

LINE SYMBOLS

- PNEUMATIC TUBING
- ELECTRICAL LEAD
- x-x- CAPILLARY TUBING
- == PRINCIPAL PIPING
- SUPPLEMENTARY PIPING/TUBING
- LOGIC CONNECTION

SEE DETAILED PIPING AND UNIT ARR'G'T. DRAWINGS FOR SCOPE OF SUPPLY AND DEGREE OF ASSEMBLY.

PIPING SYMBOLS

- FLANGES
- BLIND FLANGE
- LINE SIZE CHANGE
- Y TYPE STRAINER
- CONE TYPE STRAINER
- LIQUID INJECTION NOZZLE
- BULLS EYE SIGHT GLASS
- FILTER DRIER
- OIL FILTER
- GAS FILTER
- BRAIDED HOSE
- FLOW STRAIGHTENING VANES
- EXPANSION JOINTS
- ORIFICE PLATE
- UNION
- TUBING CONNECTION
- VENTURI TUBE

ABBREVIATIONS

FC	FAIL CLOSED
FO	FAIL OPEN
REV	REVERSE ACTING
DIR	DIRECT ACTING
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
C	COMMON
NL	NORMAL LEVEL
HL	HIGH LEVEL
HHL	HIGH HIGH LEVEL
LL	LOW LEVEL
LLL	LOW LOW LEVEL
HP	HIGH PRESSURE PORT
LP	LOW PRESSURE PORT
AS	AIR SUPPLY
GS	GAS SUPPLY
NS	NITROGEN SUPPLY
SS	STEAM SUPPLY
WS	WATER SUPPLY
ES	ELECTRIC SUPPLY
Ic	INSULATION COLD
Ih	INSULATION HOT
Ia	INSULATION ACOUSTICAL
HT	HEAT TRACE
HTR	HEATER
HV	HAND VALVE
CV	CHECK VALVE
STR	STRAINER

VALVES

- GATE
- GLOBE
- ANGLE
- THREE WAY MULTI-PORT
- ANGLE TYPE RELIEF
- STRAIGHT THROUGH RELIEF
- NEEDLE VALVE
- INSTR. BLOCK, INTERNAL BLEED
- CHECK
- BUTTERFLY
- BALL OR PLUG
- MULTI-PORT BALL OR PLUG
- FLOAT
- TWO VALVE MANIFOLD
- THREE VALVE MANIFOLD
- FIVE VALVE MANIFOLD
- SIX WAY MULTI-PORT

† COULD BE EITHER STYLE DEPENDENT UPON LINE CONFIGURATION.

CONTROL VALVES

- PNEUMATICALLY ACTUATED DIAPHRAGM CONTROL VALVE WITH POSITIONER
- PNEUMATICALLY ACTUATED DIAPHRAGM CONTROL VALVE WITHOUT POSITIONER
- SOLENOID VALVE
- HAND ACTUATOR (MOUNTED AT TOP SIDE OR BOTTOM OF ACTUATED DEVICE AS APPLICABLE)
- CYLINDER OPERATED VALVE
- PRESSURE REDUCING REGULATOR WITH EXTERNAL TAP
- PRESSURE REDUCING REGULATOR SELF CONTAINED
- BACK PRESSURE REGULATOR WITH EXTERNAL TAP
- BACK PRESSURE REGULATOR SELF CONTAINED
- DIFFERENTIAL - PRESSURE REDUCING REGULATOR WITH INTERNAL AND EXTERNAL PRESSURE TAPS
- MULTI-PORT SOLENOID VALVE
- MOTOR - ELECTRIC ACTUATOR

+ INDICATE VALVE SIZE
 ++ INDICATE FAILURE MODE OF VALVE (F.O. OR F.C.)

