Drying & Dehumidifying Series

Application Guide

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SHINI

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1. Preface

This guide is a model selection and application manual for Drying and Dehumidifying Series which includes information of plastics material drying, selection and application of SHINI's Drying and Dehumidifying equipment.

Objective

In order to assist professionals or customer service staffs to pick out proper products for customers, this guide will help them better comprehend application scope of products and enhance their application proficiency.

Object

This guide is applicable for professionals and customer service personnel who face the clients directly and need choose appropriate products as requested.

Related Information

Specific models are subject to "Product Catalogue" during model selection for customers. Please refer to "Model Selection Questionnaire" when the customer's demand is not clear or for other reasons the service is unavailable.

Notice

This guide is used for preliminary model selection of SHINI's Drying and Dehumidifying series products. It is recommended the client contact our customer service personnel before giving an order to ensure correct selection and avoid unwanted loss.

Referential texts and data in this guide do not represent SHINI's viewpoint.

If you need any further information of SHINI products, kindly feel free to contact us:

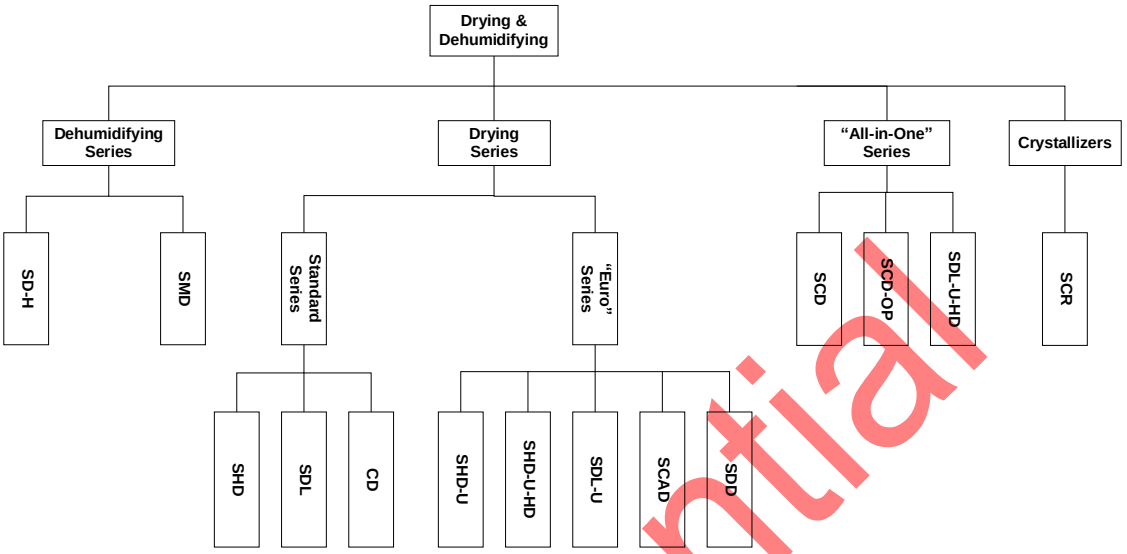
Dial direct China service hotline: +86 800-999-3222

Log on SHINI Group website: www.shini.com

Send e-Mail to us: shini@shini.com

2. Product Classification

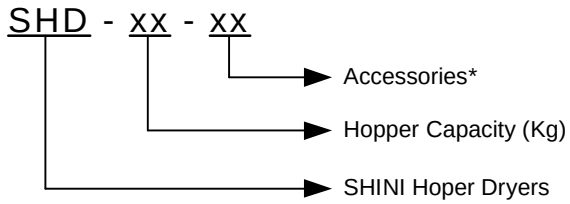
2.1 Product Category of Drying and Dehumidifying Series



Picture 2-1: Product Category

2.2 Coding Principle

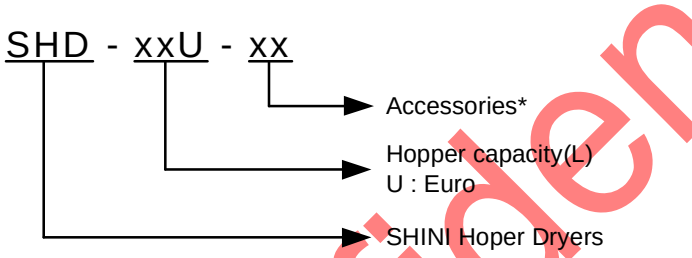
2.2.1 Coding Principle for SHD Series



Note:*

E=Standard Base	M=Magnetic Base	T=Timer
I=Insulated	H=180℃ High Temp.	DT=Microcomputer with timer
CE=Europe Standard	UL=U.S. Standard	CSA=Canada Standard

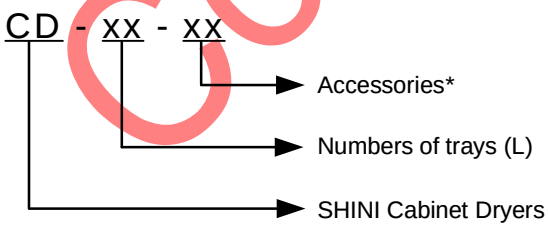
2.2.2 Coding Principle for SHD-U Series



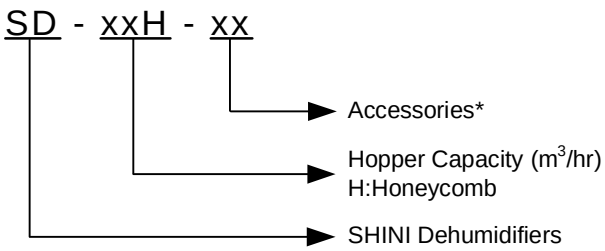
Note: *

HT=180℃ High temperature type P=Polished hopper inside

2.2.3 Coding Principle for CD Series

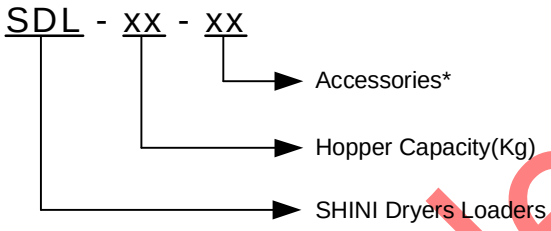


2.2.4 Coding Principle for SD-H Series



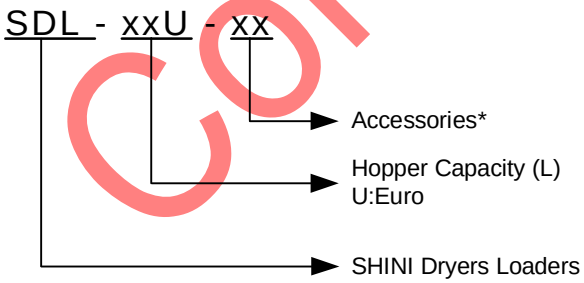
Note: *
LC=Touch Screen C=Process heater is optional, equipped with SHD-U.

2.2.5 Coding Principle for SDL Series



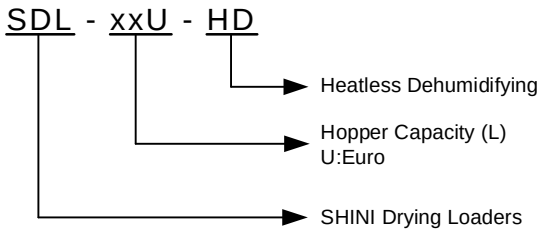
Note: *
T=Timer M=Magnetic bases
I=Insulated drying hopper HT=180℃ High temperature type
S=Single phase power

2.2.6 Coding Principle for SDL-U Series

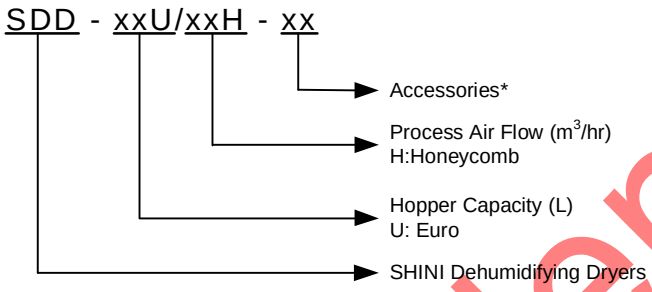


Note: *
HT=180℃ High temperature type P=Polished hopper inside

2.2.7 Coding Principle for SDL-HD Series



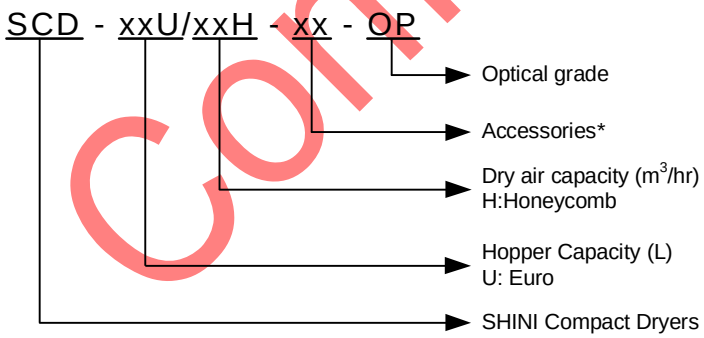
2.2.8 Coding Principle for SDD-U Series



Note: *

LC=Touch Screen	D=Add dew-point monitor
P=Polished hopper inside	HT=180℃ High temperature type

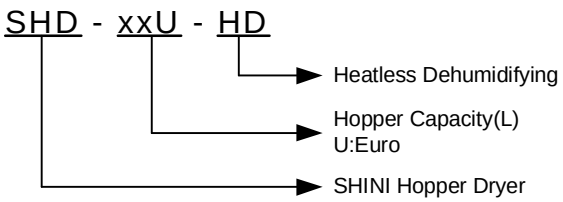
2.2.9 Coding Principle for SCD Series



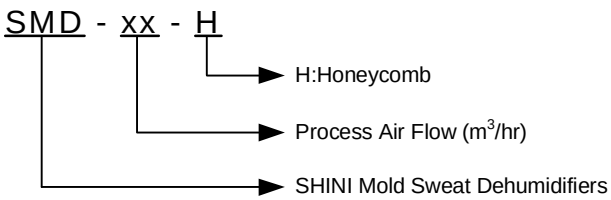
Note: *

LC=Touch Screen	D=Add dew-point
P=Polished hopper inside	HT=180℃ High temperature type

