

ENGINEERING CASE STUDY
Gas Dryer
Low Pressure – High Flow

1. INTRODUCTION

This package was developed to cool and dehumidify incoming process gas to a temperature at or below +15°C. The process flow rates are subject to variability and the final exit temperature is not critical with variability acceptable between +15°C and +5°C.

The system runs continuously and loads and unloads automatically to meet demands.

The water-cooled package unit was mounted to a hot dipped galvanised skid base and required only the connection of process services to operate.



2. PROCESS DETAILS

INLET GAS CONDITION	MAXIMUM FLOW	NORMAL FLOW	UNITS
Gas	CO ₂	CO ₂	
Flow (Dry gas)	1400	945	Nm ³ /hr
Temperature	40	40	°C
Dew point temperature.	40	40	°C
Pressure	153	153	kPa(a)
OUTLET GAS REQUIREMENT			
Flow (Dry gas)	1400	945	Nm ³ /hr
Maximum temperature	15	10	°C
Maximum dew point temperature.	15	10	°C
Maximum pressure drop through Gas Cooler/Dehumidifier	2.0	2.0	kPa

3.0 EQUIPMENT DETAILS

The package unit was mounted to a hot dipped galvanised skid base and consisted of:

- A Water Cooled Refrigeration system operating on R404A refrigerant
- An open, direct drive refrigeration compressor coupled to a 415V/3 phase/50hz, 4-pole electric motor.
- A water-cooled, shell and tube refrigerant condenser complete with a water flow-regulating valve.
- A capacity regulating Refrigerant Bypass system to allow the system to run continuously.
- All refrigeration controls and ancillary equipment for reliable operation of the plant.
- Transducers for compressor suction, compressor discharge and evaporator pressures.
- Transducers for compressor suction and compressor discharge temperatures.
- Compressor, differential oil pressure safety switch.
- A junction box with terminal connections and wiring for transducers, switches, solenoid valves and crankcase heater.
- Junction box included a stop switch, start/emergency stop switch and indicator lights.



The heat exchanger vessel assembly comprising of:

- A vertical vessel constructed of 316L stainless steel with a removable top cover and flanged connections for gas inlet and outlet.
- Inside the vessel is the gas cooling/dehumidifying, refrigerant cooled, tube-and-fin heat exchanger element all constructed of 316 stainless steel. The process gas passes vertically upwards through the vessel/heat exchanger assembly with the condensate being separated and falling to the bottom of the vessel.
- At the bottom of the vessel is a collection sump and condensate drain system with a separator system.
- Designed and construction of the vessel to AS1210 Class 3.

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