INSTRUMENT FUNCTIONAL IDENTIFICATION

* FIRST LETTERS

E	VOLTAGE (EMF)	M	MOISTURE
F	FLOW	P	PRESSURE
H	HAND (MANUAL)	Pd	PRESSURE (DIFFERENTIAL)
I	CURRENT (ELECTRICAL)	S	SPEED
J	POWER	T	TEMPERATURE
K	TIME	V	VIBRATION
L	LEVEL	Z	POSITION

- ALARM
- ALARM HIGH (ALARM)
- ALARM HIGH (SHUTDOWN)
- ALARM LOW (ALARM)
- ALARM LOW (SHUTDOWN)
- CONTROLLER
- CONTROL VALVE
- PRIMARY ELEMENT
- GLASS
- INDICATOR
- INDICATING CONTROLLER
- ORIFICE RESTRICTION
- TOTALIZED/QUANTITY
- RECORDER
- RECORDING CONTROLLER
- SWITCH
- SAFETY ELEMENT
- SWITCH HIGH (ALARM)
- SWITCH HIGH (SHUTDOWN)
- SWITCH LOW (ALARM)
- SWITCH LOW (SHUTDOWN)
- SAFETY VALVE
- TRANSMITTER
- VALVE
- WELL
- RELAY OR COMPUTE
- MANIFOLD VALVE

INSTRUMENTATION SYMBOLS

- LOCAL
- LOCAL PANEL OR BOARD
- LOCAL MICROPROCESSOR OR PC CONTROL FUNCTION
- LOCAL ALPHA-NUMERIC DISPLAY CODE
- REMOTE PANEL OR BOARD
- INSTRUMENT WITH TWO SERVICES OR FUNCTIONS IN SAME CASE
- INSTRUMENT WITH SEPARABLE WELL
- PNEUMATIC CONTROL SUPPLY (* SPECIFY A,G OR N; ** INDICATE PRESSURE 20,35,100 ETC.)

RELAY SYMBOLS

- EXTRACT SQUARE ROOT
- ADD
- SUBTRACT
- MULTIPLY
- HIGH SELECT
- LOW SELECT
- BIAS
- DIVIDE

% OR 1:3 OR 2:1 (TYPICAL) - GAIN OR ATTENUATE
 Xⁿ OR X^{1/n} - RAISE TO POWER
 D OR d/dt - DERIVATIVE OR RATE
 ∫ - INTEGRATE
 INPUT/OUTPUT : P/I (TYPICAL)

MISCELLANEOUS SYMBOLS

- PUMP
- COMPRESSOR PREROTATION VANES
- HEATER (HTR)
- RUPTURE DISK
- YORK SUPPLIED ITEM SHIPPED LOOSE FOR FIELD ASSEMBLY (CUSTOMER INSTALLED)
- FLANGE OR TUBING CONNECTION DESIGNATION
- S - CONNECTION ON THE SYSTEM
- C - CONNECTION ON THE COMPRESSOR
- G - CONNECTION ON THE GEAR
- P - CONNECTION ON THE PURGE UNIT
- T - CONNECTION ON THE TRANSFER UNIT
- W - INDICATES WATER, BRINE OR PROCESS CONNECTION
- INDICATES CUSTOMER SCOPE OF SUPPLY
- INDICATES YORK SCOPE OF SUPPLY
- INDICATES PIPING
- INDICATES TUBING

NOTE:
 1. SEE INDIVIDUAL FLOW DIAGRAMS FOR ADDITIONAL NUMBERS.

