Publication PD4 June 2002

POLYPIPE CIVILS LTD

POLYDRY

CROP COOLING, DRYING & VENTILATION

THE POLYDRY SYSTEM

Polydry has been designed and tested in conjunction with ADAS, a leading land based consultancy, for use in the on-floor cooling, drying and ventilation of all floor stored crops.

Benefits include

- Lifetime Guarantee on all components except fans*
- Suitable for use with most crops
- An integrated and comprehensive range of fans and horizontal and vertical systems
- Manufactured from materials suitable for food contact
- Corrugated ducts made from high density polyethylene and polypropylene - giving a high stiffness and impact strength
- Smooth internal bore minimises restriction to air flow within the duct
- Minimises condensation formation on the ducting
- Perforations designed to prevent ingress of small crops
- Light and easy to handle
- Push-fit fittings for quick, trouble-free assembly and disassembly
- The ducts can be used time and time again without damage - making Polydry the most economic choice

* Subject to Polypipe Civils Terms and Conditions

ENGINEERING EXCELLENCE

POLYDRY HORIZONTAL ON-FLOOR SYSTEM

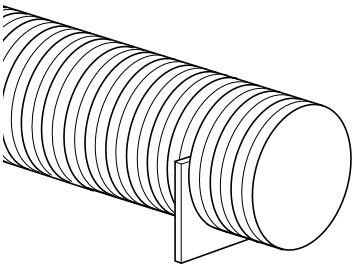
The Polydry horizontal on-floor cooling, drying and ventilation system is ideal for use with existing main air tunnels.

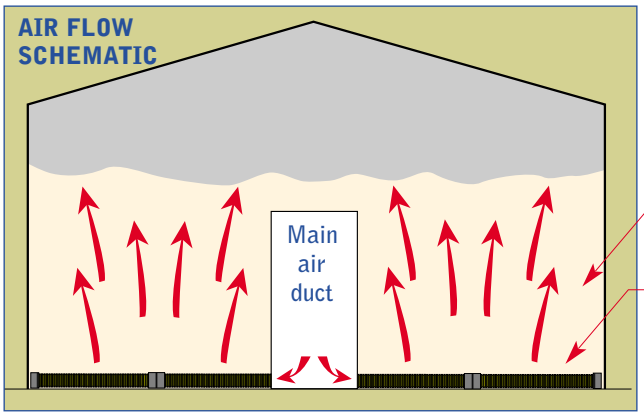
Polydry's robustness and durability makes it ideal for replacing traditional steel ducts.

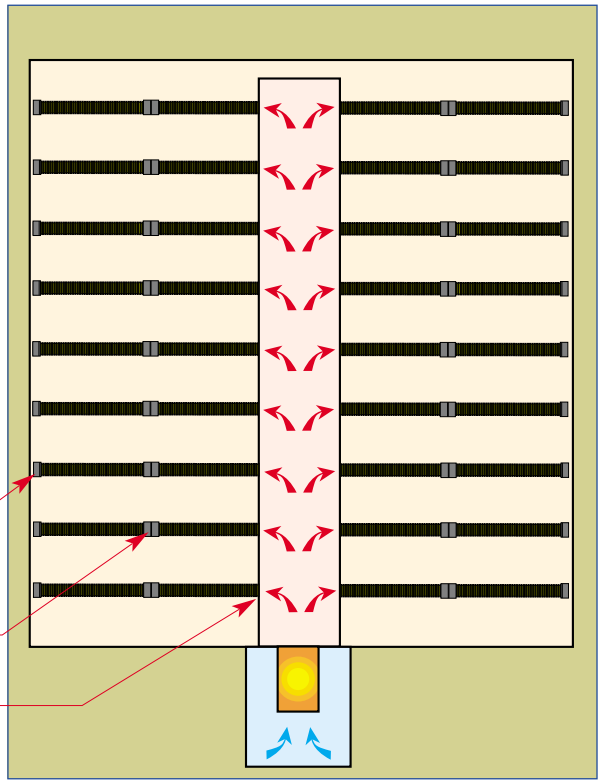
The perforations have been designed to prevent the flow of small crops, such as oilseed rape, into the duct.

The duct is available in a range of sizes from 225 to 600mm inside diameter as standard, with other sizes available on request. A range of purpose designed fittings completes the system.

Optional feet are recommended for horizontal Polydry systems used with heavy crops, such as potatoes. Each 3m length of pipe is supported by two feet, one welded near each end. This requirement must be specified at a time of enquiry and order placement.







