

VAN GAS TECHNOLOGIES"

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

FOR

PIPE LINE DEHYDRATOR FOR NATURAL GAS

PLD8-14.5 thru PLD36-14.5



WARNING

DO NOT REMOVE OR REPAIR ANY ITEM ON THIS VESSEL WHILE IT IS PRESSURIZED.

DO NOT OPERATE A LEAKING VESSEL. IMMEDIATELY TAKE VESSEL OUT OF SERVICE AND NOTIFY YOUR CERTIFYING AUTHORITY. IF THERE IS A LEAK, INSPECT AND RE-PAIR OR REPLACE AS NECESSARY.

DO NOT OPERATE ABOVE MAXIMUM WORKING PRESSURE (MWP) AND OR MAXIMUM OPERATING TEMPERATURE (DEGREES $^\circ\text{F}$).

DO NOT WELD OR GRIND VESSEL. IT WILL NOT BE SAFE TO OPERATE.

DO NOT OPERATE IF VESSEL HAS BEEN DAMAGED BY FIRE. TAKE OUT OF SERVICE IMMEDIATELY AND NOTIFY YOUR CERTIFYING AUTHORITY.

ANY DAMAGE TO VESSEL CAN MAKE IT UNSAFE. INSPECT OUTSIDE AND INSIDE OF VESSEL REGULARLY FOR CORROSION AND DAMAGE (I.E., DENTS, GOUGES OR BULGES). IF DAMAGED, TAKE OUT OF SERVICE IMMEDIATELY AND NOTIFY YOUR CERTIFYING AUTHORITY.

1.0 PURPOSE

A Pipeline Dehydrator removes the water vapor (humidity) present in the gas stream. The process cleans and dries the gas as it flows through the vessel which is filled with a special drying agent (desiccant). The dehydrator operates automatically. There are no moving parts and no external source of power is required.

"Wet" natural gas enters the lower portion of the dryer where liquid water and solid particles are separated by gravity and fall to the bottom of the vessel. The gas moves upward through the prebed and drying bed of Van Gas desiccant tablets. The tablets attract and absorb moisture from the gas as it flows through the desiccant bed. The tablets dissolve gradually as they absorb the moisture and the liquid falls to the bottom of the vessel. The liquid run off in the prebed creates an extended surface area capable of removing additional moisture from the gas. This conserves the absorbent desiccant tablets. The "dry" natural gas flows through the dryer outlet.

The solution of dissolved desiccant and water that falls into the claim area at the bottom of the vessel must be drained regularly to prevent the vessel from flooding. An automatic drain valve can be installed to prevent the vessel from flooding.

2.0 INSTALLATION

2.1 LOCATION

The ability of a dehydrator to dry natural gas is dependent on the correct location of the unit. Temperature and pressure are the keys to selecting the proper location.

IMPORTANT

ALWAYS PROCESS THE GAS THROUGH THE DEHYDRATOR AT THE LOWEST TEMPERA-TURE AND THE HIGHEST PRESSURE.

INLET TEMPERATURE: Lower inlet gas temperatures will result in lower moisture content at the dehydrator outlet. Locate the dehydrator at the point where temperature is the lowest.

CAUTION The gas temperature should not exceed: 100°F for GASDRY PRIME 80°F for GASDRY PEAK 100°F for GASDRY MAX

MAXIMUM CAPACITIES - MSCFD

1,000 STANDARD CUBIC FEET PER DAY

AFTERCOOLING: If the gas being processed has been compressed mechanically, an aftercooler, finned tubing or extended run of piping will usually be necessary to reduce the inlet gas temperature to the dehydrator.

OPERATING PRESSURE: More gas can be processed through the dehydrator at higher pressures. Locate the dehydrator at the highest practical pressure, but do not exceed the maximum rated working pressure of the dehydrator. Refer to the capacity chart located below.