INSULATION

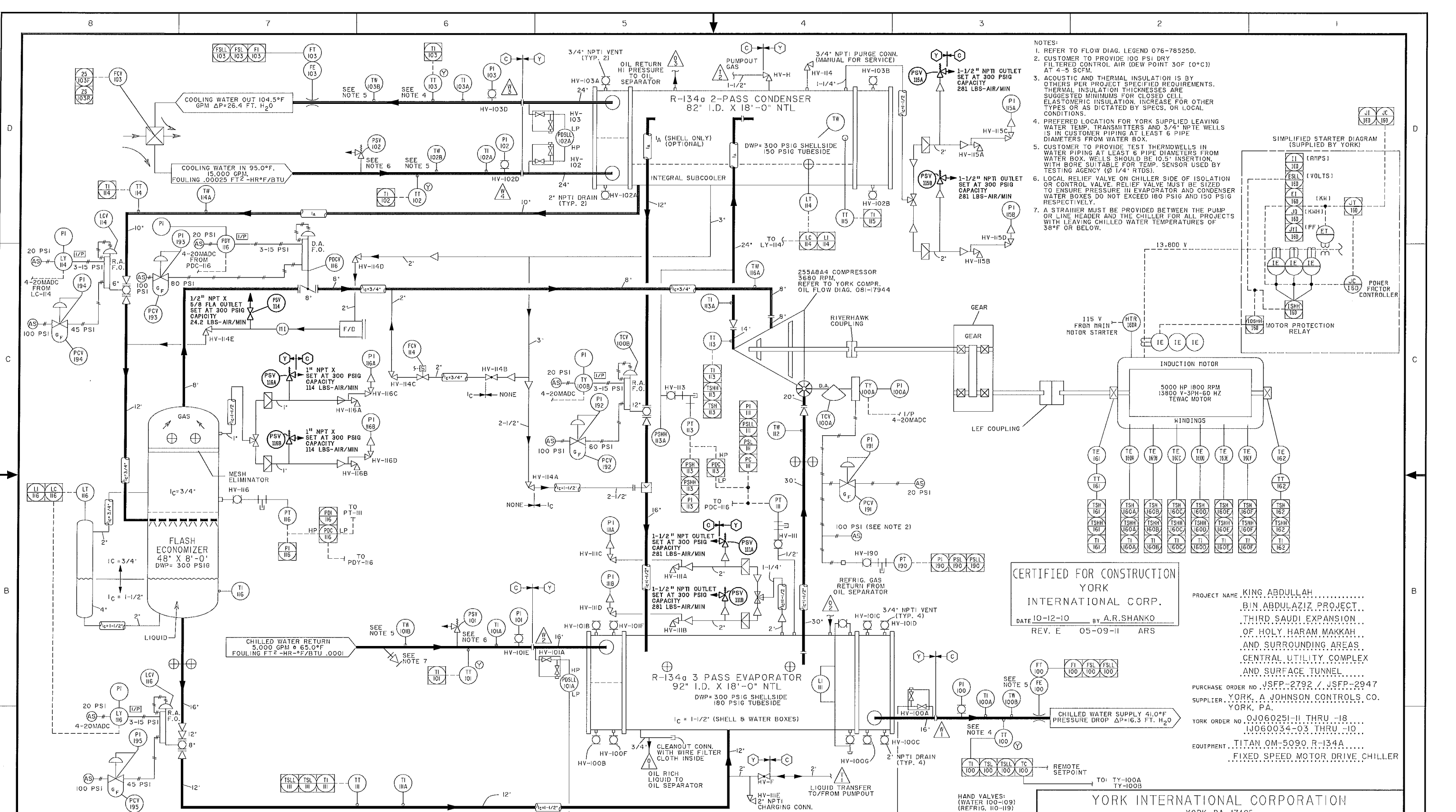
- INSULATION COLD **
- INSULATION HOT
- INSULATION ACOUSTICAL
- HEAT TRACING
- CHANGE IN INSULATION THICKNESS

* RECOMMENDED INSULATION THICKNESS
 ** RECOMMENDED COLD INSULATION THICKNESS BASED ON "K" VALUE .22 @ 0°F; 90°F AMBIENT; 85% R.H.; ZERO MPH WIND VELOCITY (INSULATION AND HEAT TRACING NOT BY YORK FACTORY)