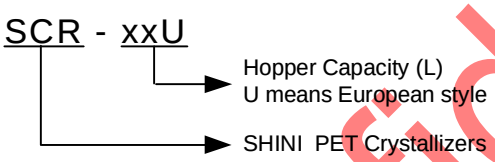
2.2.10 Coding Principle for SHD-U-HD Series



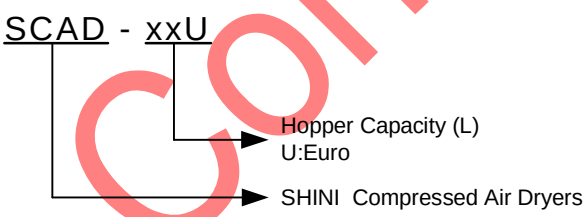
2.2.11 Coding Principle for SMD Series



2.2.12 Coding Principle for SCR Series



2.2.13 Coding Principle for SCAD Series



3. Standard Hopper Dryers SHD

Picture 3-1: “Standard”Hopper Dryers

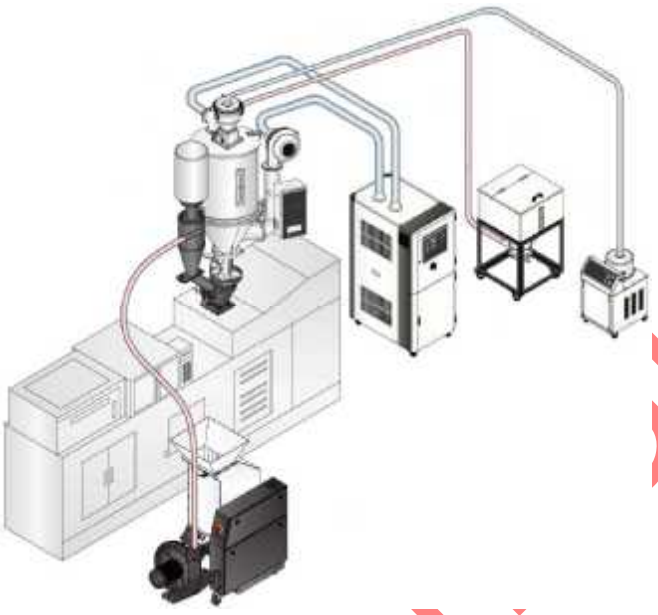
3.1 Application Fields

SHD series are suitable for drying row materials and recycling materials, such as ABS, PA, PBT, PC, PE, PET, PMMA, PP, POM, PPS, PS, PUR, PVC and so on. SHD can not be suitable for drying powder materials and all kinds of food, chemical medicine, inflammable and explosives materials, volatile goods. If customers’ product is optical grade, SCD-OP series is available but not SHD series. If it is hygroscopic materials, such as ABS, PA, PC, PET, PMMA, etc., SHD should be equipped with SD-H series. If the size of raw materials are uneven or other forms, material density is need to be considered.

3.2 Application Cases

Under normal circumstance, there are two types of installation for SHD, machine mount and floor mount.

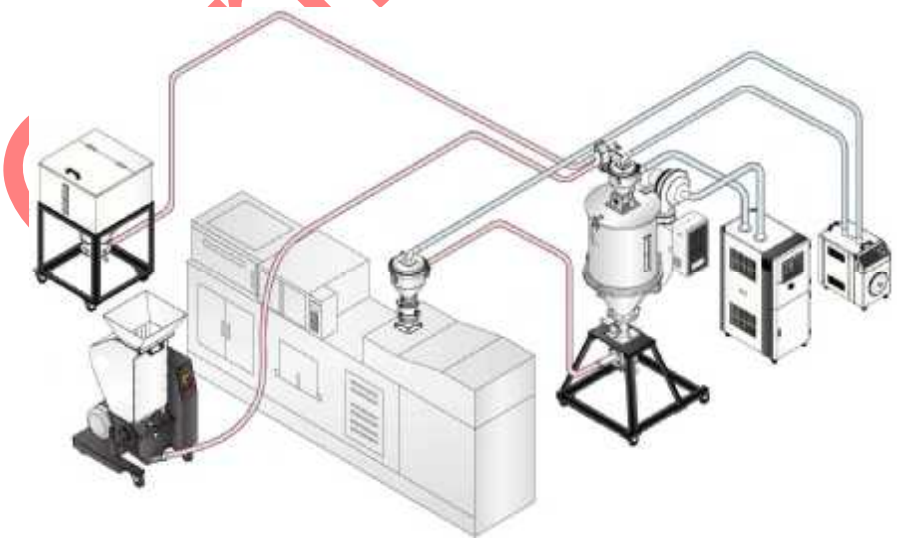
Machine mount



Picture 3-2: Machine Mount

This machine mount type is suitable for SHD-200 and below models.

Floor mount



Picture 3-3: Floor Mount

This floor mount type is suitable for SHD-300 and above models. Hopper loaders are used to convey materials automatically to moulding machine's feed port. It is used in the field of that when height restriction is concerned at the workshop and there are some difficulties for machine mount.

3.3 Model Selection

The hopper capacity of SHD series is calculated basing on the material density of 0.65kg/L. If there are some differences in customer's material density, hopper capacity is calculated by the appropriate proportion.

According to Mould Maximum Output Capacity

Q: An injection moulding machine uses ABS, the bulking density is 0.6kg/L, material consume rate per hour is 50kg, drying time is 3hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume rate) × (drying time)=50 × 3=150kg.

So SHD-150 is available.

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

150kg × 1.2 = 180kg

So SHD-200 is available.

Note: For the bulk density of ABS is 0.6kg/L, it almost has no difference with 0.65kg/L of standard parameters. So it need not refer to material's density when calculating hopper capacity.

Q: An injection moulding machine uses PET(crystallized), the bulking density is 0.38kg/L, material consume rate per hour is 50kg, drying time is 6hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume rate) × (drying time) ÷ (0.38

÷ 0.65) = 50 × 6 ÷ 0.59 = 500kg

Considering that drying effect of raw material and hopper volume is fully in accordance with using demands, it needs to be multiplied by 1.2.

500kg × 1.2 = 600kg

So SHD-600 is available.

According to Mould Clamping Force (Ton)

We suggest not referring to this method under normal circumstance, expect that customer do not know moulding machine' s capacity.

Q: An injection moulding machine with 500Ton uses ABS material, the bulking density is 0.6kg/L, drying time is 3hr. Please select out what kind of dryer is suitable for this application?

A: The maximum capacity of moulding machine is about 500 × 0.08 (empirical coefficient) =40kg according to empirical formulas.

Hopper loading capacity=(hourly consume rate) × (drying time)
=40 × 3=120kg.

Considering that the drying effect of raw material and hopper volume is fully in accordance with using demands, it needs to be multiplied by 1.2.

120kg × 1.2=144kg

120kg × 1.2=144kg

So SHD-150 is available.

Note: For the bulk density of ABS is 0.6kg/L, which has almost no difference with 0.65kg/L of standard parameters. So it is not necessary to refer to material's bulk density when calculating hopper capacity.

3.4 Q & A

Q: Do all SHD series adopt up-blowing air heating mode?

A: SHD-800 & SHD-1000's hopper capacity is too large and their hopper height is too high of. In order to improve drying effect, they adopt hot air down-blowing mode. Other models all adopt hot air up-blowing mode.

Q: Under what circumstance requires matching HCF, ADC and HAR?

A: HCF is optional if much dust is in raw materials, which can effectively filter dust from dry hopper and avoid environmental pollution. If the request for air exhaust is higher, ADC is optional, and filtering effect is up to 90%.

HAR is optionally equipped to form a semi-closed circulation loop with drying air, which can avoid temperature rising and save energy.

Q: What is the magnetic induction density of magnetic bases optionally equipped with SHD?

A: The magnetic induction density of magnetic bases is about 1000 gauss.

4. Hopper Dryers SHD-U

Picture 4-1: Hopper Dryers SHD-U

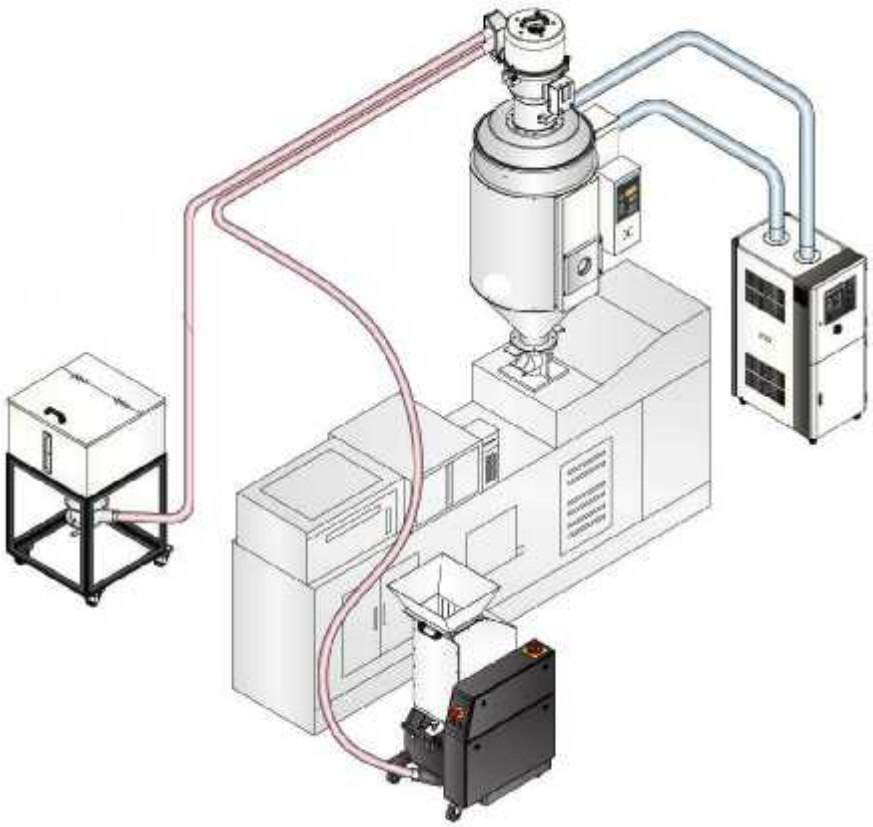
4.1 Application Fields

SHD-U series are suitable for drying row materials and recycling materials, such as ABS, PA, PBT, PC, PE, PET, PMMA, PP, POM, PPS, PS, PUR, PVC and so on. SHD-U can not suitable for drying powder materials and all kinds of foods, chemical medicine, inflammable and explosives materials, volatile goods. If customers' products are optical grade, SCD-OP series is available but not SHD-U series. If it is hygroscopic materials, such as ABS, PA, PC, PET, PMMA, etc., SHD-U should be equipped with SD-H series. If the size of raw materials is uneven or other forms, material density is needs to be considered.