Easy to handle and assemble and easily adapted to existing main air tunnels

Air control door for flow regulation

Anti-roll push-fit coupler

Anti-roll push-fit end cap

DUCT SPECIFICATION

Diameter (mm)	OD (mm)	Length (m)	Slot width* (mm)	Slot length* (mm)	Slots per metre*
225	266	3,6	1.5	90	60
300	354	3,6	1.5	80	189
450	514	3,6	1.5	130	158
600	675	3,6	3.0	120	98

* Applicable to perforated ducts only.

POLYDRY HORIZONTAL SELECTION TABLES FOR DRYING

The tables should be used to determine the diameter of Polydry duct to use in the on-floor drying of the specified floor stored crop.

The selection tables below have been developed by ADAS and provide for safe selection of duct size within the noted parameters.

TABLE 1 - WHEAT & BARLEY

Duct length (m)	Crop depth (m) 2.4	3.0	3.6
2	225	225	225
3	225	225	225
4	225	225	225
5	225	225	225
6	300	225	225
7	300	300	300
8	300	300	300
9	300	300	300
10	450	450	450
11	450	450	450
12	450	450	450
13	450	450	450
14	450	450	450
15	450	450	450
16	450	450	450
17	450	450	450
18	450	450	450
19	450	450	450
20	450	450	450
21	600	450	450
22	600	450	450
24	600	600	600
26	600	600	600
28	600	600	600
30		600	600

Calculations are based on:

- 1.0m centres for 225, 300 and 450mm ducts
- 1.2m centres for 600mm ducts
- A ventilation rate of 0.047m³/s tonne

TABLE 2 - BEANS AND PEAS

Duct length (m)	Crop depth (m) 2.4	3.0
2	225	225
3	300	225
4	300	300
5	300	300
6	300	300
7	450	300
8	450	450
9	450	450
10	450	450
11	450	450
12	450	450
13	600	450
14	600	450
15	600	450
16	600	450
17	600	600
18	600	600
19		600
20		600
21		600
22		600
24		600

Bulk peas should not be dried in depths greater than 3.0m.

Calculations are based on:

- 1.0m centres for 225, 300 and 450mm ducts
- 1.2m centres for 600mm ducts
- A ventilation rate of 0.062m³/s tonne

PRODUCT CODES

Size (mm)	Plain ended* (3m)	Plain ended* (6m)	Duct with integral socket* (3m)	Duct with integral socket* (6m)	Spigot with air door	Anti roll coupler	Anti roll end cap
225	PY225X3PE	PY225X6PE	-	-	PY225SAD	PY225C	PY225EC
300	PY300X3PE	PY300X6PE	-	-	PY300SAD	PY300C	PY300EC
450	PY450X3PE	PY450X6PE	PY450X3IS	PY450X6IS	PY450SAD	PY450C	PY450EC
600	PY600X3PE	PY600X6PE	PY600X3IS	PY600X6IS	PY600SAD	PY600C	PY600EC

* Codes shown are for perforated pipes only. For unperforated pipes insert 'S' in the product code, e.g. PY225X3SPE for unperforated 225mm Polydry pipes in 3m lengths.

How to use the tables

The tables require three pieces of information:

- The type of crop to be ventilated
- The depth of the crop being ventilated in the store
- The maximum length of lateral duct required

Proceed as follows:

1. Select the correct table for the type of crop.
2. From the table, identify the crop depth and maximum length of lateral duct required.
3. The number at which these intersect identifies the recommended diameter of Polydry to use.

Please note that the tables do not apply to:

- Storage of crops other than those specified
- Ventilation at rates outside the scope of those specified
- Storage of crops at depths other than those specified

TABLE 3 - POTATOES

Duct length (m)	Crop depth (m) 2.4	3.0	3.6	4.0
2	225	225	225	225
3	300	225	225	225
4	300	300	225	225
5	450	450	300	300
6	450	450	300	300
7	450	450	450	300
8	600	450	450	450
9	600	450	450	450
10	600	450	450	450
11	600	450	450	450
12	600	600	450	450
13	600	600	600	450
14	600	600	600	450
15	600	600	600	600
16	600	600	600	600
17	600	600	600	600
18	600	600	600	600
19		600	600	600
20		600	600	600
21		600	600	600
22		600	600	600
24			600	600
26				600

Calculations are based on:

- 1.5m duct centres
- A ventilation rate of 0.02m³/s tonne

TABLE 4 - OILSEED RAPE

Duct length (m)	Crop depth (m) 1.5	2.0	2.4
2	300	225	225
3	300	225	225
4	300	225	225
5	300	300	225
6	300	300	225
7	300	300	225
8	300	300	300
9	300	300	300
10	300	300	300
11	300	300	300
12	300	300	300
13	450	450	300
14	450	450	300
15	450	450	450
16	450	450	450
17	450	450	450
18	450	450	450
19	450	450	450
20	450	450	450
21	450	450	450
22	450	450	450
23	450	450	450
24	450	450	450

Oilseed rape should not be dried in depths greater than 2.4m.

Calculations are based on:

- 1.0m duct centres
- A ventilation rate of 0.05m³/s tonne

RESISTANCE TO AIR FLOW

When the duct selection is based on the tables provided the air pressure required to move cooling air through the crop is mainly dependent on the crop depth. Contact the Technical Department at Polypipe Civils for further information on air volume and pressure requirements.

How to use the low volume ventilation tables

1. Select the appropriate table for the crop
2. Decide the depth of crop to be ventilated and the length of duct required based on the building size.
3. Find a duct length in the table for the required crop depth which just exceeds the length needed for the bulk.
4. The diameter of the required duct can be read from the left hand column.

POLYDRY HORIZONTAL SELECTION TABLES FOR LOW VOLUME VENTILATION

Low volume ventilation through the Polydry horizontal system is used to cool and condition dry grain bulks in flat stores during long-term storage. Moist grain may also be ventilated to prevent heating prior to high temperature drying. The air volumes used to cool grain are too small to change the grain moisture content significantly, although some moisture reductions may result when cooling hot grain following high temperature drying.

Duct spacing in flat and peaked bulks are based on a longest to shortest air path of 1.5 to 1. A design ventilation rate of 0.0025 m^3/s tonne and a maximum variation of ventilation rate within the bulk of 20% has been shown to be effective. In some cases it may be acceptable to depart from these standards but at increased risk of damage to the crop and increased running costs.

At low volume ventilation rates crop resistance is small compared with the dynamic effects of air movement through the ducts. Wheat, barley and oats will behave similarly. Oilseed rape has a higher resistance so longer maximum duct lengths can be used.

The recommended maximum duct lengths for low volume ventilation under a range of crop depths is included for wheat and barley and oilseed rape. The tables illustrate the maximum duct length and duct centres that will ensure adequate uniformity of ventilation in a level grain bulk. Shorter lengths and closer spacings will give less variation in air flow through the bulk.

LOW VOLUME VENTILATION OF WHEAT, BARLEY AND OATS

Duct diameter		Crop depth (m) 2.4	3.0	3.6	4.2	4.8
225	Length Centres	15 1.95	12 2.25	10 3.15	8 3.75	7 4.35
300	Length Centres	28 1.8	21 2.4	18 3.0	16 3.6	14 4.2
450	Length Centres	- -	56 2.1	44 2.7	36 3.3	31 3.9

LOW VOLUME VENTILATION OF OILSEED RAPE

Duct diameter		Crop depth (m) 2.4	3.0	3.6	4.2	4.8
225	Length Centres	30 1.95	27 2.25	18 3.15	14 3.75	12 4.35
300	Length Centres	62 1.8	42 2.4	33 3.0	27 3.6	24 4.2

PEDESTALS

Description	Size (mm)	Code
1.2m x 300mm lower section to 2 x 1m x 100mm extension pipes	300 to 100	PYV3001002
1.2m x 300mm lower section to 2 x 1m x 150mm extension pipes	300 to 150	PYV3001502
1.2m x 450mm lower section to 3 x 1m x 150mm extension pipes	450 to 150	PYV4501503

Pedestals with other lower section lengths can be manufactured on request.

POLYDRY VERTICAL ON-FLOOR SYSTEM

Polydry vertical pedestals are a low cost solution to cooling and conditioning most floor stored crops.

Each unit consists of a perforated body section, reducing cone and extension ducts. Base plates are included in 300mm pedestals.

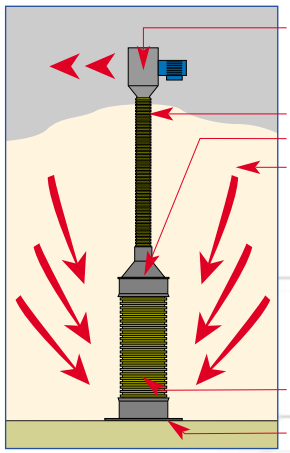
All components are made from a food grade high density polyethylene or polypropylene material.