CAPACITY: The chart below indicates the maximum flow rate through the dehydrator for a 24 HOUR period. To calculate the capacity for a rate per minute just multiply the **MSCFD RATE (from chart) by 0.6944** example:

A PLD12-14.5 operating at 100 PSIG has a maximum MSCFD rate of 119. To figure the SCFM multiply 119 MSCFD x 0.6944 which equals 83 SCFM

NOTE: This is the MAXIMUM instantaneous flow that can be processed through the dehydrator without deterioration of the drying performance.

MODEL	PART NO.	MAXIMUM WORKING PRESSURE	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
PLD8-14.5	80-1477	1450 PSIG	64	428	567	623	679	735	791	819
PLD12-14.5	80-1442	1450 PSIG	119	793	1052	1156	1259	1363	1467	1519
PLD16-14.5	80-1483	1450 PSIG	188	1255	1666	1830	1994	2158	2322	2404
PLD20-14.5	80-1482	1450 PSIG	310	2069	2746	3017	3287	3558	3829	3964
PLD24-14.5	80-1484	1450 PSIG	447	2983	3958	4348	4738	5128	5518	5714
PLD30-14.5	80-1485	1450 PSIG	695	4635	6150	6756	7362	7968	8574	8877
PLD36-14.5	80-1486	1450 PSIG	1191	7943	10539	11578	12616	13655	14694	15213



2.2 PIPING & ANCILLARY EQUIPMENT 2.3 INLET AND OUTLET PIPING

IMPORTANT

COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS CONCERNING IN-STALLATION OF NATURAL GAS SYSTEMS.

COMPLIANCE WITH AND KNOWLEDGE OF ALL REGULATIONS IS THE RESPONSIBIL-ITY OF THE INSTALLER.

Make sure that the gas temperature is not over the maximum for the desiccant being used. If gas temperature is too high, cool it prior to the dehydrator.

Mount the dehydrator on a level surface capable of supporting the weight of the vessel, such as a cement pad or a skid.

Install a pressure relief valve in the up-stream piping (relief valve not furnished). A relief valve must be installed to conform with the ASME **Boiler and Presssure Vessel Codes, Section VII.** Division 1 UG-125, Paragraph (1) and OSHA standards. Also comply with all applicable Federal. State and Local codes.

Two shut-off valves should be installed (not furnished with dehydrator)--one at dehydrator inlet and another at dehydrator outlet. See Figure 2-A Recommended Installation.

Connect the inlet piping and outlet piping as shown in Figure 2-A.

NOTE Inlet and outlet shut-off valves will make start-up and addition of desiccant easier.

2.4 DRAIN VALVE

Install a drain valve (not furnished with dehydrator) in the drain coupling at the bottom of the tower (except on PLD8-14.5). A float/auto drain valve system is available. Contact Van Gas for details.

2.5 AFTERFILTER

Van Gas "GF" Series Filters can be installed downstream of the dehydrator to remove particulate contamination from the natural gas. Contact Van Gas for details.



2.5 INSTALLING DESICCANT

IMPORTANT

DEPRESSURIZE DEHYDRATOR COM-PLETELY BEFORE ATTEMPTING TO RE-MOVE FILL COVER. Open fill cover and add the proper amount of pre-bed material and desiccant to fill the dehydrator to the MAXIMUM LEVEL; then level off the top off the bed. (Reference SECTION 4.3 for desiccant installation instructions) **USE VAN GAS ABSORBENT DESICCANT ONLY!**

Close fill hatch. Make sure that the inlet and outlet shut-off valves, and manual drain valve are closed.



3.0 OPERATION

3.1 START-UP

Close dehydrator drain valve. See Figure 2-A Recommended Installation.

SLOWLY pressurize by opening the inlet shutoff valve (if installed).

Open the outlet shutoff valve (if installed) slowly to place dehydrator on stream.

CAUTION

Make sure that the dehydrator is not subjected to sudden flow surges. Always open valves slowly to permit a gradual equalization of pressure between the dehydrator and the gas supply lines.