4.2 Application Cases

Under normal circumstance, there are two types of installation for SHD-U, machine mount and floor mount.

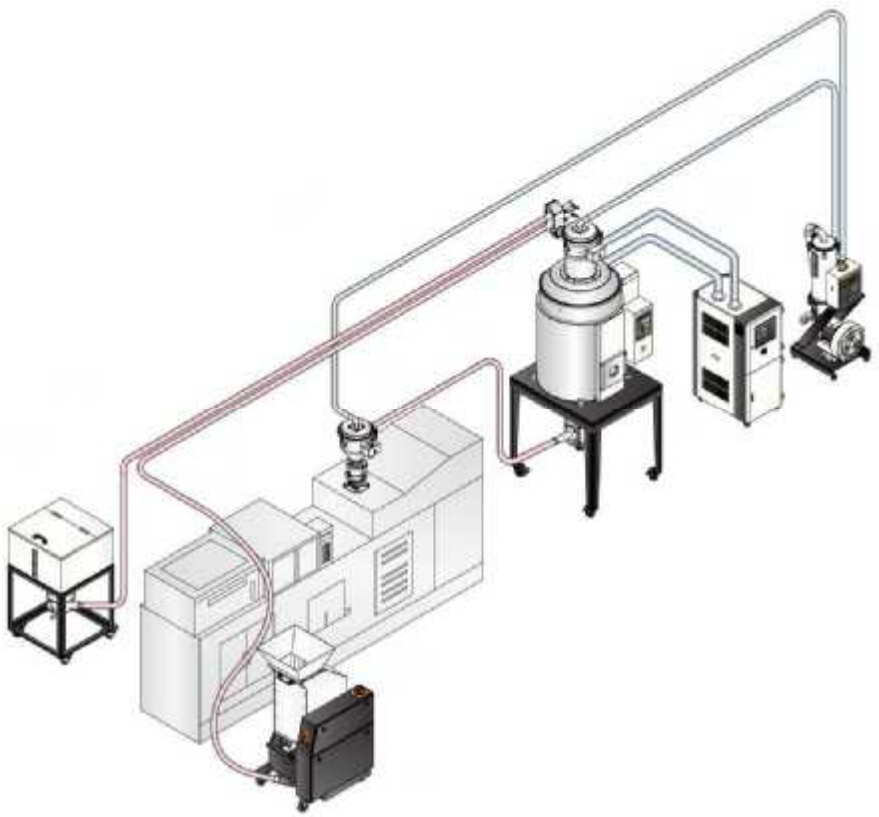
Install Directly on Moulding Machine



Picture 4-2: Install Directly

Install directly mode is suitable for SHD-450U and below models. SHD-U is installed directly on a moulding machine, and raw materials directly fall into moulding machine for using.

Install on floor stand



Picture 4-3: Install on Floor Stand

Floor mount mode is suitable for SHD-U series models. Virgin material is conveyed by hopper loader to feeding port of moulding machine to use. This mode is used when height restriction is concerned at the workshop and machine mount is not available or models are SHD-600U and above.

4.3 Model Selection

SHD-U series' hopper capacity is calculated by unit liter. If customers' requirement is calculated by unit kg/hr, unit of weight is converted to unit of capacity. If the bulk density of material is different, the hopper capacity needs to be increased or decreased within a certain range.

According to Maximum Output of Moulding Machine

Q: An injection moulding machine uses ABS material, the bulking density is

0.6kg/L, material consume rate per hour is 50kg, drying time is 3hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume capacity) × (drying time)
=50 × 3=150kg.

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

150kg × 1.2=180kg

Volume=weight(kg) ÷ density(kg/L)=180 ÷ 0.6=300L

So SHD-300U is available.

Q: An injection moulding machine uses PET material(crystallized), the bulking density is 0.38kg/L, material consume capacity per hour is 50kg, drying time is 6hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume capacity) × (drying time)
= 50kg/h × 6h=300kg

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

300kg × 1.2=360kg

Volume=weight (kg) ÷ density (kg/L)=360 ÷ 0.38=947L

So SHD-900U is available.

According to Mould Clamping Force (Ton)

We suggest not referring to this method under normal circumstance, expect that customer do not know moulding machine' s capacity.

Q: An injection moulding machine with 500Ton uses ABS, the bulking

density is 0.6kg/L. Please select out what kind of dryer is suitable for this application?

A: The maximum capacity of moulding machine is about 500 × 0.08 (empirical coefficient) =40kg, according to empirical formulas.

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

40kg × 1.2 = 48kg

Hopper loading capacity=(hourly consume capacity) × (drying time)=48 × 3=144kg

Volume=weight(kg) ÷ density(kg/L)=144 ÷ 0.6=240L

So SHD-230U is available.

4.4 Q & A

Q: What is hot air down-blowing heating mode?

A: Adopt hot air pipe which is fixed in the center of the drying hopper. Hot air is blow from the top of the pipe into hopper through down blowing air pipe, and out of the bottom to dry materials. Bell-mouthed air pipe and punched plate are equipped at the bottom of air pipe to ensure even distribution of hot air to maintain a steady temperature in the hopper and increase drying efficiency.

Q: When do AIF-U、HAR-U and ADC-U be optional ?

A: AIF-U is optionally installed to ensure no material contamination if there is much dust in workshop.

HAR-U is optionally equipped to form a semi-closed circulation loop with drying air, which can avoid temperature rising and save energy.

If much dust is contained in raw materials, ADC-U is optional, which can effectively filter dust from drying hopper and avoid environmental pollution, filtering effect being up to 90%.

Q: Customer said that after enough drying time, the temperature on the top of SHD-U is not reach the setting value except the temperature at the bottom of it.

A: SHD-U series adopt air down-below design, and normally the temperature at the bottom of it would quickly reach setting value. But if the temperature of material rise slowly on the top of hopper, air flow at the bottom of it being not enough, the temperature of material on the top rise slowly. However, this does not affect machine's normal operation. Because the dried material at the bottom is continuously conveyed and drying material on the top is also falling down, when machine is on. So material is dried in such moving process.

5. Drying Loaders SDL

Picture 5-1: Drying Loaders SDL

5.1 Application Fields

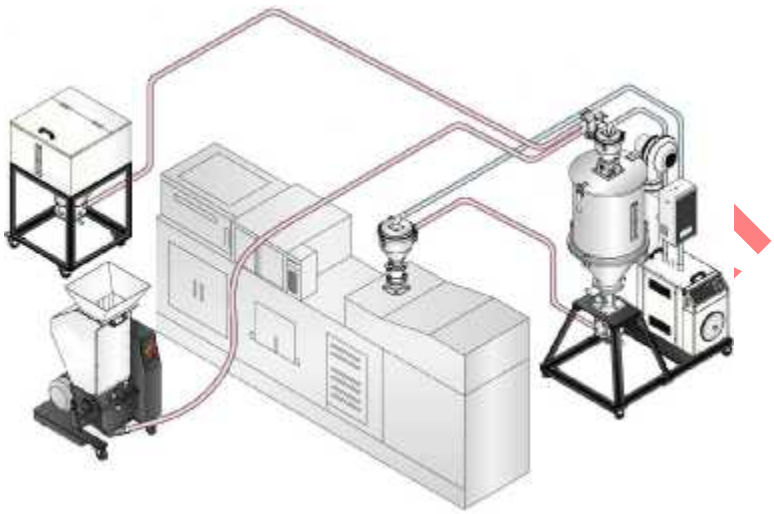
SDL series of drying loaders combine conventional hot air drying and conveying functions into a compact unit. It is particularly suitable for using with the big tonnage moulding machines when height restriction is concerned at the workshop. It can be equipped with one to two combinations (SAL-900G) to reach the function of conveying raw materials to drying hopper and dried material to moulding machine. SDL series are suitable for drying row materials and recycling materials, such as ABS, PA, PBT, PC, PE, PET, PMMA, PP, POM, PPS, PS, PUR, PVC and so on. It can not suitable for drying powder materials and all kinds of food, chemical medicine, inflammable and explosive materials, volatile goods. If customers' product is optical grade, SCD-OP series is available but not SDL series. If it is hygroscopic materials, such as ABS, PA, PC, PET, PMMA, etc., SDL should be equipped with SD-H series. If the size of raw material is uneven or other forms, material density needs to be considered.

5.2 Application Cases

Under normal circumstance, SDL series apply to single-stage conveying combination and two-stage conveying combination.

SDL series is equipped with photo-sensor hopper for conveying drying materials. It adopts manual feeding to dry material, which is conveyed into photo-sensor hopper to work after dried.

Two-stage Conveying Combination



Picture 5-2: Two-stage Conveying Combination

SDL is equipped with one to two combination (SAL-900G) to convey raw material to dryer hopper and dried material to moulding machine.

