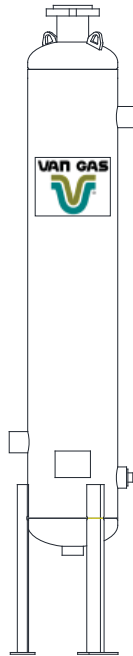


VAN GAS TECHNOLOGIES™

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS
FOR

PIPE LINE DEHYDRATOR FOR NATURAL GAS
PLD 8-7.2 thru PLD 36-7.2



WARNING

DO NOT REMOVE, REPAIR OR REPLACE ANY ITEM ON THIS VESSEL WHILE IT IS UNDER PRESSURE.

DO NOT OPERATE IF THERE IS A LEAK IN VESSEL. IMMEDIATELY TAKE VESSEL OUT OF SERVICE AND CALL YOUR CERTIFYING AUTHORITY. IF THERE IS A LEAK, DEPRESSURIZE VESSEL, INSPECT, REPAIR AND OR REPLACE AS NECESSARY.

DO NOT OPERATE ABOVE MAXIMUM WORKING PRESSURE (MWP) AND OR ABOVE MAXIMUM OPERATING TEMPERATURE (DEGREES °F).

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

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

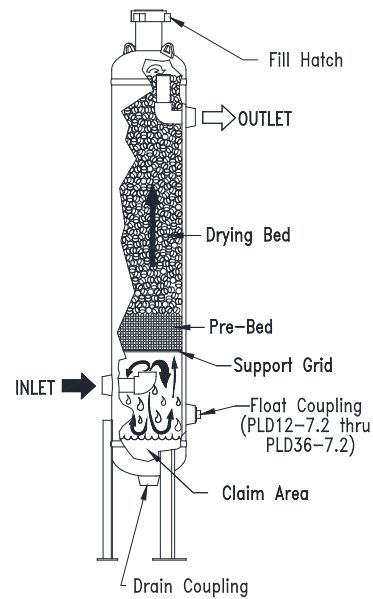
ANY DAMAGE TO VESSEL CAN MAKE IT UNSAFE. INSPECT OUTSIDE AND INSIDE OF VESSEL REGULARLY FOR CORROSION OR ANY DAMAGE (I.E., DENTS, GOUGES OR BULGES). IF DAMAGED, TAKE OUT OF SERVICE IMMEDIATELY. CALL YOUR CERTIFYING AUTHORITY.

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 a 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 TEMPERATURE AND THE HIGHEST PRESSURE.

INLET GAS TEMPERATURE: Lower inlet gas temperatures will result in a lower moisture content at the outlet of the dehydrator. 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**

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 PLD 12-7.2 operating at 100 PSIG has a maximum MSCFD rate of 132. To figure the SCFM multiply 132 MSCFD x 0.6944 which equals 92 SCFM

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

MAXIMUM CAPACITIES - MSCFD

1,000 STANDARD CUBIC FEET PER DAY

MODEL NO.	PART NO.	MAXIMUM WORKING PRESSURE	100 PSIG	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
PLD 8-7.2	80-1326	720 PSIG	70	132	193	254	315	377	450
PLD 12-7.2	80-1328	720 PSIG	132	248	363	479	594	709	848
PLD 16-7.2	80-1330	720 PSIG	207	387	567	748	928	1108	1325
PLD 20-7.2	80-1332	720 PSIG	332	621	910	1200	1489	1778	2126
PLD 24-7.2	80-1334	720 PSIG	471	881	1291	1701	2112	2522	3014
PLD 30-7.2	80-1466	720 PSIG	747	1398	2049	2700	3350	4001	4783
PLD 36-7.2	80-1308	720 PSIG	1191	2230	3269	4307	5346	6385	7631

2.2 PIPING AND ANCILLARY EQUIPMENT

IMPORTANT
COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS CONCERNING INSTALLATION OF NATURAL GAS SYSTEMS.

