THE MAXIMUM TO MINIMUM DEHYDRATION APPLICATIONS

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It is difficult to completely describe this dehydration system in one sentence. The variables effecting the design are many and must be given full consideration. To start outlining the criteria probably the first concern in the design is the volume of gas to be processed. This leads into the pressure and temperature. The governing control of the design is the sales specification for the maximum water content. In this simplistic form the unit can be sized and applied to the job. However, there are other questions that should be considered. What is the life of the production? Will compressors come into use later. The above design concerns need individual review as they affect the total system.

1. Pressure is a very large variable. The application of dehydration cover the complete application of operating pressure from 12 psig up to 2000 psig. Each application service can be processed with reliability and meet the performance specifications. These pressure ranges were used because they represent successful installations.

2. The gas volume has a great influence on the design and it's criteria is well established. The real variable regarding the volume is it's stability. Will the gas delivery be constant or will there be periods of reduced sales? If the sales is reduced from 5MMSCFD down to 200MSCFD will your dehydrator still meet the water specification? If your dehydrator is designed for this variable you have no fear of meeting performance.

3. Temperature relates to the sales gas specification and is a significant factor in the unit design. The compressor discharge temperature will in most southwest applications be 120 degrees, but in the rockies most water dew points require 5#/mmscf. Therefore this becomes a very important design feature. Many applications calculate the theoretical trays necessary to produce the dew point depression requirement to produce specification sales gas. We determine the theoretical trays necessary and we install that many trays. The duosorb tray meets the theoretical tray performance in it's actual operation.

4.The glycol purity is a constant as far a we are concerned. We apply the technology to produce 99.7% pure glycol and take advantage of it's benefit. This feature should be a minimum for any installation. It saves fuel, provides constant performance results and lowers emissions due to reduced circulation rates.

The above performance objectives will give you good dehydration. We wish to now cover the design specifics to give you a theoretical tray

design that produces the ability to make the system complete.

A. Design the tray for uniform distribution of gas flow across the entire absorber crossection.

B. A fluid packed section can exhibit a boiling or roiling action. This would mix the liquid section to create a uniform glycol concentration. We want to maintain the graduated dilution that starts with the highest purity at the top and then increases as the water absorption adds to the glycol as it flows vertical down to the withdrawal level.

C. Maintain uniform withdrawal of the glycol from the tray floor. There should not be any turbulence at this point.

D. Design the gas distribution system to create very small gas bubbles. The small gas bubbles will speed the complete reaction between the glycol and the water vapor in the gas bubble. The smaller the bubble the more complete the reaction.

E. Designing the system to maintain separation of the gas bubbles is very important to sustain reaching equilibrium between the water vapor and the glycol. If this separation can be sustained throughout the bed depth, it will enhance the performance. We have applied packing to improve this liquid stability through the bed depth.

F.The tower design uses the full inside diameter for active contact. There are no weirs or cross flow that if used would create channels and non uniform contact. The tower and the tray design controls the wet glycol collection and removal from the tower. This also is kept in a uniform withdrawal path. This is the critical parts of the tray that produces the tray performance that is equivalent to a theoretical tray. This tray used within the design requirements and with the glycol purity as specified will provide the following system performance. This is illustrated on figure B.

1. The <u>infinite turndown</u> will occur when the fluid levels are established and maintained by gas flowing through the tray. This operation provides the total fluid packed depth giving complete contact with the gas. There is no route for gas by—passing to occur and the gas bubble will be controlled.

2. The <u>high efficiency of dew point depression</u> is a function of the minimum gas bubble diameter, the depth of the bubble travel, the uniform distribution control and glycol purity. The diameter of the gas bubble is the more critical need to benefit the equilibrium approach.

3. The <u>compact design</u> for the absorber includes the glycol surge section, the tray sections and the final separation section. This

does not include vessel skirt and head depth.

The attached drawings fig. a and b show the illustration of the tray and the contactor. Each of the features illustrated in the performance description are evident, and their effectiveness is obvious. We are also providing the operating data for ten units. The basic data is shown for each of the examples of applications. If there are questions regarding these applications we will be happy to answer your inquiry.

PERFORMANCE DATA TYPICAL UNITS

LOCATION	FLOW RATE MMSCFD	SALES #/MM	PRESS PSIG	TEMP DEGF	REB TEMP DEG F	GLYCOL GPH	DEWPOINT SALES DEG.F
LIBERAL	.04	14	12	70	385	2	-20
WETUMKA	.100	6	360	80	375	17	10
OKEMAH	.600	0	250	45	380	6.5	—40
BRYAN	22.0	1.2	860	96	385	58	—14
JONESBORO	.500	1.4	600	80	390	22	—15
SYCAMORE	.800	5.5	40	60	375	30	27
JEWITT	.750	4.5	880	48	390	9	18
BLUE MT.	6.0	2.5	600	75	395	58	— 2
LIBERAL	2.0	0.0	550	45	400	15	—40
ARAPAHO	188.0	1.3	625	85	375		-16

This illustrates the operation of several units that had been in operation several weeks. Some of the units have been in service 7 years. We will be happy to discuss any of the above units.