5.3 Model Selection

The selection for SDL series is based on loading capacity of SHD series. The hopper capacity of SDL series is calculated basing on the material density of 0.65kg/L. If there are some difference in customer's material density, hopper capacity is calculated by the appropriate proportion.

The selection of conveying system is based on conveying distance and purpose, within the rang of 5m in horizontal distance and 4m in height, referring to catalog. And it is also based on the performance curve of conveying blower to select proper conveying system.

One to one combination is selected: SAL-700G、SAL-800G

One to two combination is selected: SAL-900G

SMH-6L is available if it is installed on dryer hopper, and SVH-6L is available if it is installed on the feed opening of moulding machine.

According to Maximum Output of Moulding Machine

Q: An injection moulding machine uses ABS material and material consume rate per hour is 50kg, the bulk density is 0.6kg/L, drying time is 3hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume rate) × (drying time)
=50 × 3=150kg

Considering that the drying effect of raw materials and hopper volume is fully in accordance with using demands, it needs to be multiplied by 1.2.

150kg × 1.2 = 180kg

So SDL-200 is available.

Note: For the density of ABS is 0.6kg/L, which almost has no difference with standard parameters of 0.65kg/L. So it is not necessary to refer to material's bulk density when calculating hopper capacity.

Q: An injection moulding machine uses PET(crystallized), the bulking density is 0.38kg/L, material consume capacity per hour is 30kg, drying time is 6hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly capacity rate) × (drying time) ÷ (0.38 ÷ 0.65)= 30kg/h × 6h ÷ 0.59=305kg

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

305kg × 1.2=366kg

So SDL-400 is available.

According to Mould Clamping Force (Ton)

We suggest not referring to this method under normal circumstance, expect that customer do not know moulding machine' s capacity.

Q: An injection moulding machine uses ABS material with 500Ton, the bulk density is 0.6kg/L, drying time is 3hr. Please select out what kind of dryer is suitable for this application?

A: The maximum capacity of moulding machine is about 500 × 0.08 (empirical coefficient) =40kg according to empirical formulas.

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

40kg × 1.2 = 48kg

Hopper loading capacity=(hourly consume rate) × (drying time)
=48 × 3=144kg.

So SDL-150 is available.

Note: For the bulk density of ABS is 0.6kg/L, which almost has no difference with standard parameters of 0.65kg/L. So it is not necessary to refer to material's bulk density when calculating hopper capacity.

5.4 Q & A

Q: How to control drying and conveying section of SDL?

A: SDL series integrates loading and drying into one unit, adopting combination of standard SHD and SAL-G.

Q: Can material shut-off function optionally equip with conveying part of SDL?

A: Material conveying part of SDL adopt main unit of SAL-700G/800G/900G, except for SAL-900G, SAL-700G/800G needs to install timer on control

section when select material shut-off function.

6. Drying Loaders SDL-U

Picture 6-1: Drying Loaders SDL-U

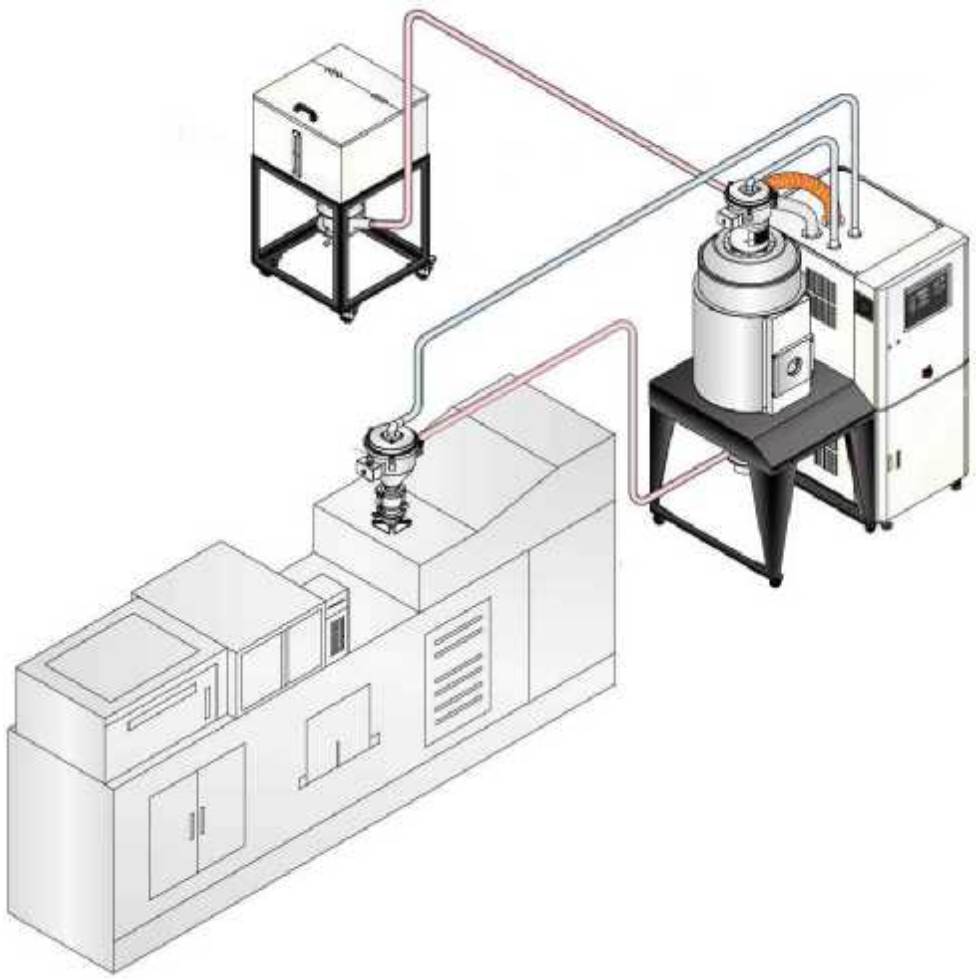
6.1 Application Fields

SDL-U series of drying loaders combine conventional hot air drying and conveying functions into a compact unit. It is particularly suitable for using with the big tonnage moulding machines when height restriction is concerned at the workshop. SHD series are suitable for drying row materials and recycling materials, such as ABS, PA, PBT, PC, PE, PET, PMMA, PP, POM, PPS, PS, PUR, PVC and so on. SHD can not suitable for drying powder materials and all kinds of food, chemical medicine, inflammable and explosive materials, volatile goods. If customers' product is optical grade, SCD-OP series is available but not SDL series. If it is hygroscopic materials, such as ABS, PA, PC, PET, PMMA, etc., SHD-U should be equipped with SD-H series. If the size of raw material is uneven or other forms, material density needs to be considered.

6.2 Application Cases

SDL-U is always placed near the molding machine. The material is filled into

the storage bin by manual, and then it will be conveyed into molding machine by blower for direct use after being dried complete within the drying hopper.



Picture 3-2: SDL-U Floor Stand

If the SDL-U location remotes from the molding machine, the dried material may get the possibility of moisture re-absorption. In order to avoid the above, it is needed to consider equipped with pneumatic shut off valve during the material conveying process.

6.3 Model Selection

The selection of SDL-U is based on the hopper capacity (kg), which was tested based on the material with bulk density 0.65kg/L. So the actual hopper capacity will vary with actual bulk density of material customers provided.

Please refer to conveying capacity from the catalog and conveying distance to select the conveying material part under testing condition with horizontal distance 5m and vertical height 4m. The conveying material part also can be selected in accordance with performance curve of blower. (See picture13-1)

According to maximum output of molding machine

Q: One customer wants to dry material ABS with bulk density of 0.6kg/L, the drying time is 3hrs and the required output is 50kg/hr. please select one suitable model for this application.

A: Total weight (kg)= output × drying time = 50 × 3=150kg

Thinking about the drying effect and the actual hopper capacity, it is better to add safety factor (1.2 times with the above result).

150kg × 1.2 = 180kg

Hopper capacity (L)

=total weight (kg) ÷ bulk density (kg/L)=180 ÷ 0.6=300L

So the SDL-300U is suitable.

Q: One customer wants to dry PET scrap with output of 25kg/hr, the bulk density of PET scrap is 0.38kg/L and the drying time of this material is 6hrs. So which model is suitable?

A: Total weight (kg) = output × drying time = 25×6=150kg

Thinking about the drying effect and the actual hopper capacity, it is needed to add safety factor (1.2 times with the above result).

150kg × 1.2 = 180kg

Hoppe capacity(L)=total weight (kg) ÷ bulk density (kg/L)
=180 ÷ 0.38=474L

SDL-600U can meet this application.

Based on Mold Clamping Force of Molding Machine

Please refer to following experience method to select suitable model if customers can not provide the maximum. output. We don't suggest using this method except for special status.

Q: One molding machine with 500 ton mold clamping force needs to mold ABS virgin material with bulk density of 0.6kg/L and drying time of 3hr, please suggest one suitable model?

A: According to experience method, the maximum output can be figured out=500 × 0.08 (experience factor) =40kg/hr.

Total weight (kg) = output × (drying time) =40 × 3=120kg

Thinking about the drying effect and the actual hopper capacity, it is needed to add safety factor (1.2 times with the above result).

120kg × 1.2=144kg

Hopper capacity (L)=total weight (kg) ÷ bulk density (kg/L)
=144 ÷ 0.6=240L

SDL-300U can meet this case.

6.4 Q & A

Q: What is the lowest dew-point for SDL-U-HD?

A: The lowest dew-point is -40℃.

Q: For normal operation, how much is the air consumption of the heatless regenerator?

A: Refer to table as below:

Model SDL-U-HD	40U	80U	120U	160U	230U	300U	450U	600U	750U	900U	1200U
Air consumption (m^3/min)	0.19	0.25	0.36	0.5	0.75	1.13	1.5	1.5	3.75	3.75	3.75

Q: For normal operation, how much is the needed pressure of compressed air of the heatless regenerator?

A: The pressure of compressed air ranges from 4 to 10 kgf/ cm^2. The higher the pressure is, the lower the dew-point gets. Thinking about the actual state, the pressure of 6.5 kgf/ cm^2 is suggested to use.