4.0 MAINTENANCE

4.1 DRAIN VESSEL REGULARLY

WARNING IF VESSEL IS NOT DRAINED REGULARLY, FLOODING WILL OCCUR AND ACCUMU-LATED LIQUID MAY ENTER SYSTEM AND DAMAGE DOWNSTREAM EQUIPMENT.

4.2 INSPECT DESICCANT BED LEVEL

Check bed level monthly until the actual usage rate is determined.

During the drying process, the desiccant tablets dissolve slowly. More tablets must be added to the supply when the top of the bed drops to the MINIMUM LEVEL. The consumption rate is dependent upon several factors, such as inlet temperature and flow. In Section 4.5, DESICCANT CON-SUMPTION, are several charts showing desiccant consumption rates. Use the charts to determine an approximate consumption rate for your application.

NOTE

Use VAN GAS desiccant only. Filling dryer with any other material will void the warranty.

4.3 ADDITION OF DESICCANT

Close dryer inlet and outlet shut-off valves (if installed). Open drain valve and allow dryer to depressurize completely.

WARNING COMPLETELY DEPRESSURIZE DRYER BEFORE ATTEMPTING TO REMOVE FILL COVER.

Remove the fill cover.

Use a solution of soapy water to check all pipe and fitting connections made during installation for leaks. If any leaks are present, immediately depressurize the system and remedy the problem before continuing operation.

3.2 SHUTDOWN

Before shutdown, use the manual drain valve to remove any liquid that has accumulated in the sump area of the vessel.

Close dryer inlet and outlet shutoff valves (if installed). Open drain valve to depressurize the vessel.

Using the chart in Figure 4-A Determine the proper quantity of prebed.

Place the prebed into the dehydrator first. Level off the prebed.

Again using the chart in Figure 4-A determine the correct quantity and type of desiccant required to fill the dehydrator.

Slowly pour the desiccant into the dehydrator. Level off the desiccant bed. The desiccant level should NOT be higher than the OUTLET screen.

Replace the fill cover.

WARNING WHEN FILL COVER IS REMOVED TO ADD DESICCANT, ALWAYS CHECK O-RING FOR SIGNS OF WEAR.

CHECK COVER FOR RUST, CORROSION OR DAMAGE; REPLACE AS NEEDED.

SEE SECTION 6 FOR REPLACEMENT PARTS.

Close the drain valve.

Slowly open the inlet shut-off valve (if installed) to pressurize the dehydrator.

Open the outlet shut-off valve (if installed) and place the dehydrator on stream.

FIGURE 4-	A BED LE	VEL DET	AIL					+ +	
	DRYER DIMENSIONS (INCHES)]			
MODEL	A Dim. To Grid	B Dim. T Pre-Be	o Din d MIN	C n. To LEVEL	D MA	D Dim. To X LEVEL			
PLD8-14.5	51-5/8"	45-5/8	30-	·5/8"	1	5-5/8"]	"Å"	
PLD12-14.5	57-1/4"	51-1/4	" <u>30</u> -	·1/4"	9	9-1/4"		"À"	
PLD16-14.5	58-3/8"	52-3/8	" 31·	-3/8"	1	0-3/8"			<u>↓ MIN 37589566666868666</u>
PLD20-14.5	56-3/4"	50-3/4	" 29	-3/4"	- 1	8-3/4"			
PLD24-14.5	58"	52"	3	51"		10"			
PLD30-14.5	61"	55"	3	4"		13"			PRE-BED
PLD36-14.5	62-7/8"	56-7/8	35	-7/8"	1	4-7/8"			
	CERAMIC			DR	YI	NG			
MODEL	BEAD	GASDRY PRIME	lbs./in of bed	GASD PEA	RY K	lbs./in of bed	GASDRY MAX	lbs./in of bed	
PLD8-14.5	14 LBS	57 LBS	1.9	44 LE	3S	1.5	48 LBS	1.6	
PLD12-14.5	32 LBS	178 LBS	4.2	136 L	BS	3.2	148 LBS	3.5]
PLD16-14.5	50 LBS	282 LBS	6.7	215 L	BS	5.1	235 LBS	5.6	
PLD20-14.5	83 LBS	464 LBS	11.0	355 L	BS	8.4	387 LBS	9.2]
PLD24-14.5	119 LBS	669 LBS	15.9	511 L	BS	12.2	557 LBS	13.3	
PLD30-14.5	186 LBS	1039 LBS	24.8	794 L	BS	18.9	866 LBS	20.6	
PLD36-14.5	318 LBS	1781 LBS	42.4	1361 L	BS	32.4	1484 LBS	35.3	