CERTIFIED FOR CONSTRUCTION
 YORK
 INTERNATIONAL CORP.
 DATE 10-23-98 BY M.R.BODELL
 REV. C. 08-15-06 T.W.WISE

REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	LEGEND	MATERIAL
B	06-01-01	REDRAWN, WAS E SIZE. NOTE 1 WAS NOTE 2. ORIG. NOTE 1 RELATED TO SYMBOL SCALE, NOW INVALID. IDENT. LETTER FOR VIBRATION WAS X, AT D-5.	CS01	0360	MEB	MEB												LEGEND FLOW DIAG.	TYPE _____ ENG. STD. _____ PART NO. _____ CUT SIZE _____
C	08-15-06	ADDED LOGIC CONN. TO LINE SYMBOLS & ELEC. ACTUATOR TO CONTROL VALVES SECTION.	CS06	0308	MEB	TWW												NAME DATE DR. D.J. PETROSKE 09-17-92 APPR. D.L. SHAFFER 09-17-92 SCALE: N.T.S.	SIZE CAGE NO DRAWING NUMBER D 66935 076-78525-000

A.175



- NOTES:
- REFER TO FLOW DIAG. LEGEND 076-78525D.
 - CUSTOMER TO PROVIDE 100 PSIG DRY FILTERED CONTROL AIR (DEW POINT 30F [10°C]) AT 4-5 SCFM.
 - ACOUSTIC AND THERMAL INSULATION IS BY OTHERS PER PROJECT SPECIFIED REQUIREMENTS. THERMAL INSULATION THICKNESSES ARE SUGGESTED MINIMUMS FOR CLOSED CELL ELASTOMERIC INSULATION. INCREASE FOR OTHER TYPES OR AS DICTATED BY SPECS. OR LOCAL CONDITIONS.
 - PREFERRED LOCATION FOR YORK SUPPLIED LEAVING WATER TEMP. TRANSMITTERS AND 3/4" NPT WELLS IS IN CUSTOMER PIPING AT LEAST 6 PIPE DIAMETERS FROM WATER BOX.
 - CUSTOMER TO PROVIDE TEST THERMOWELLS IN WATER PIPING AT LEAST 6 PIPE DIAMETERS FROM WATER BOX. WELLS SHOULD BE 10.5" INSERTION, WITH BORE SUITABLE FOR TEMP. SENSOR USED BY TESTING AGENCY (Ø 1/4" RTDS).
 - LOCAL RELIEF VALVE ON CHILLER SIDE OF ISOLATION OR CONTROL VALVE RELIEF VALVE MUST BE SIZED TO ENSURE PRESSURE IN EVAPORATOR AND CONDENSER WATER BOXES DO NOT EXCEED 180 PSIG AND 150 PSIG RESPECTIVELY.
 - A STRAINER MUST BE PROVIDED BETWEEN THE PUMP OR LINE HEADER AND THE CHILLER FOR ALL PROJECTS WITH LEAVING CHILLED WATER TEMPERATURES OF 38°F OR BELOW.

CERTIFIED FOR CONSTRUCTION
 YORK
 INTERNATIONAL CORP.
 DATE 10-12-10 BY A.R.SHANKO
 REV. E 05-09-11 ARS

PROJECT NAME: KING ABDULLAH BIN ABDULAZIZ PROJECT - THIRD SAUDI EXPANSION OF HOLY HARAM MAKKAH AND SURROUNDING AREAS - CENTRAL UTILITY COMPLEX AND SURFACE TUNNEL
 PURCHASE ORDER NO. JSFP-2792 / JSFP-2947
 SUPPLIER: YORK, A JOHNSON CONTROLS CO. YORK, PA.
 YORK ORDER NO. 0J060251-11 THRU -18 / 1J060034-03 THRU -10
 EQUIPMENT: TITAN OM-5090 R-134A FIXED SPEED MOTOR DRIVE CHILLER