Q: What is the life span of desiccant inside the heatless regenerator?

A: The life span is usually 2 years and it can be replaced by manual.

Q: Could the SDL-U-HD equip with the dew-point monitor?

A: Yes.

7. Honeycomb Dehumidifiers SD-H

Picture 7-1: Honeycomb Dehumidifiers

7.1 Application Fields

SD-H series honeycomb dehumidifiers are mainly used to dry hygroscopic engineering plastics, such as PET, PC etc. A honeycomb rotor is used to offer effective drying, which under ideal conditions, can supply dehumidified dry air with a dew-point lower than -40℃. One set of SD-H can work together with one set of SHD or many sets in order to meet customer's requirements.

7.2 Application Cases

SD-H can work together with hopper dryer, not only equipped with one to one configuration but also equipped with one to many sets configuration. With regard to detail configuration, there are two mounted type, unequal pipe line system and equal pipe line system, to meet actual status.

Unequal Pipe Line System (2 pipes)

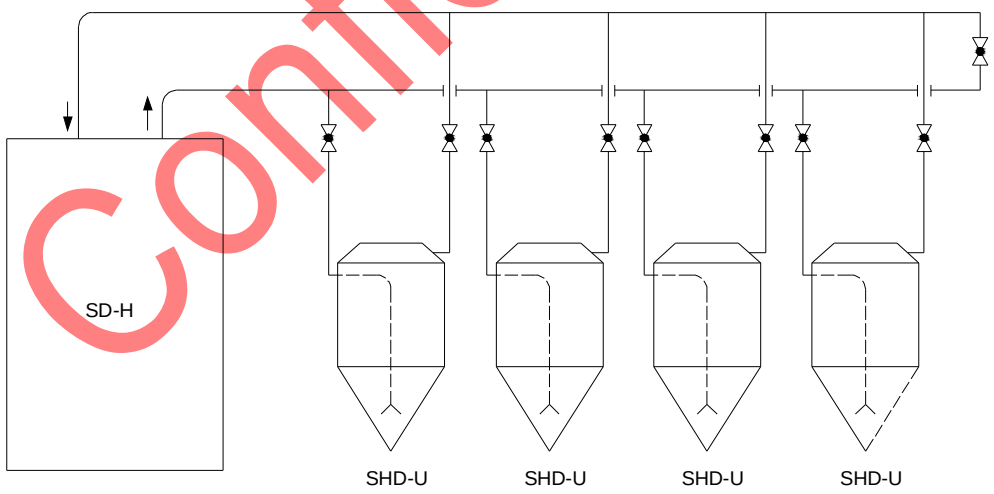
This system uses two pipes (one air outlet pipe and one air inlet pipe) to connect the hopper dryer to honeycomb dehumidifier. The length of pipe

flown by the drying air is not same, so do the flow resistant of drying air and the air capacity.

When configuring this system, it is better to place the smaller hopper dryer near the dehumidifier, and so do others. This arrangement has some advantages, which ensure variety of models got enough drying air.

Beside of the above, there is one other point of notice. Due to flow resistant of drying air of each cycle is not same, the air capacity that flows into each hopper dryer is not same too (even if the models are same). In order to reduce the bad effect, the air inlet and outlet of hopper dryer should have following adjustment: installing ball valve and air flow valve to adjust the air capacity and short the air inlet and outlet of SD-H by ball valve, which can act as by-pass for small system. (Be careful: when adjusting air flow, it is commonly suggested to open the ball valve of air inlet completely but adjusting the scale of ball valve of air outlet)

The number of hopper dryers usually is 4 sets or more than 4 sets for equal pipe line system (two pipes). It is better to place the SD-H at the middle of the system.



Picture 7-2: Equal Pipe Line System

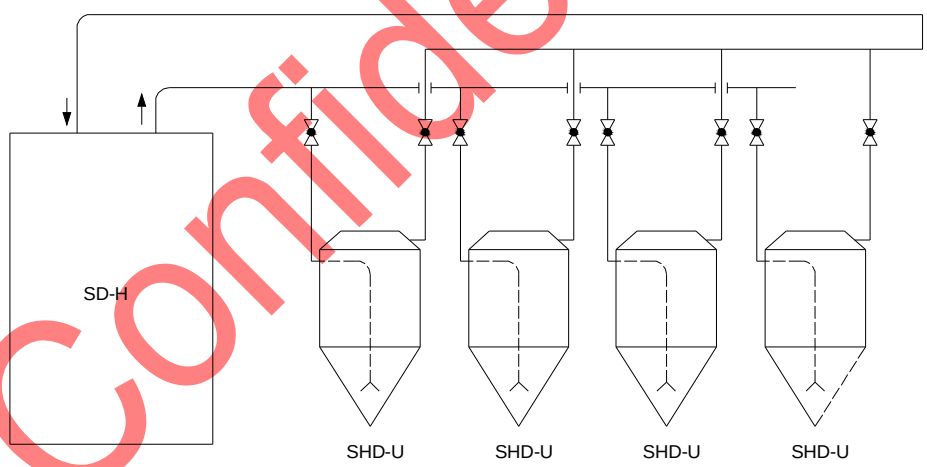
Unequal Pipe Line system (3 pipes)

This system uses three pipes (one air outlet pipe and two air return pipes which was shorted at the pipe end by ball valve) to connect the hopper dryer to honeycomb dehumidifier. The length of pipe flown by the drying air is same, so do the flow resistant of drying air and the air capacity.

When configuring this system, the smaller hopper dryer should also be placed near the SD-H.

If entire hopper dryer is same, the ball valve need not be installed at the inlet and outlet of the hopper dryer. In order to repair conveniently, it is better to install ball valve. If entire hopper is not same, the ball valve still need been installed to adjust the air flow. (Be careful: when adjusting air flow, it is commonly suggested to open the ball valve of air inlet completely but adjusting the scale of ball valve of air outlet)

When the number of hopper dryer is not less than 3 sets, it is suggested to select this second system.



Picture 7-3: Equal Pipe Line System

The cost of these two systems is same, the only different point is the latter have one pipe more than the former holds, but the latter have better performance. It is suggested to select the latter under following condition: many sets of hopper dryer or long distance between SD-H and hopper dryer.

7.3 Model Selection

The model selection is in accordance with two important parameters: needed air flow per unit time per weight and output per unit of drying material.

$Q = q \times W$

Meaning of each code:

Q—air flow per unit time (Nm^3/hr)

W—output per unit time (kg/hr)

q—drying air flow per unit time per weight ($Nm^3/kg\text{-}hr$)

The result figured out through the above formula is needed drying air flow per unit time, which should be less than air flow that the SD-H can provides.

For example:

One customer wants to process the PET material with output of 30kg/hr, so which model is suitable?

Following the table 12-1 to find that the needed air flow of PET per unit time per weight is 2.4~3.5 $m^3/kg\text{-}hr$ (this value have included the safety factor)

$Q=q \times W = 3.5 \times 30 = 105\ m^3/hr$

So the model of SD-120H is suitable.

7.4 Q & A

Q: How to understand the dehumidifying process?

A: Dehumidifying process means that removes moisture contained in the air or a variety of gas, but to create drying air.

Q: What meanings is respectively each of the absolute humidity, relative humidity and dew-point?

A: Absolute humidity:

It is water vapor mass contained in the air per unit volume. Its unit commonly is expressed by mm Hg.

Drying degree of air is relative with the mass of water vapor contained in

the air per unit volume. Under certain temperature and certain volume of air, the thicker the density of water vapor is, the higher the air pressure is, and the opposite is true. So the humidity is usually expressed by pressure of water vapor contain in the air.

Relative humidity:
It is percentage between the actual density of water vapor contained in the air and the density of saturated water vapor under same temperature. It also can be expressed by the percentage between absolute humidity and the pressure of saturated water vapor under same temperature.

In fact, many phenomena related with humidity what we meet are not directly relative with absolute humidity but with the degree that the water content deviate from the saturated state. So the relative humidity worked as a new concept, which can express the degree that the water content deviates from the saturated state, was raised. The density of water vapor is directly proportional to air pressure of water vapor with same temperature, so relative humidity just is a percentage between actual pressure of water vapor and air pressure of saturated water vapor with same temp.

Dew-point:
It is one of the expression of air humidity (for short dew-point temperature), which means dewing temperature when the saturation water vapor begins to dew. When the relative humidity is 100%, the ambient temperature just is the dew-point temperature. The lower the dew-point temperature (than the ambient temperature) is, the less possible to dew, that also means the more drying the air is. The dew-point will not be influenced by temperature, but influenced by pressure.

In fact, the dew-point is an indicator of water content, which just expresses it by temperature. That is to say, most of the time, what we said about the water content just is the dew-point temperature.

Actually the water content was expressed by the dew-point under much lower relative humidity, sometimes it can be presented directly by the

PPM without the decimals. The concept of the dew-point is not existed under high temperature because the water have been evaporated completely (except for high pressure).

Q: What is the main function of the SD-H?

A: In modern society, the plastic had been applying in variety of fields all over the world, such as food, chemical, medical treatment and aviation etc. Because of high water content and strong moisture absorption, the plastic, when molding under high temperature, will produce following failure, such as weak intensity, dimension error, air bubble, fissuring and color defects etc. For the plastic with strong moisture absorption, the conventional hot air dryer can not remove completely the water contained in the plastic, but the SD-H can get good effect, not only reducing the water content but also keep plastic performance when molding products. Before dehumidifying, the water content of plastic is usually 0.2~1%. After dehumidifying, the plastic not only can be crystallized at certain degree but also be dried completely, which means the water content of plastic reaches down to 0.02%, in order that make them have good performance.

Q: Whether would the drying time reduce after used the SD-H?

A: The SHD would be used in drying material with hot air. There is a causal relationship between drying effect and drying parameter of material. If drying material with drying air with low dew-point, the dehumidifier must be used, such as PET, PC etc. If the requirement of drying effect or dew-point is low, the dehumidifier will not be needed but SHD, such as PE, PP etc. Thinking about the above explanation, it is known that the drying time is same for these two models.