4.4 BED LEVEL GUIDE

The level of the desiccant bed should be maintained as close to the MAXIMUM level as possible. The bed level should not be allowed to fall below the MINIMUM level, or dehydrator performance will be effected. Reference Figure 4-A for levels and quantities.

With the fill port cover removed, use a measuring stick to determine the distance from the top of the fill opening to the top of the desiccant bed. Reference Figure 4-A. Add desiccant as required to bring desiccant bed to MAXIMUM level.

CAUTION

Never fill the vessel above the MAXIMUM LEVEL. Filling the vessel above the MAXIMUM level may effect the performance of the dehydrator.

The desiccant bed level should be checked regularly. Section 4.5 DESICCANT CONSUMPTION will help to estimate the amount of desiccant that the dehydrator should use based on operating conditions.

4.5 DESICCANT CONSUMPTION

Consumption is rate based on average conditions. Actual conditions can vary.

4.5-A GASDRY PRIME DESICCANT

This general purpose tablet is recommended for installations where inlet gas temperature is 100°F or lower. Depending on the pressure and temperature, GasDry Prime can provide a residual moisture content below 6 #/MMSCF. Chart 1 shows the level of dryness that GasDry Prime will provide at different conditions.

Chart 2 shows an approximate consumption rate for GasDry Prime at several conditions. Use the charts for guidelines to calculate the approximate consumption rate of the desiccant.

CHART 1 ·

MOISTURE CONTENT OF GAS (LBS. H2O/MMSCF) AFTER DEHYDRATOR WITH GASDRY PRIME

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
100°F	224.7	40.9	32.8	30.7	28.8	27.3	26.0	25.4
95°F	193.1	35.4	28.5	26.6	25.0	23.7	22.6	22.1
90°F	165.9	30.6	24.7	23.1	21.7	20.6	19.6	19.2
85°F	141.6	26.3	21.2	19.9	18.7	17.8	16.9	16.6
80°F	120.8	22.6	18.3	17.2	16.2	15.3	14.6	14.3
75°F	102.5	19.3	15.7	14.7	13.9	13.2	12.6	12.3
70ºF	86.6	16.5	13.4	12.6	11.9	11.3	10.8	10.6
65°F	73.2	14.0	11.5	10.8	10.2	9.7	9.2	9.1
60°F	61.7	11.9	9.8	9.2	8.7	8.3	7.9	7.8
55°F	51.4	10.1	8.3	7.8	7.4	7.0	6.7	6.6
50°F	43.0	8.5	7.0	6.6	6.3	6.0	5.7	5.6

NOTE MMSCF is 1,000,000 STANDARD CUBIC FEET

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
100°F	40.9	7.4	6.0	5.6	5.2	5.0	4.7	4.6
95°F	35.1	6.4	5.2	4.8	4.6	4.3	4.1	4.0
90°F	30.2	5.6	4.5	4.2	4.0	3.8	3.6	3.5
85°F	25.8	4.8	3.9	3.6	3.4	3.2	3.1	3.0
80°F	22.0	4.1	3.3	3.1	2.9	2.8	2.7	2.6
75°F	18.6	3.5	2.9	2.7	2.5	2.4	2.3	2.2
70°F	15.7	3.0	2.4	2.3	2.2	2.1	2.0	1.9
65°F	13.3	2.6	2.1	2.0	1.9	1.8	1.7	1.7
60°F	11.2	2.2	1.8	1.7	1.6	1.5	1.4	1.4
55°F	9.4	1.8	1.5	1.4	1.3	1.3	1.2	1.2
50°F	7.8	1.6	1.3	1.2	1.1	1.1	1.0	1.0

CHART 2 GASDRY PRIME CONSUMPTION RATE (LBS./MMSCF)

4.5-B GASDRY PEAK DESICCANT

This general purpose tablet is recommended for installations where inlet gas temperature is 80°F or lower. Depending on the pressure and temperature, GasDry Peak can provide a residual moisture content below 7 #/MMSCF.

