain heat.

SHUTDOWN PROCEDURE

There are various methods for completing a process run of material, depending on the particular application. A recommended procedure would be to permit material which was last loaded into the machine to completely crystallize without pulling any material from the crystallizer prior to shutting the machine down. This will insure that good crystalline material is available upon start-up again. If it is desired to completely drain the crystallizer, it is important that a supply of material which is already crystalline is added to the crystallizer again, prior to processing. Otherwise approximately 50 lbs in the bottom of the crystallizer could agglomerate if amorphous material were in this area.

MAINTENANCE

CAUTION: BEFORE SERVICING DRYER BE SURE TO SWITCH MAIN DISCONNECT TO OFF POSITION.

Lubrication - All gear motors have been lubricated prior to shipment, but should be checked periodically to avoid any possible damage. There is a high temperature bearing located in the lower section of the agitation shaft which does not need lubricated, but should be checked approximately once a year to insure that there has not been excessive wear on the bearing. If the bearing shows excessive wear, it should be replaced.

In order to gain access to this bearing, the top plate must be unbolted from the hopper and the whole assembly lifted approximately 8 to 10 inches. This will expose the lower bearing. The bearing can be easily removed and a new one installed if necessary. Care should be taken to reposition the top plate to the same location in which it was initially mounted. There should be exactly 2" of shaft protruding up through the gear motor. If this dimension is not held, severe binding could occur internally.

Fines Removal - In order to alleviate processing problems related to the presence of fines in the material being processed, the crystallizing hopper should be evacuated of fines periodically. The frequency of the fines removal process depends on the type of granulate being processed, but it should be made every three or four days of operation.

To achieve this, open the bottom butterfly valve to allow the fines to be emptied into a collection container. Then pressurize the crystallizer hopper to force the fines out of the hopper base by closing the top butterfly valve for 20 to 30 seconds. It is very important that this process is carried out in the proper order to prevent excessive pressure build-up in hopper. Upon completion of the fines removal, open the top butterfly valve, and then close the bottom butterfly valve.

Heat Booster - The heat booster is supplied with a high temperature switch for protection against overheating conditions. The heating elements in your Conair crystallizer require no routine maintenance. After a very long term of service, however, elements may eventually require replacement. Should an element need replaced, care should be taken in rewiring the new elements the same as the previous ones.

The high temperature switch is supplied in order to protect against any possible high temperature burnout condition. The high temperature switch will automatically open should this occur. If the dryer should shut down because of this particular reason, continuity should be checked across the two terminals inside the control box (see wiring diagram for proper terminal points) to determine if the high temperature switch opened because of a malfunction in the higher temperature. If the crystallizer has been shut down because of the high temperature switch, it will take approximately 15 minutes for the temperature switch to cool to a point where the crystallizer can be started again -- under strict supervision -- to determine the exact fault condition. This condition should be determined prior to leaving the system run without proper supervision.

CALL TOLL-FREE FOR CONAIR REPLACEMENT PARTS AND SERVICE

Wats Line 800-458-1960 is your direct line to the Conair Parts Department. Help in identifying the parts you need is available through that department. Service related calls should be made to 800-338-9046.

CONAIR GUARANTEE

Conair guarantees the machinery and equipment described herein for a period of one year from date of shipment against defects in material and workmanship, under the normal use and service for which it was recommended; except filters, flexible material conveying hose, and liners for valves in material lines. Conair's guarantee is limited to repairing or replacing, at our option, the part or parts determined by us to be defective after examination of the part or parts. The customer assumes the cost of transportation of the part or parts to and from the factory. THERE ARE NO WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, OTHER THAN AS EXPRESSED HEREIN. No liability for any special, indirect, or consequential damages of any nature is assumed by or shall be imposed on Conair based on its undertakings herein.

CONAIR SERVICE COMMITMENT

Conair equipment is built to give long, reliable, efficient service if it is installed, operated and maintained properly. Occasionally, you may require help from Conair's Service Department in making minor field corrections or in correcting operating malfunctions.

During normal business hours there is a Conair Service Man available by phone to discuss any service problem you may have: Call (814) 437-6861.

Before calling, check the Troubleshooting Guide in this instruction book to see if corrective action is described. If not, try to determine which part of a normal cycle is not operating properly. Note the model number and serial number of the unit and keep this instruction book handy for reference during the call.

If you need a Conair Serviceman, He'll be there fast! We know you need prompt attention. Most service calls are made within a few days from the request, often, because Conair has several factory-based servicemen in the field every week, you will get attention even faster. During your call to the Service Department it will be determined if a visit is needed at your plant. You will be asked to give us a purchase order number to cover the cost of a service call if the problem is not covered by the equipment Warranty or Performance Guarantee. Calls made to cover such warranty or guarantee items are made at Conair's expense. The Service Department will detail current service costs, if any.

He stays until the job is done! Conair Servicemen are instructed to stay at your plant until you're satisfied that the difficulty has been corrected or your personnel know what to do should correction depend upon receipt of replacement parts. We know that good service often helps sell the next Conair units you buy . . . so we do everything we can to make it the best service in the industry.

We'll help train your people too! Conair will be pleased to quote, and arrange for, instruction sessions in your plant on the operation and maintenance of your Conair Equipment. Such training sessions may be arranged through the Service Department. (814) 437-6861

CONAIR PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at, or above, the capacities as stated in specific quotations covering the equipment or as detailed in engineering and sales literature as long as the equipment is applied, installed, operated and maintained in the recommended manner as outlined in either a quotation or in literature.

Should performance not meet claimed levels, Conair, at its option, will:

1. Make an inspection of the equipment by a qualified representative and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless poor performance is due to misapplication, improper installation, maintenance or operation, or . . .
2. Replace the original equipment with other Conair equipment which will meet original performance claims at no extra cost to the customer, or . . .
3. Refund the invoiced cost of the equipment. Credit is subject to prior notice by the customer at which time a Return Goods Number will be issued by Conair's Service Department. Returned equipment must be well crated. Returns must be prepaid.