Q: What advantage does the SD-H has compared with hopper dryer?

A: This series of dehumidifier of SD-H, which can produce drying air that the dew-point can reach down to -40℃, is used to dry engineering material with strong moisture absorption to get high efficiency drying effect. The dehumidifier with honeycomb rotor can ensure providing enough air

flow for drying material during drying process. The honeycomb rotor unlike other dehumidifying device will not produce powder which may flow with drying air into drying hopper because of molecular sieve aging. The SD-H has other advantages: Both regeneration and dehumidifying process is running at the same time; equipped with closed loop system; strict design ensure dehumidifying process being reliable and steady.

Q: How long can the dew-point reach down to -40℃ for the SD-H?

A: a) If the SD-H is idle for long time such as 1~2 months, the dew-point of SD-H can reach down to -40 ℃ for running 40~60mins after regenerated the honeycomb for 1~2 hours by regenerative heater.

b) The dew-point of SD-H can reach down to -40℃ after running 40~60min with normal operation.

Q: The dew-point of one set of SD-H could reach down to -45℃ last week. But these two days suddenly the dew-point dropped strongly down to -20℃ under the same condition like before. Please suggest suitable solution.

A: The possible cause is much impurity contained in the cooling water resulting in Y-type filter blocking, please try to check and clear it.

Q: One customer wants to dry PET-G, detail requirements as follow, please select one suitable model.
material: PET-G
output: 300 kg/hr
drying time: 6 hr
drying temperature: 60 ℃
dying air flowrate: 3.5 m³/kg-hr
bulk density: 0.6kg/L

A: SD-1500H-C together with DH-3000U and ACF-6” are suitable for this case.

Q: One customer needs model configuration which one set of SD-H worked together with three hopper dryers: SHD-2500U, SHD-900U and

SHD-450U. The raw material is HDPE, drying temperature is 90℃, drying time is 2 hrs, please selecting one suitable model of SD-H.

A: We don't suggest that SD-H works with variety of hopper dryers. If entire material is same, customer could select one hopper with capacity of 4000L. The needed air flow is 2.5m3/kg-hr for drying HDPE, so the SD-2000H is suitable for this application.

Q: One customer purchased one set of SD-2000H before, now he wants to buy singly one set of built-in dew-point monitor. Please explain how to install it.

A: This customer need to purchase following components: mounted base of dew-point, dew-point monitor and dew-point transducer. The mounted position of dew-point monitor and dew-point detecting position have been reserved, so the installing operation is simply without worry.

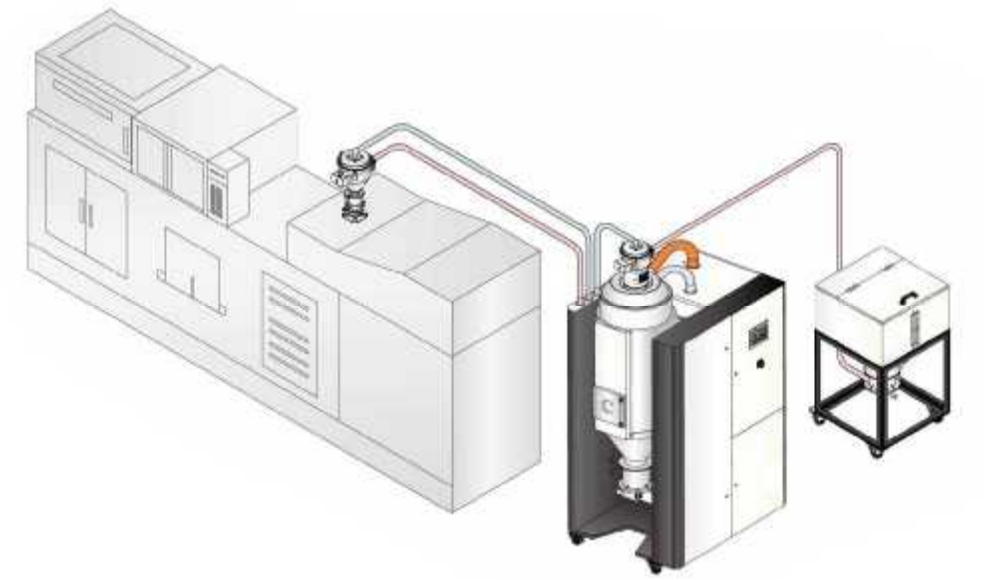
8. “All-in-one” Compact Dryers SCD

Picture 8-1: “All-in-one” Compact Dryers

8.1 Application Fields

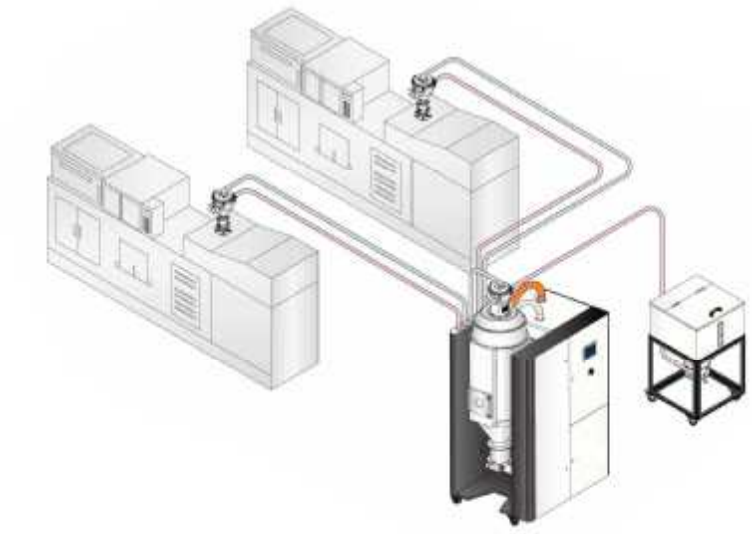
SCD mainly is used to dry and convey material with strong moisture absorption, such as ABS、PA、PBT、PC、PE、PET、PMMA、PP、POM、PPS、PS、PUR、PVC etc, but not in following fields: powder material, food, chemical medicine, inflammable and explosive materials and volatile materials. If customer’s product belongs to optical fields, the standard model of SCD is not suitable but SCD-OP series. It was needed to think about the bulk density and fluid of material with uneven shape.

8.2 Application Cases



Picture 8-2: Application Sketch Drawing of SCD 1

The optional parts of PLC plus LCD are default if equipped with three stages material conveying function, which can convey the material from material storage bin to hopper, hopper to molding machine 1 and hopper to molding machine 2.



Picture 8-3: Application Sketch Drawing of SCD 2

8.3 Model Selection

The selection of SCD is based on the hopper capacity (L). So the actual hopper capacity will vary with actual bulk density of material customers provided.

Please refer to conveying capacity from the catalog and conveying distance to select the conveying material part under testing condition with horizontal distance 5m and vertical height 4m. The conveying material part also can be selected in accordance with performance curve of blower. (picture13-1)

We can select the SCD according to hopper capacity and air flow for drying material. It is better to take the maximum value, that is to say, it just is to get enough air flow and hopper capacity. But if drying scrap material with small bulk density, it is on the basis of the hopper capacity because the gap between hopper capacity and drying air flow is large.

Based on Maximum Output of Molding Machine

Q: Customer wants to process material ABS with bulk density of 0.6kg/L, the drying time is 3hr and the required output is 50kg/hr. please select one suitable model for this application.

A: Total weight (kg)= output × drying time = 50 × 3=150kg

Thinking about the drying effect and the actual hopper capacity, it is better to add safety factor (1.2 times with the above result).

150kg × 1.2 = 180kg

Hopper capacity (L)=total weight (kg) ÷ bulk density (kg/L)

=180 ÷ 0.6=300L

We can find that the needed air flow per unit time per weight for drying ABS is 1.8~2.4m^3/kg-hr (take the maximum) according to table 12-1.

Q=q × W =2.4 × 50=120 m^3/hr

So the SCD-300U/150H is suitable.

Q: One molding machine needs to mold PET scrap with output of 25kg/hr, the bulk density of PET scrap is 0.38kg/L and the drying time of this material is 6hr，which model is suitable?

A: Total weight (kg) = output × drying time = 25×6=150kg

Thinking of the drying effect and the actual hopper capacity, it is needed to add safety factor (1.2 times with the above result).

150kg × 1.2 = 180kg

Hoppe capacity (L)=total weight (kg) ÷ bulk density (kg/L)
=180 ÷ 0.38=474L

We can find that the needed air flow per unit time per weight for drying PET scrap is 2.4~3.5m^3/kg-hr (take the maximum) according to table 12-1.

Q=q × W =3.5 × 25=87.5 m^3/hr

Because the bulk density of PET scrap is small, the gap between hopper and drying air flow is big. With hopper capacity accurate, so the SCD-600U/200H can meet this application.

Please refer to following experience method to select model if the customer can not provide the maximum. output. We don't suggest using this method except for special status.

Based on Mold Clamping Force of Molding Machine

Please refer to following experience method to select model if the customer can not provide the maximum. output. We don't suggest using this method except for special status.

Q: One molding machine of 500 ton of mold clamping force needs to mold ABS virgin material with bulk density of 0.6kg/L and drying time of 3hr, please suggest one suitable model?

A: According to experience formula, the maximum. output can be figure out: 500 × 0.08 (experience factor) =40kg/hr.

Total weight (kg) = output × (drying time) =40 × 3=120kg

Thinking about the drying effect and the actual hopper capacity, it is needed to add safety factor 1.2 on basis of the above result.

120kg × 1.2 = 144kg

Hopper capacity (L)=total weight (kg) ÷ bulk density (kg/L)
=144 ÷ 0.6=240L

We can find that the needed air flow per unit time per weight for drying ABS is 1.8~2.4m^3/kg-hr (take the maximum) according to table 12-2.

Q=q × W =2.4 × 40=96 m^3/hr

SCD-300U/150H can meet this case.

8.4 Q & A

Q: Why need to select three stage material conveying function for the customers?