Chart 3 shows the level of dryness that GasDry Peak will provide at different conditions.

Chart 4 shows an approximate consumption rate for GasDry Peak at several conditions. Use the charts for guidelines to calculate the approximate consumption rate of the desiccant.

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
80°F	72.5	13.6	11.0	10.3	9.7	9.2	8.8	8.6
75°F	61.5	11.6	9.4	8.8	8.3	7.9	7.6	7.4
70ºF	51.9	9.9	8.1	7.6	7.1	6.8	6.5	6.3
65°F	43.9	8.4	6.9	6.5	6.1	5.8	5.5	5.4
60°F	37.0	7.2	5.9	5.5	5.2	5.0	4.8	4.7
55°F	30.9	6.0	5.0	4.7	4.4	4.2	4.0	4.0
50°F	25.8	5.1	4.2	4.0	3.8	3.6	3.4	3.4
45°F	21.5	4.3	3.6	3.3	3.2	3.0	2.9	2.8

CHART 4 —

GASDRY PEAK CONSUMPTION RATE (LBS./MMSCF)

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
80°F	66.9	12.5	10.1	9.5	9.0	8.5	8.1	7.9
75°F	56.7	10.7	8.7	8.2	7.7	7.3	7.0	6.8
70ºF	47.9	9.1	7.4	7.0	6.6	6.3	6.0	5.8
65°F	40.5	7.8	6.4	6.0	5.6	5.4	5.1	5.0
60°F	34.1	6.6	5.4	5.1	4.8	4.6	4.4	4.3
55°F	28.5	5.6	4.6	4.3	4.1	3.9	3.7	3.7
50°F	23.8	4.7	3.9	3.7	3.5	3.3	3.2	3.1
45°F	19.8	4.0	3.3	3.1	2.9	2.8	2.7	2.6

4.5-C GASDRY MAX DESICCANT

Where extremely dry gas is required or where operating pressure is low, GasDry Max tablets provide a lower residual moisture content.

Chart 5 shows the level of dryness that GasDry Max will provide at different conditions.

Chart 6 shows an approximate consumption rate for GasDry Max at several conditions. Use the charts for guidelines to calculate the approximate consumption rate of the desiccant.

CHART 5 —

MOISTURE CONTENT OF GAS (LBS. H2O/MMSCF) AFTER DEHYDRATOR WITH GASDRY MAX

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
100°F	53.1	9.7	7.8	7.3	6.8	6.4	6.1	6.0
95°F	45.6	8.4	6.7	6.3	5.9	5.6	5.3	5.2
90°F	39.2	7.2	5.8	5.5	5.1	4.9	4.6	4.5
85ºF	33.5	6.2	5.0	4.7	4.4	4.2	4.0	3.9
80°F	28.6	5.3	4.3	4.1	3.8	3.6	3.5	3.4
75°F	24.2	4.6	3.7	3.5	3.3	3.1	3.0	2.9
70ºF	20.5	3.9	3.2	3.0	2.8	2.7	2.5	2.5
65°F	17.3	3.3	2.7	2.5	2.4	2.3	2.2	2.1
60°F	14.6	2.8	2.3	2.2	2.1	2.0	1.9	1.8
55°F	12.2	2.4	2.0	1.8	1.7	1.7	1.6	1.6
50°F	10.2	2.0	1.7	1.6	1.5	1.4	1.4	1.3
45°F	8.5	1.7	1.4	1.3	1.2	1.2	1.1	1.1
40°F	7.0	1.4	1.2	1.1	1.1	1.0	1.0	0.9