COMPLIANCE TO AND KNOWLEDGE OF ALL REGULATIONS IS THE RESPONSIBILITY OF THE INSTALLER.

Make sure that the temperature of gas 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 Pressure Vessel Codes, Section VIII, Division 1 UG-125, Paragraph (1) and OSHA standards. Also comply with all applicable Federal, State, and Local codes.

2.3 INLET AND OUTLET PIPING

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

Connect the inlet 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.

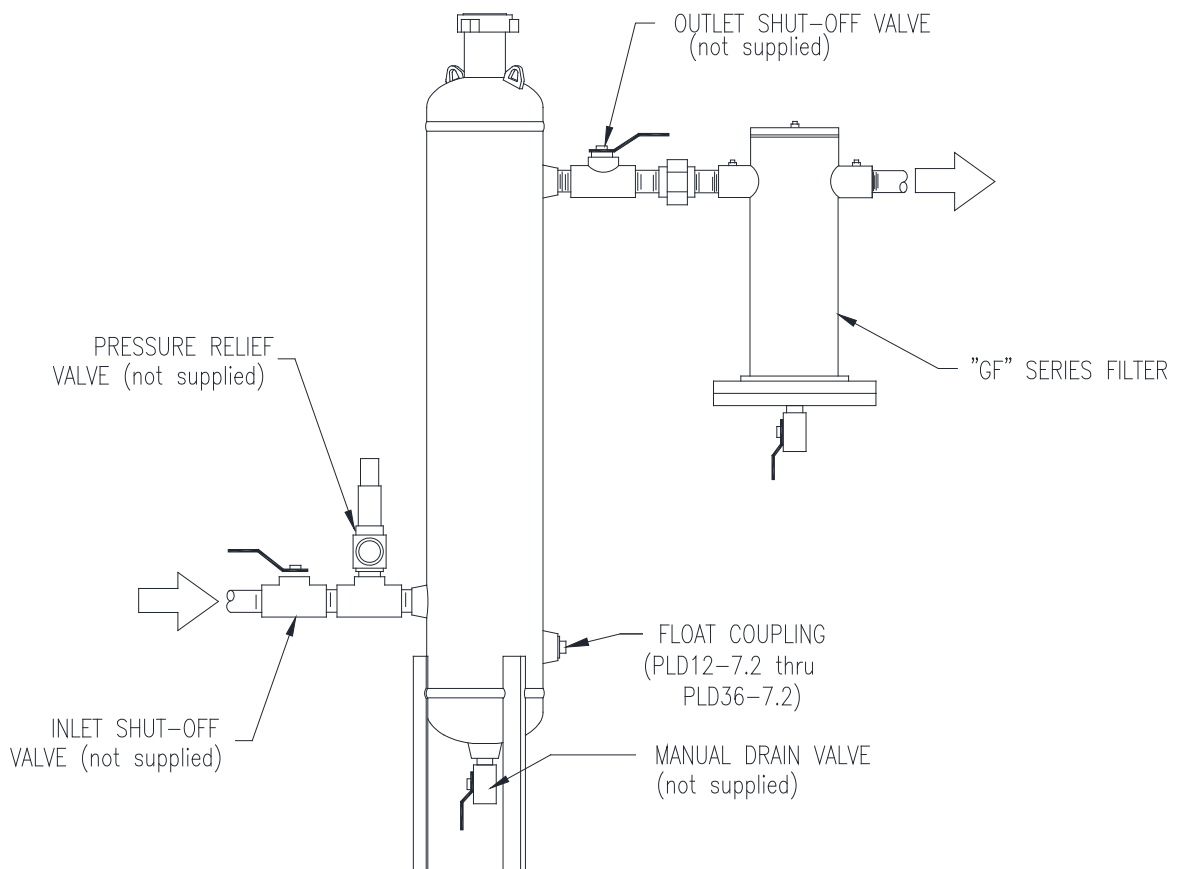
2.4 AFTERFILTER

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 DRAIN VALVE

Install a drain valve (not furnished with dehydrator) in the drain coupling at the bottom of the tower (except on PLD8-7.2). A float/auto drain valve system is available. Contact Van Gas for details.