A: In order to save cost and mounted space, the three stage material conveying function with LCD+PLC can be selected when customers want to dry single material for two molding machine.

Q: what if customers need the dew-point reached down to -50℃?

A: At present, the dew-point of standard model of SCD can reach down to -40℃. If needed to get lower dew-point such as -50℃, the customers can select honeycomb rotor with full molecular sieve.

Q: What if the dew-point is unsteady or high?

A: Possible cause: air return temperature is high or improper regenerative temperature or insufficient air flow. Please set the second being 150℃, check flow and temperature of cooling water, check tightness of system and clear filter.

Q: One customer wants to dry PC with output 100kg/hr and PA6 with output 200kg/hr. please suggest suitable models.

A: SCD-450U/300H100kg/hr is suitable for PC and the combination of SD-1000H-C plus DH-2000U is suitable for PA6.

Q: One customer wants to purchase SD-120H plus DH-160U to make PET bottle. Whether does he need to equip with cyclone?

A: The SD-120H needs installing built-in heater because the DH-160 U has not heater, and special connecting ports is needed to connect this two models because the connecting ports of this two models are different. The cyclone is unnecessary for such a small output. We suggest using SCD-160U/120H instead of the above models.

Q: One customer wants to reserve the SCD-OP with three stages material conveying function. Detail information is following:
material: PC
drying time: 7~8hrs
drying temperature: 120℃
output: 0.34kg per 4 min per machine
bulk density: 0.7kg/L

Please suggested suitable models.

In addition, please recommended one set of suitable SHR-3U-EOP worked together with SCD-OP.

A: We suggest following configuration based on customer's requirements:

Hopper capacity:

0.34 / 4 × 60 = 5.1kg/hr x 8 = 40.8kg/hr / 0.7kg/L = 60L × 2

So the SCD-120U/80H-LC-D-OP-M2 and SHR-3U-EOP × 2 are suitable.

Q: The filter inside EOF-150 had been changed to new type with stainless steel. Customers want to know the difference between the old and the new and if the new is better than the old. Now customer wants to change the old filter, which has bad filter performance now, to new one. He confuses about if the new one can directly be installed and if need doing any modification.

A: EOF-150 is one set of oil filter. The old one is made of paper, which features with no oil resistance and easy damage and single built-in filter. But the new one has double filter, which the rough filter with stainless steel will not be damaged because of oil contamination and the fine filter with activated carbon inside the rough filter ensure filtering oil completely. The new one can be cleaned repeatedly but the old one. They can be exchanged. The bad filter performance must not be due to the filter of itself, that is to say, the filter effect must not be improved by changing the filter. The oil filter is based on principle which the oil will be condensed on the surface of the copper pipe under cold temperature. So please confirm if the cold water is enough.

Q: One customer purchased one set of SCD-600U/300H one year ago. Now he wants to use this SCD for serving two molding machines. Please suggest how to finish this application.

A: Add one set of shut off valve suction box and one set of hopper loader SAL-2HP-UR and SHR-12U-E, which are used to conveying the dried material into throat of the second molding machine.

9. PET Crystallizer SCR

Picture 9-1: PET Crystallizer

9.1 Application Fields

SCR series crystallizer with closed air loop is used mainly to crystallize non-crystallized pet plastic, which means changing the non-crystallized PET plastic or regrinding to crystallized PET plastic by heating.

Usually the bulk density of PET with granule shape is 0.8kg/L and with the scrap shape is 0.38~0.4kg/L.

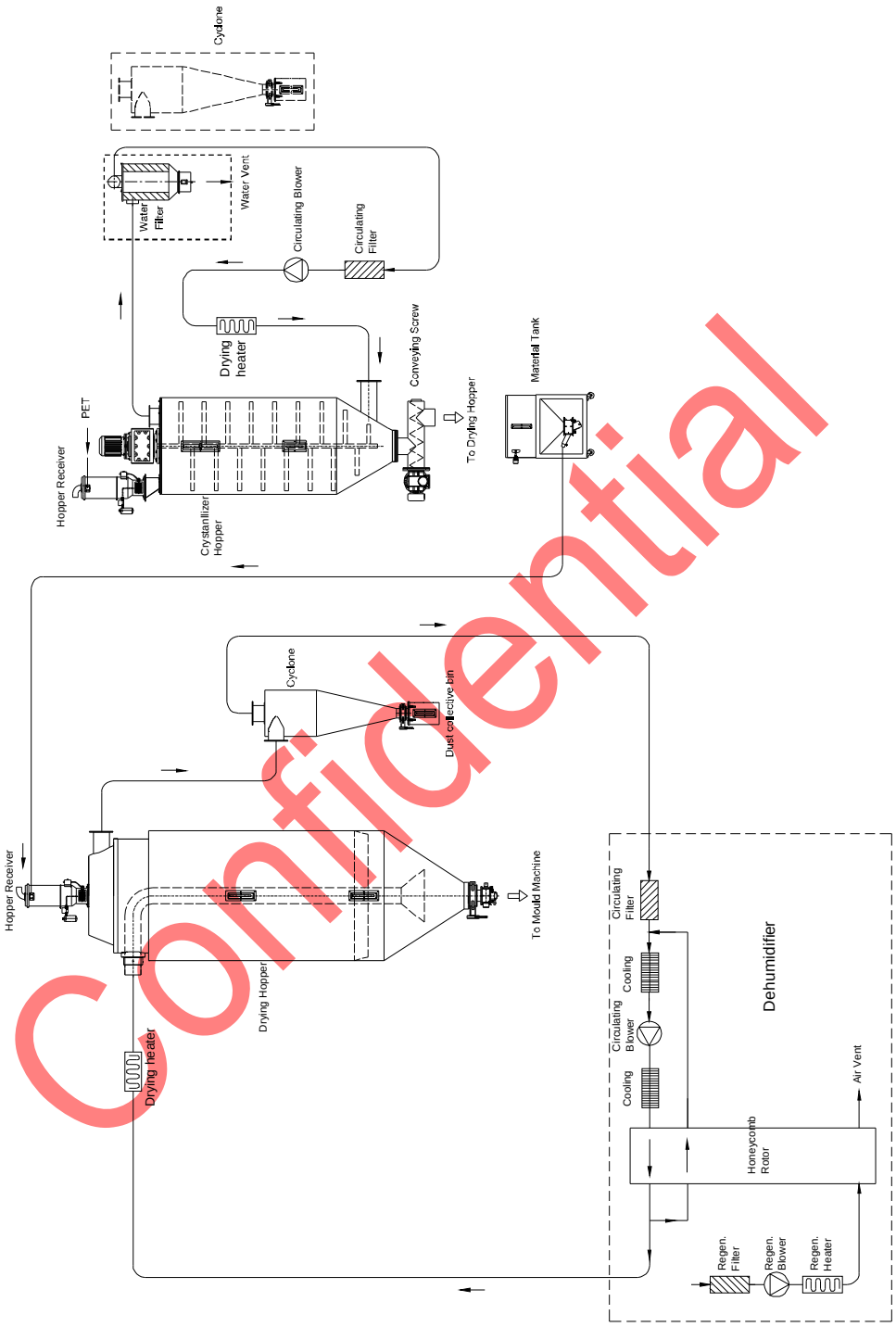
9.2 Application Cases

Generally, SCR can be used singly, according to customer's requirements, to crystallize the PET. It can also work together with SCD or DDS to continuously process PET (included crystallization and drying).

If there is lots of dust contained in regrinding or non-crystallized PET material, it is better to equip with one set of cyclone on the air return way of crystallizer, which can remove the dust efficiently and protect the blower.

Application of SCR with Drying and Dehumidifying Equipment

Application of SCR with drying and dehumidifying equipment，after the adoption of the pre-crystallization and dehumidifying drying method.



Picture 9-2: SCR with Dehumidifier and Dryer

9.3 Model Selection

Capacity of the SCR units are liters (L), if you is the use of raw materials unit is weight（kg/hr）, you will need to convert the weight of unit volume unit.

According to Moulding Machine Maximum Output Capability

Q: The injection machine maximum. output capability is 50kg/hr with PET chip, the material bulk density is 0.8kg/L, crystallization time is about 2 hour. We should choose which one model for the case? 某注塑机使用

A: Hopper volume=output capability（kg/hr）× crystallization time（hr）
=50 × 2=100kg

Thinking about the drying effect and the actual hopper capacity, it is better to add safety factor (1.2 times with the above result).

100kg × 1.2 = 120kg

Hopper volume(L)= weight(kg) ÷ bulk density(kg / L)=120 ÷ 0.8=150L

So the SCR-160U is suitable.

9.4 Q & A

Q: Under what conditions needs to option conveying screw device?

A: When user needs to have automatic temperature controlled using the crystallization of raw materials discharge or discharging directly to pack.

Q: Which item should be observed when selection the SCR?

A: Need to a certain proportion of crystal-material to started crystallizer
Need to customer supply the initial moisture value
Crystal temp. and Time
If the raw materials for the flake all need to consider in the molding machine feed throat selection the force feeding device break-bridge device(recycling flake).

10. Mould Sweat Dehumidifier SMD

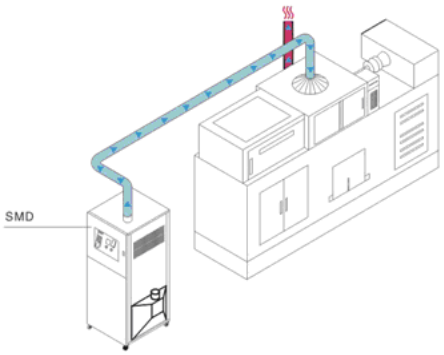
Picture 10-1: Mould Sweat Dehumidifier

10.1 Application Fields

SMD series mould sweat dehumidifiers are designed to remove the moisture sweat from condensing on the mould surface. Forming of moisture sweat on the mould surface is due to the use of chilled water for reducing the mould cycle time, particularly while moulding of the PET performs.