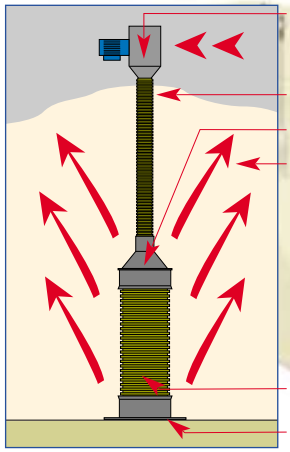
Polydry vertical pedestal units work either by blowing air through crop or by drawing air down through the stored crop into the perforated body section and up through the fan. This system helps keep the crop cool and free from moulds and insects, avoiding the need for applying organo phosphates.

The diameter of the extension ducts is determined by the size of the proposed fan unit.

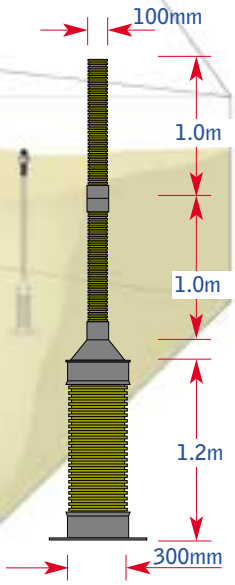
The Polydry vertical pedestals are spaced to allow bulk loaders to pass between them. They are also visible above the crop, further reducing the likelihood of damage.

The pedestal units are easily moveable.

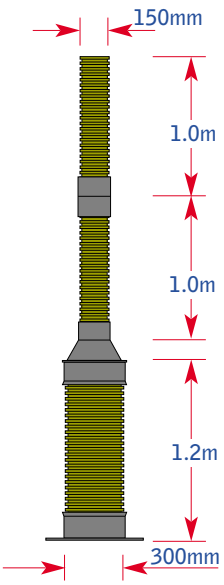




AIR FLOW SCHEMATICS



PYV3001002



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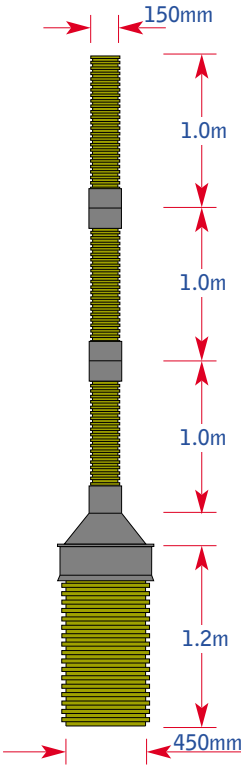


PYV4501503

EXTENSION DUCTS

Description	Size (mm)	Code
1m x 100mm	100	PYV100X1
1m x 150mm	150	PYV150X1
2m x 150mm	150	PYV150X2

EXTENSION COUPLERS

Description	Size (mm)	Code
100mm	100	CRD100
150mm	150	CRD150

SELECTION TABLES FOR PEDESTAL VENTILATION UNITS

Polydry pedestal ventilation units are available with either 300 or 450mm base units. When connected to the pedestal the VBW7 fan unit will move between 0.2 and 0.3 m^3/s at a working pressure of 700 Pa (450-630 cfm at 2.8 in wg). When the crop depth is greater than 3 metres, two metre high base units will allow larger volumes of grain to be cooled with a single pedestal. The VBW9 fan unit will deliver between 0.5 and 0.6 m^3/s at a working pressure of 750 - 900 Pa (1100 cfm at 3.3 in wg).

Ventilation pedestal units should be spaced so that the whole grain bulk can be cooled in 120 - 150 hours of ventilation. Cooling will be rapid near the pedestal and slower further away. If units are placed too far apart heating and deterioration may take place before cooling air reaches all areas between them. Fans can be moved to a new duct every 6 to 10 days so one fan may be shared between up to 3 duct units.

FAN SELECTION

The air flow resistance characteristics of pedestal ventilators are governed by the perforations in the base unit and their interaction with the crop. The fan pressure required is little affected by the crop depth. The slot size is governed by the need to prevent seed entering the duct. For small seeds performance will be improved by covering the base unit with a fabric sleeve.