FIGURE 2-A RECOMMENDED INSTALLATION



2.6 INSTALLING DESICCANT

IMPORTANT

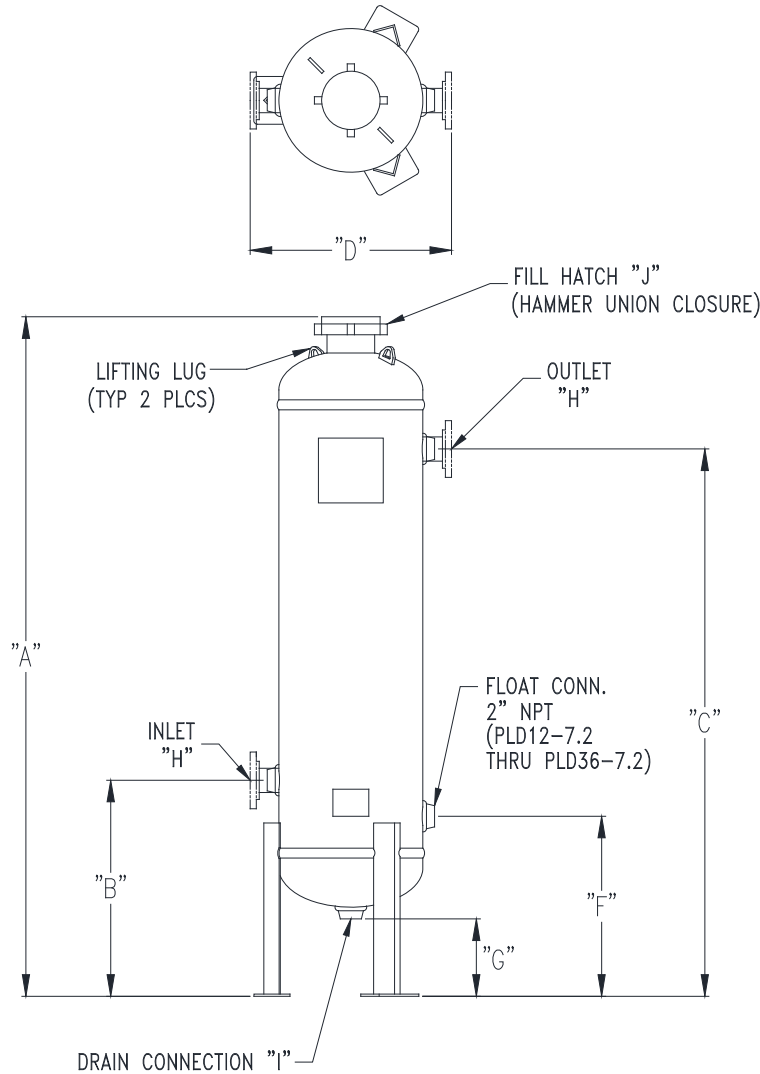
DEPRESSURIZE DEHYDRATOR COMPLETELY BEFORE ATTEMPTING TO REMOVE FILL COVER.