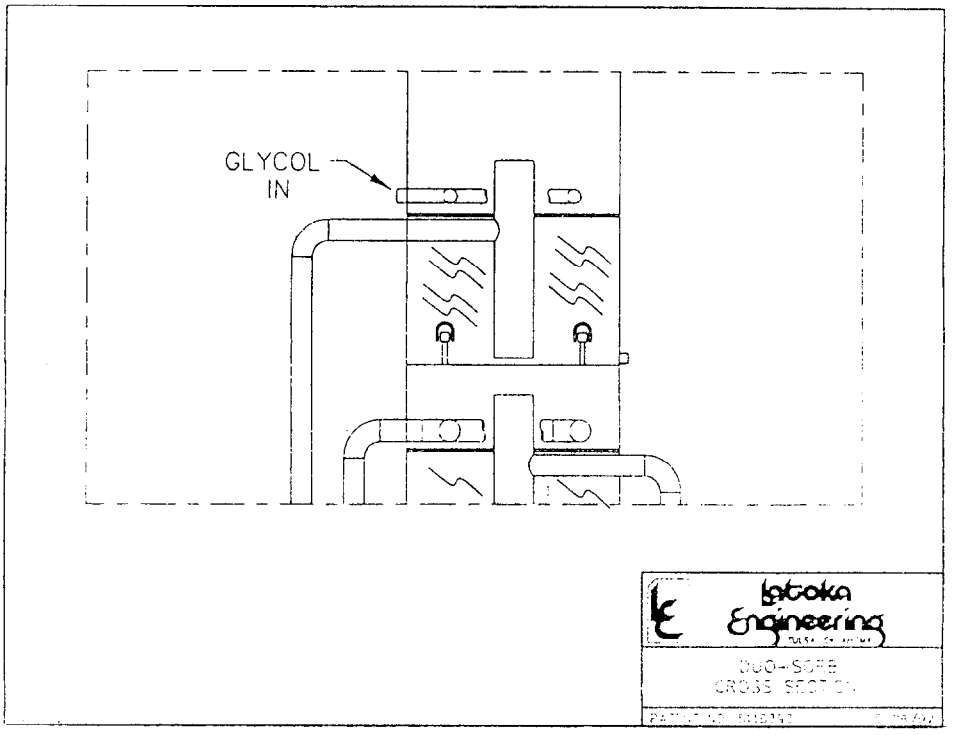

Figure A

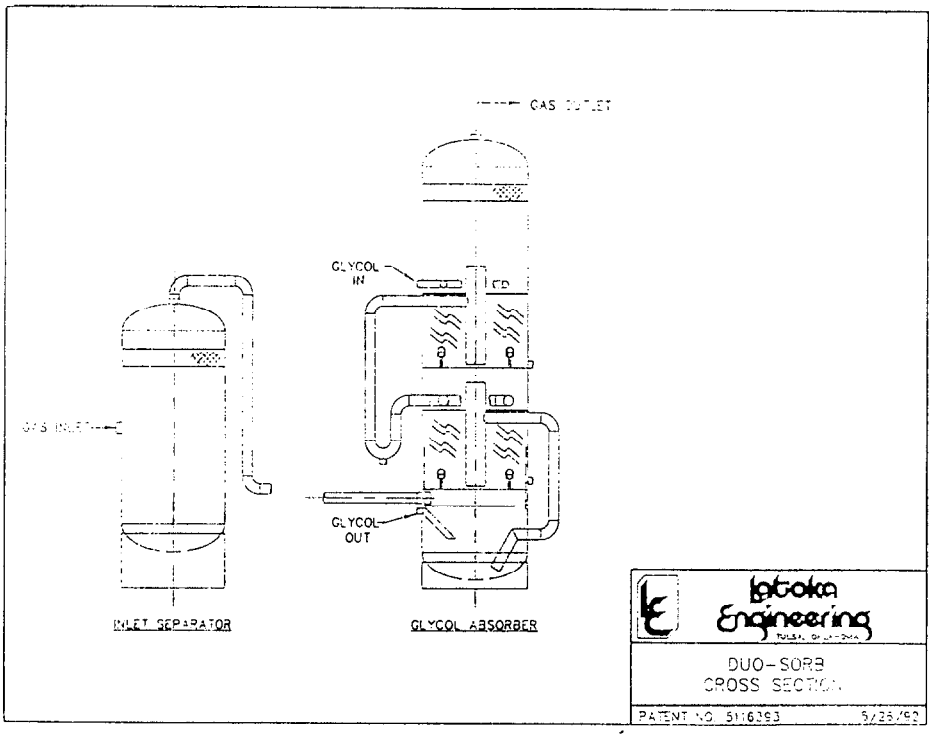

Figure B