THE ADVANTAGES OF BLOWING OR DRAWING AIR THROUGH THE CROP

BLOWING

- Cools up to 20% more grain than drawing air through the crop
- Aeration can be started during loading without transferring heat from warm to already cooled grain
- Fans lower relative humidity of ventilating air, reducing re-wetting risk
- Warmest grain, nearest the surface, is more easily monitored

DRAWING AIR THROUGH THE CROP

- Avoids condensation of warm moist air on grain or a cold roof
- Avoids excessive temperature rise in deep grain beds
- Any inlet dampening will be at the surface where it is easily monitored and treated
- Cooling conforms to uneven grain surfaces
- Ducts are unlikely to become blocked with dust

CONSERVATIVE RECOMMENDED UNIT CENTRES FOR OILSEED RAPE

Base unit size	Crop Depth (m)		
	2.4	3.0	3.6
300 x 1200mm	2.6	2.0	1.9
450 x 1200mm	3.6	2.9	2.2

CONSERVATIVE RECOMMENDED UNIT CENTRES FOR WHEAT AND BARLEY*

Depth (m)	2	3	4	5	6	7	8
Blowing							
300 x 1200	7.3	6.2	5.4	4.8	4.3	3.9	3.6
450 x 1200	8.1	6.8	5.9	5.3	4.8	4.4	4.0
Drawing							
300 x 1200	6.6	5.5	4.9	4.4	4.0	3.6	3.3
450 x 1200	7.2	6.1	5.4	4.8	4.4	4.0	3.7

* Based on 100 hour cooling time at 700 Pa.

All unit centres are in metres

POLYDRY FAN UNITS

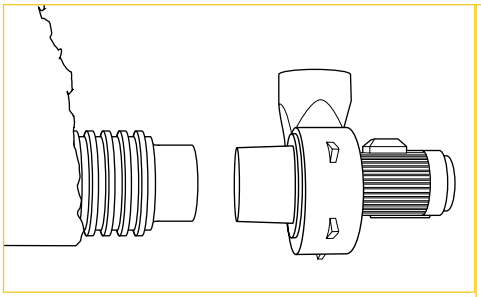
Polydry fan units are efficient, low cost and effectively complete the Polydry system.

All fans carry centrifugal forward curving impellers offering exceptional performance.

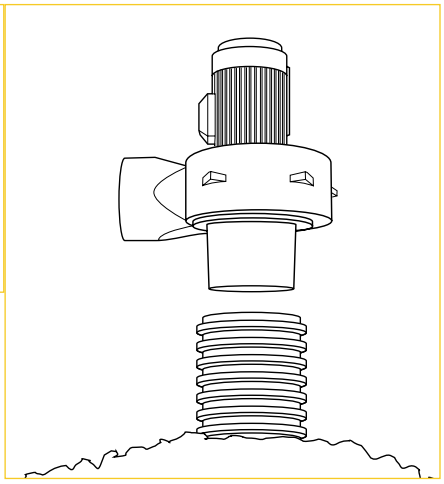
Benefits

- Fully reversible VBW7 & VBW9 fans available in single or three phase
- Corrosion free aluminium casing
- Internally fitted impeller guards
- Grain condition can be monitored from air leaving the fan outlet
- Can be easily moved between units
- All fans are fully adaptable for horizontal and vertical systems

HORIZONTAL



VERTICAL



ALL FANS ARE FULLY ADAPTABLE FOR HORIZONTAL AND VERTICAL SYSTEMS

FAN TECHNICAL DETAILS

Specification	1000CFM VBW9	655CFM VBW7
High performance centrifugal fan	✔	✔
Fully reversible	✔	✔
Guards fitted internally	✔	✔
Single / three phase option		✔
Three phase only	✔	
Non-rust aluminium casing	✔	✔
20kg or less in weight		✔
200mm spigots	✔	
150mm spigots		✔

IMPORTANT NOTES IN THE USE OF POLYDRY SYSTEMS

- When using fans to blow air into pedestals the weight of the fan is not centered and care should be taken to prevent toppling. Alternatively, other fans can be provided as a special order item.
- In order to prevent excessive movement of lateral ducts in horizontal systems the spaces between the laterals should be infilled prior to bulk filling of the store.
- Care should be taken when loading stores equipped with vertical pedestals to ensure that they are not deflected excessively.

Conversion factors: 1metre = 39.37 inches
1mm = 0.0394 inches

For orders and further information contact

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Q06225, FM11944, FM318

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