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

FIGURE 2-B DIMENSIONS



DRYER DIMENSIONS-INCHES

MODEL	DRYER DIMENSIONS-INCHES									
	A Overall Height	B Inlet Height	C Outlet Height	D In to Out Width	E Outside Dia.	F Float Height	G Drain Height	H Inlet /Outlet	I Drain	J HAMMER UNION
PLD 8-7.2	70"	13-13/16"	54-13/16"	13-1/8"	8-5/8"	N/A	2-9/16"	2" NPT	1" NPT	4"
PLD 12-7.2	94-3/8"	30"	76"	15-3/4"	12-3/4"	25"	13-9/16"	2" NPT	2" NPT	4"
PLD 16-7.2	95-1/4"	30"	76"	19-1/4"	16"	25"	12-7/8"	2" NPT	2" NPT	4"
PLD 20-7.2	94-3/4"	30"	76"	23-1/4"	20"	25"	11-7/8"	2" NPT	2" NPT	6"
PLD 24-7.2	93-1/8"	26-1/8"	71-5/8"	36"	24"	21-1/8"	6-3/16"	3" RF FLG 300#	2" NPT	6"
PLD 30-7.2	98-5/16"	30"	75-1/2"	42"	30"	25"	8-7/16"	3" RF FLG 300#	2" NPT	6"
PLD 36-7.2	100-13/16"	30-11/16"	76-3/16"	49-3/4"	37-3/4"	25-11/16"	7-1/8"	3" RF FLG 300#	2" NPT	6"

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.

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.

4.0 MAINTENANCE

4.1 MAINTENANCE

WARNING
IF DRYER IS NOT DRAINED REGULARLY, FLOODING WILL OCCUR AND ACCUMULATED LIQUID MAY ENTER SYSTEM AND DAMAGE DOWNSTREAM EQUIPMENT.

Remove the fill cover.

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.

4.2 INSPECT DESSICCANT 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 CONSUMPTION, are several charts showing desiccant consumption rates. Use the charts to determine an approximate usage rate for your application.

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

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.

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.

WARNING
WHEN HATCH 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.

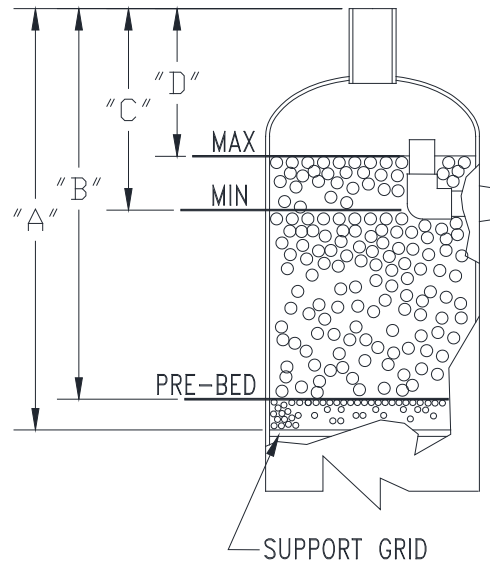
Slowly open the inlet shut-off valve (if installed) to pressurize the dehydrator.

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

FIGURE 4-A BED LEVEL DETAIL

DRYER DIMENSIONS-INCHES				
MODEL	A Dim. To Grid	B Dim. To Pre-Bed	C Dim. To MIN LEVEL	D Dim. To MAX LEVEL
PLD 8-7.2	52-1/16"	46-1/16"	31-1/16"	16-1/16"
PLD 12-7.2	57-3/8"	51-3/8"	30-3/8"	10-3/8"
PLD 16-7.2	58-1/4"	52-1/4"	31-1/4"	10-1/4"
PLD 20-7.2	57-1/4"	51-1/4"	30-1/4"	9-1/4"
PLD 24-7.2	58-1/2"	52-1/2"	31-1/2"	10-1/2"
PLD 30-7.2	60-1/16"	54-1/16"	33-1/16"	12-1/16"
PLD 36-7.2	61-7/8"	55-7/8"	34-7/8"	13-7/8"

MODEL	PRE-BED CERAMIC BEAD	DRYING GASDRY PRIME	DRYING GASDRY PEAK	DRYING GASDRY MAX
PLD 8-7.2	16 LBS	63 LBS	48 LBS	52 LBS
PLD 12-7.2	35 LBS	193 LBS	148 LBS	161 LBS
PLD 16-7.2	55 LBS	309 LBS	236 LBS	258 LBS
PLD 20-7.2	89 LBS	496 LBS	379 LBS	413 LBS
PLD 24-7.2	126 LBS	704 LBS	537 LBS	586 LBS
PLD 30-7.2	199 LBS	1116 LBS	853 LBS	930 LBS
PLD 36-7.2	318 LBS	1781 LBS	1361 LBS	1484 LBS



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. 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 you estimate the amount of desiccant that the dehydrator should use, based on operating conditions.