CHART 6

GASDRY MAX CONSUMPTION RATE (LBS./MMSCF)

INLET TEMP	100 PSIG	750 PSIG	1000 PSIG	1100 PSIG	1200 PSIG	1300 PSIG	1400 PSIG	1450 PSIG
100°F	118.5	21.5	17.3	16.2	15.2	14.4	13.7	13.4
95°F	101.8	18.6	15.0	14.0	13.2	12.5	11.9	11.6
90°F	87.5	16.1	13.0	12.2	11.5	10.9	10.4	10.1
85°F	74.7	13.9	11.2	10.5	9.9	9.4	8.9	8.7
80°F	63.7	11.9	9.7	9.0	8.5	8.1	7.7	7.5
75°F	54.0	10.2	8.3	7.8	7.3	7.0	6.6	6.5
70°F	45.6	8.7	7.1	6.6	6.3	6.0	5.7	5.6
65°F	38.6	7.4	6.1	5.7	5.4	5.1	4.9	4.8
60°F	32.5	6.3	5.2	4.8	4.6	4.4	4.2	4.1
55°F	27.1	5.3	4.4	4.1	3.9	3.7	3.5	3.5
50°F	22.7	4.5	3.7	3.5	3.3	3.2	3.0	3.0
45°F	18.9	3.8	3.1	2.9	2.8	2.7	2.6	2.5
40°F	15.6	3.2	2.6	2.5	2.3	2.2	2.1	2.1

5.0 TROUBLESHOOTING

If liquid water is detected downstream, or if desiccant consumption seems excessively high, the most likely causes are as follows:

Problem	Possible Cause
Liquid downstream	The frequency of draining is not adequate.
High inlet	Check inlet Temperature. Conditions may have changed. Determine the cause.
temperature	If gas is compressed mechanically, check compressor aftercooler.
Low desiccant level	Check bed level to make sure that desiccant tablet level has not dropped below minimum level.
Incorrect flow	Check flow through dehydrator, refer to chart on page 2.
and/or pressure	Check inlet pressure.
Contaminated Desiccant bed	Inspect condition of desiccant. If discolored (deep yellow or brown), it may be contaminated. A heavily contaminated desiccant bed must be replaced to return dehydrator to optimum performance.

If correcting conditions in the troubleshooting check list does not remedy the problem, consult your local VAN GAS Distributor or call the VAN GAS factory in Lake City, Pennsylvania (888)-606-9303 or (814)-774-2636.

6.0 PARTS

PLD8 THRU PLD16 DEHYDRATOR

DESCRIPTION	PART NO.
BLIND PLATE	26-7126
HAMMER UNION NUT	26-7128
FILL COVER O-RING	26-3639

PLD20 THRU PLD36 DEHYDRATOR

DESCRIPTION	PART NO.
BLIND PLATE	26-7127
HAMMER UNION NUT	26-7349
FILL COVER O-RING	26-3640

DESICCANTS

CERAMIC BEAD 1/2" (PREBED)

DESCRIPTION	PART NO.
90 LB. CARTON	33-0281

GASDRY PRIME (DRYING)

DESCRIPTION	PART NO.
50LB PAIL	33-0355
50 LB BAG	33-0354
506 LB DRUM	33-0356

GASDRY PEAK (DRYING)

DESCRIPTION	PART NO.
45 LB. PAIL	33-0328
50 LB. BAG	33-0205
400 LB. DRUM	33-0283

GASDRY MAX (DRYING)

DESCRIPTION	PART NO
25 LB. PAIL	33-0232
45 LB. PAIL	33-0366
450 LB. DRUM	33-0378

GasDry Prime, GasDry Peak and GasDry Max are the registered trade names of chemical drying agents specifically formulated by and for VAN GAS Single Tower Dehydrators.

VANGAS TECHNOLOGIES"

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