

# **CO2 LOW PRESSURE SYSTEM REF. 비교표**

**26TON**

L.P Co2 REF. COOLING HEAT LOAD CALCULATION CAPACITY

## **1, L.P Co2 REF. PLANT COOLING CAPACITY**

### **(1) L.P CO2 TANK CAPACITY (CO2 탱크 사이즈)**

L(길이) 9410mm D(둘레) 1840mm 경판 580mm(2ea) TANK VOLUME : 26000Lit.

$$A = \pi \times 1.84 \times 9.45 + ( 2 \times \pi \times (0.6 \times 2) ) = \text{실재 값 } 62.17\text{m}^2$$

### **(2) L.P CO2 TANK HEAT TRANSMISSION**

$$Q = K \times A \times ( t_0 - t_1 ) \Delta t \text{ } ^\circ\text{C}$$

A : SURFACE AREA = 62.17m<sup>2</sup>

t<sub>0</sub> : OUTSIDE TEMPERATURE = +45<sup>°C</sup> (툄 주위온도)

t<sub>1</sub> : INSIDE TEMPERATURE = -21.9<sup>°C</sup> 압력 19Kg/cm<sup>2</sup> (Co2 탱크 내 유지온도)

### **HEAT TRANSMISSION SURROUNDING AIR / SURFACE IN INSULATION**

$$1/\alpha = 1/8 = 0.125\text{m}^2\text{ } ^\circ\text{C}/\text{W} \quad (\text{보온재 바깥의 공기대류 열전도 계수 : } 8.0\text{W}/\text{m}^2\text{ } ^\circ\text{C})$$

### **HEAT TRANSMISSION THROUGH POLYURETHANE FOAM**

$$\lambda = 0.022\text{W} / \text{m}^2\text{ } ^\circ\text{C} \quad (\text{보온재 의 열전도율}) \text{ or } 0.026\text{W} / \text{m}^2\text{ } ^\circ\text{C}$$

INSULATION THICKNESS T = 0.15m (150t),

### **열 전달율**

$$1/k = \frac{1}{(1/\alpha + 1/\lambda)} = \frac{1}{(0.125+0.15 \div 0.022)} = 0.144\text{W} / \text{m}^2\text{ } ^\circ\text{C}$$

ADDITIONAL FOR COLD CONDUCTORS : 40%

$$Q = 0.144 \times 62.17 \times 1.4\% \times (45 - (-21.9\text{ } ^\circ\text{C})) = 838.5\text{W} \times 860 = (721.11 \text{ Kcal/h})$$

ADDITIONAL FOR SHIP'S ROLLING AT SEA : 50% 상기 (721.11÷2) = 360.60 Kcal/h

$$721.11\text{Kcal/h} + 360.60\text{Kcal/h} = 1081.70\text{Kcal/h..}$$

(3) CAPACITY OF ON COMPRESSOR SET IN COOLING PLANT : 1081.70Kcal/h

(4) ACTUAL WORKING LOAD : 1081.70Kcal/h÷860 = 1.226kW = 21.85% 미리 용량을 선정

(5) DESIGNED COMPRESSOR UNIT : KIC-RU55 for R.404a 적용

Max. COOLING CAPACITY : 4,950 Kcal/h (5.8Kw)

(6) ESTIMATED ACTUAL RUNNING HOUR : 24시간 중 □□시간 운전

※ 24시간 1081.70용량 4,950용량을 했을 때 시간 : ≙ 7.0시간 운전

## **2, EVAPORATING TUBE 전열면적**

$$A = Q \div (K \cdot \Delta t \text{ } ^\circ\text{C})$$

$$A = \pi \times D \times L$$

K 값 : 7

$$(1) 32A : (42.7\text{OD} \times 35.5\text{ID}) = 0.0427 \times \pi = 0.134078$$

Δt m : 5.3

$$\therefore \text{TOTAL LENGTH (m)} : A = Q \div ( \pi \times D ) \quad A = 1081.7 / ( 5.3 \times 7 ) = 29.2\text{m}^2$$

$$\text{※ } 32A \text{ TL} : 29.2 / ( \pi \times 0.134078 ) = 69.32\text{m} \text{ 이상 필요}$$

**3, Total Weight : 750Kg/2sets per Co2 TANK**

**4. One Compressor Max Capacity : Te45<sup>°C</sup> / Te-28<sup>°C</sup> : 4,950Kcal/h**

**5. Motor Power Rating : 5.5BkW**

※ 본 계산식은 참고용으로만 사용하세요.