4.5 DESICCANT CONSUMPTION

Consumption 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 9 lbs/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	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
100°F	224.7	124.0	87.2	68.3	56.6	48.8	42.2
95°F	193.1	106.6	75.1	58.9	48.8	42.1	36.5
90°F	165.9	91.7	64.7	50.8	42.2	36.4	31.6
85°F	141.6	78.4	55.4	43.5	36.1	31.2	27.1
80°F	120.8	67.0	47.4	37.2	31.0	26.8	23.3
75°F	102.5	56.9	40.3	31.7	26.5	22.9	19.9
70°F	86.6	48.2	34.2	26.9	22.5	19.5	17.0
65°F	73.2	40.8	29.0	22.8	19.1	16.6	14.5
60°F	61.7	34.4	24.5	19.4	16.2	14.1	12.3
55°F	51.4	28.8	20.5	16.2	13.6	11.9	10.4
50°F	43.0	24.1	17.2	13.6	11.5	10.0	8.7

NOTE
MMSCF is 1,000,000 STANDARD CUBIC FEET

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

INLET TEMP	100 PSIG	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
100°F	40.9	22.5	15.9	12.4	10.3	8.9	7.7
95°F	35.1	19.4	13.7	10.7	8.9	7.7	6.6
90°F	30.2	16.7	11.8	9.2	7.7	6.6	5.7
85°F	25.8	14.3	10.1	7.9	6.6	5.7	4.9
80°F	22.0	12.2	8.6	6.8	5.6	4.9	4.2
75°F	18.6	10.4	7.3	5.8	4.8	4.2	3.6
70°F	15.7	8.8	6.2	4.9	4.1	3.6	3.1
65°F	13.3	7.4	5.3	4.2	3.5	3.0	2.6
60°F	11.2	6.3	4.5	3.5	3.0	2.6	2.2
55°F	9.4	5.2	3.7	3.0	2.5	2.2	1.9
50°F	7.8	4.4	3.1	2.5	2.1	1.8	1.6

4.5-B GASDRY PEAK DESICCANT

The 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 5 lbs/MMSCF.

Chart 3 shows the level of dryness that GasDry Peak provides 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.

CHART 3
MOISTURE CONTENT OF GAS (LBS. H2O/MMSCF)
AFTER DEHYDRATOR WITH GASDRY PEAK

INLET TEMP	100 PSIG	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
80°F	72.5	40.2	28.4	22.3	18.6	16.1	14.0
75°F	61.5	34.2	24.2	19.0	15.9	13.7	11.9
70°F	51.9	28.9	20.5	16.1	13.5	11.7	10.2
65°F	43.9	24.5	17.4	13.7	11.5	10.0	8.7
60°F	37.0	20.7	14.7	11.6	9.7	8.4	7.4
55°F	30.9	17.3	12.3	9.7	8.2	7.1	6.2
50°F	25.8	14.5	10.3	8.2	6.9	6.0	5.2
45°F	21.5	12.0	8.6	6.8	5.8	5.0	4.4

CHART 4
GASDRY PEAK CONSUMPTION RATE (LBS./MMSCF)