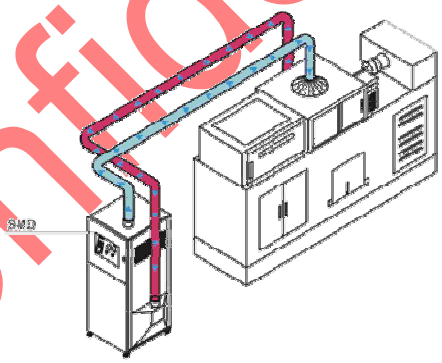
10.2 Application Cases

Open-loop Air Circulation



Picture 10-2: Open-loop Air Circulation

Closed-loop Air Circulation



Picture 10-3: Closed-loop Air Circulation

10.3 Model Selection

Table 10-1: SMD Model Selection

Model	SMD-500H	SMD-1000H		SMD-1500H	SMD-2000H	
Cavity Number	12	16	24	32	48	56
Cavity Array	(2×6)	(2×8)	(4×6)	(4×8)	(4×12)	(4×14)

Cavity Distance		Standard	Standard	Standard	Standard	Standard	Standard
Maximum. output (kg/hr)		200	270	400	420	560	560
Dryer Model		SHD-1500U	SHD-2000U	SHD-3000U	SHD-3000U	SHD-4000U	SHD-4000U
Dehumidifier Model		SD-750H	SD-1000H	SD-1500H	SD-1500H	SD-2000H	SD-2000H
Hopper Loader Model		SAL-2HP-UG	SAL-2HP-UG	SAL-3.5HP-UG	SAL-3.5HP-UG	SAL-5HP-UG	SAL-5HP-UG
Chiller	Water-cooled	SIC-25W-HP	SIC-30W-HP		SIC-193SW-HP	SIC-223SW-HP	
	Air-cooled	SIC-25A-HP	SIC-30A-HP		SIC-180A-HP	SIC-210A-HP	

10.4 Q & A

Q: What conditions need to use closed-loop air circulation mode?

A: Closed-loop air circulation is used to collect return air from moulding area back, which is particularly practical in tropical climate, example environment temp. ⩾ 30℃ and humidity ⩾ 60%.

Q: Why need to ues the condenser of air outlet?

A: Air temperature generated by this series of machine is about 35℃, If customer uses a very low temperature (5℃) water-cooled mold cooling that makes the mold surface temperature is very low, the surface vulnerable to condensation, it can choose to use a vent in the SMD cooling device, making SMD out the outlet temperature of ⩽ 20℃, to prevent surface condensation.

11. Compressed air dryers SCAD

Picture 11-1: Compressed Air Dryer

11.1 Application Fields

In the raw material handing process, SCAD integrates drying and loading into one unit. This machine is particularly suitable for using with the small tonnage molding machines whose height restriction is concerned at the workshop. This unit which shows good appearance and low energy consumption could convey the material by compressed air. It is suitable for drying and loading a little amount of material. It can convey the material from tank to hopper for drying, and then the air discharge through the filter. It suits for working at such fields: product testing or experiments for raw material etc.

11.2 Application Cases

Under normal condition, this series of machine is installed directly on a molding machine, and dried materials directly fall into molding machine for using.

11.3 Model Selection

SCAD series' hopper capacity is calculated by volume (unit: liter). If customers' requirement is calculated by weight (unit: kg), unit of weight needs to be converted to unit of capacity. If the bulk density of material is different, the hopper capacity needs to be increased or decreased within a certain range.

According to Maximum Output of Molding Machine

Q: An injection molding machine uses PP material, the bulking density is 0.5kg/L, material consume rate per hour is 2kg, drying time is 2hr, please select out what kind of dryer is suitable for this application?

A: Hopper loading capacity=(hourly consume capacity) × (drying time)
=2 × 2=4kg.

Considering that drying effect of raw material and hopper capacity is fully in accordance with using demands, it needs to be multiplied by 1.2.

4kg × 1.2=4.8kg

Volume=weight(kg) ÷ density(kg/L)=4.8 ÷ 0.5=9.6L

So SCAD-12U is available.

11.4 Q & A

Q: Can SCAD produce drying air that the dew-point can reach down to -40 ℃?

A: SCAD can't produce drying air that the dew-point can reach down to -40 ℃. SCAD just only can dry the material by hot compressed air.

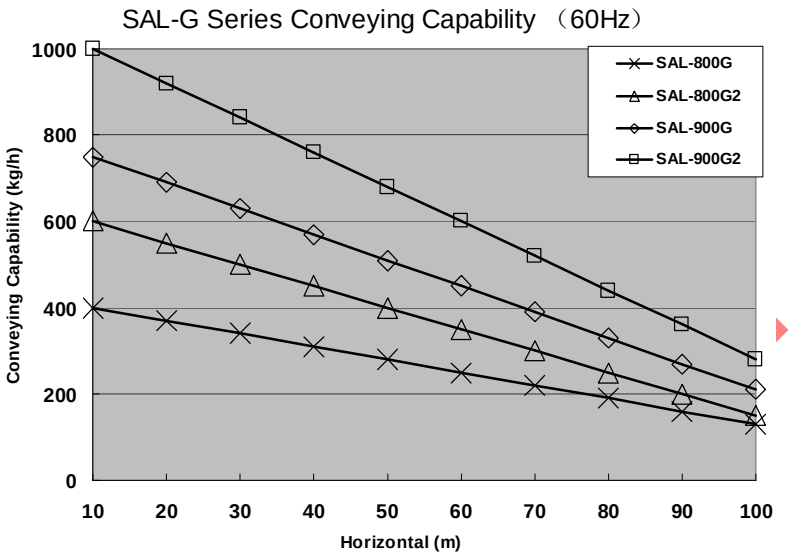
Q: Is it needed to add hopper on SCAD when it works?

A: SCAD is Compressed Air Dryer; it is said that it contains two functions of drying and conveying. It is no need to add other devices when SCAD works normally, just only to put the feed-in pipe into material tank, the unit would fill material automatically according to the level of material

inside the tank.

12. Refer. Information

12.1 Conveying Blower Capability



Picture 12-1: Conveying Blower Capability

Note:

SAL-700G blower（Carbon brush）power: 1.15kW;

SAL-800G blower（Induction）power: 0.75kW;

SAL-800G2 blower（Induction）power: 1.5kW;

SAL-900G blower（Induction）power: 0.75kW;

SAL-900G2 blower（Induction）power: 1.5kW;

1M（vertical）= 2M（horizontal）, 1 bend （90 degree）= 5M（horizontal）.

You can reference to “conveying and feeding series application guide” for other model.

12.2 Material Drying Parameter

Table 12-1: Material Drying Parameter

Material	Drying Temp. (℃)	Bulk Density (kg/L)	Drying Time (hr)	Initial Moisture Content (%)	Residual Moisture Content (%)	Airflow Requ. (Nm^3/kg-hr)
ABS	80	0.6	2~3	0.2	0.02	1.8~2.4
CA	75	0.5	2~3	1.0	0.02	2.5~3.5
CAB	75	0.5	2~3	0.8	0.02	3.0~3.5
CP	75	0.6	2~3	1.0	0.02	2.9~3.5
LCP	150	0.6	4	0.04	0.02	1.8
PA	70~80	0.65	3~6	1.0	0.05	2.4~3.0
PBT	120~140	0.7	4	0.3	0.02	1.8~2.4
PC	120	0.7	2~3	0.3	0.01	1.8
PE	90	0.6	1	>0.01	>0.01	1.8~2.4
PEEK	150	0.6	3~4	0.4	0.02	1.8
PEI	150	0.6	3~4	0.25	0.02	1.8
PEN	170	0.85	5	0.01	0.005	2.4 ~3.5
PES	150~180	0.7	4	0.8	0.02	1.56~2.4
PET	160~180	0.85	4~6	0.08	0.005	2.4~3.5
PETG	60~70	0.6	4~6	0.5	0.02	2.4
PI	120~140	0.6	3	0.4	0.02	1.5~1.8
PMMA	70~100	0.65	3	0.5	0.02-	2.0 ~2.4
POM	95~110	0.6	3	0.2	0.02	1.7~2.4
PP	90	0.5	1	>0.01	0.02-	1.8 ~2.4
PPO	110~125	0.5	2	0.13	0.04	1.8~2.1
PPS	140~150	0.6	3~4	0.1	0.02	1.8
PS	80	0.5	1	>0.01	0.02	1.5~1.8
PSU	120~170	0.65	4	0.3	0.02	1.8~2.0
PUR	80~90	0.7	3	0.2	0.02	2.5~2.8
PVC	70	0.5	1	0.1	0.02	1.7~2.1
SAN	80	0.5	2~3	0.1	0.05	1.7~2.1
SB	80	0.6	2	0.2	0.05	1.7~2.1
TPE	105	0.7	3	0.1	0.02	2.9

Note:

1. Airflow requ. has included air flow margin.

2. Above date Principle only, consult material supplier for details.

12.3 SD-H Cooling Water

Table 12-2: SD-H Cooling Water

Model	SD-30H	SD-50H	SD-80H	SD-120H	SD-150H	SD-200H	SD-300H	SD-400H
Flowrate（L/min）Temp. difference 5℃	4	6	10	15	20	30	40	50
Pipe Dia.	3/4”	3/4”	3/4”	3/4”	3/4”	3/4”	3/4”	3/4”
Condenser inlet Temp.(℃)	⩽30℃							
Pressure（kgf/cm^2）	3~5							
Model	SD-500	SD-700H	SD-1000H	SD-1500H	SD-2000H	SD-3000H	SD-4000H	
Flowrate（L/min）Temp. difference 5℃	60	80	120	150	180	360	480	
Pipe Dia.	1”	1”	1.5”	1.5”	2”	2”	2” 2in/2out	
Condenser inlet Temp.(℃)	⩽30℃							
Pressure（kgf/cm^2）	3~5							

Version

No.	Page (P) Chapter (C)	Description	Date Dep./Name
1		New Document	2010-04-01 TM/Henry Chang
2		Revising coding principle Add introduction of new model Revising pictures	2010-10-19 TM/Gavin Bai
3		New brand image	2013-04-28 TM/Gavin Bai

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2. Your opinion about format and layout of this manual:

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