INLET TEMP	100 PSIG	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
80°F	66.9	37.1	26.3	20.6	17.2	14.9	12.9
75°F	56.7	31.5	22.3	17.6	14.6	12.7	11.0
70°F	47.9	26.7	18.9	14.9	12.5	10.8	9.4
65°F	40.5	22.6	16.0	12.6	10.6	9.2	8.0
60°F	34.1	19.1	13.6	10.7	9.0	7.8	6.8
55°F	28.5	15.9	11.4	9.0	7.6	6.6	5.8
50°F	23.8	13.3	9.5	7.6	6.4	5.5	4.8
45°F	19.8	11.1	7.9	6.3	5.3	4.6	4.1

4.5-B 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 Peak 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	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
100°F	53.1	29.3	20.6	16.1	13.4	11.5	10.0
95°F	45.6	25.2	17.8	13.9	11.5	10.0	8.6
90°F	39.2	21.7	15.3	12.0	10.0	8.6	7.5
85°F	33.5	18.5	13.1	10.3	8.5	7.4	6.4
80°F	28.6	15.8	11.2	8.8	7.3	6.3	5.5
75°F	24.2	13.5	9.5	7.5	6.3	5.4	4.7
70°F	20.5	11.4	8.1	6.4	5.3	4.6	4.0
65°F	17.3	9.6	6.9	5.4	4.5	3.9	3.4
60°F	14.6	8.1	5.8	4.6	3.8	3.3	2.9
55°F	12.2	6.8	4.8	3.8	3.2	2.8	2.5
50°F	10.2	5.7	4.1	3.2	2.7	2.4	2.1
45°F	8.5	4.7	3.4	2.7	2.3	2.0	1.7
40°F	7.0	3.9	2.8	2.2	1.9	1.7	1.5

CHART 6
GASDRY MAX CONSUMPTION RATE (LBS./MMSCF)

INLET TEMP	100 PSIG	200 PSIG	300 PSIG	400 PSIG	500 PSIG	600 PSIG	720 PSIG
100°F	118.5	65.4	46.0	36.0	29.8	25.7	22.2
95°F	101.8	56.2	39.6	31.0	25.8	22.2	19.2
90°F	87.5	48.4	34.1	26.8	22.2	19.2	16.6
85°F	74.7	41.4	29.2	22.9	19.1	16.5	14.3
80°F	63.7	35.3	25.0	19.6	16.4	14.2	12.3
75°F	54.0	30.0	21.3	16.7	13.9	12.1	10.5
70°F	45.6	25.4	18.0	14.2	11.9	10.3	9.0
65°F	38.6	21.5	15.3	12.0	10.1	8.8	7.6
60°F	32.5	18.2	12.9	10.2	8.6	7.4	6.5
55°F	27.1	15.2	10.8	8.6	7.2	6.3	5.5
50°F	22.7	12.7	9.1	7.2	6.1	5.3	4.6
45°F	18.9	10.6	7.6	6.0	5.1	4.4	3.9
40°F	15.6	8.8	6.3	5.0	4.2	3.7	3.2

NOTE
MMSCF is 1,000,000 STANDARD CUBIC FEET

5.0 TROUBLESHOOTING CHECK LIST

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

Problem	Possible Causes
Liquid downstream	The frequency of draining is not adequate.
High inlet temperature	Check inlet Temperature. Conditions may have changed. Determine the cause. 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 and/or pressure	Check flow through dehydrator, refer to chart on page 2. 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 REPLACEMENT PARTS LIST

DESICCANTS CERAMIC BEAD (PREBED)

DESCRIPTION	PART NO.
90 LB. CARTON	33-0281

GASDRY PRIME(DRYING)

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

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.
7 LB. PAIL	33-0318
25 LB. PAIL	33-0232

PLD 8, PLD 12, AND PLD 16 DEHYDRATOR

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

PLD 20, PLD 24, AND PLD 36 DEHYDRATOR

DESCRIPTION	PART NO.
BLIND PLATE	26-7127
HAMMER UNION NUT	26-7129
FILL COVER O-RING	26-3640

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.

VAN GAS TECHNOLOGIES™

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