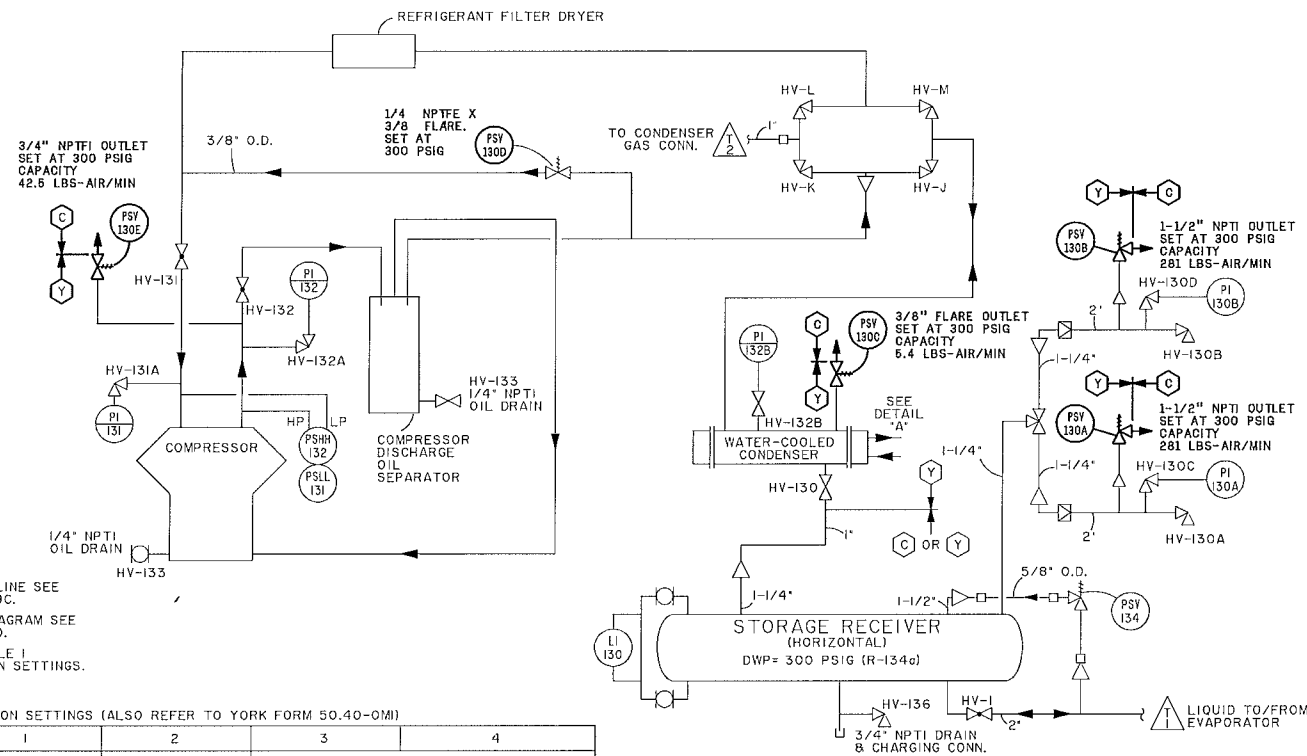
YORK INTERNATIONAL CORPORATION
 YORK, PA. 17405

REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.
-	NEW					B	09-28-10	EVAP. WAS 2 PASS & 150 PSIG TUBESIDE. ADDED FT-100, FT-103, HV-100F, HV-100G HV-101D HV-101F. CHG'D. WINDINGS ON THE MOTOR. PDCV-116 & TCY-100 PSI WAS 40. SEE SH. 2 FOR REV.	CS10 0589	EES	ARS	C	02-20-10	ADDED TO CUST STAMP, PO# JSFP-2947 & YORK ORDER #J060034-03 THRU -10.	CS10 0589	EES	ARS
A	06-30-10	REVISED TCY-100A, LCV-114, LCV-115, PDCV-116, TCY-100B, HV-113, HV-116 & PT-111. EVAP. & COND. WAS 180 PSIG SHELLSIDE. PSV-111A, -111B, -117A & -117B WAS 2" NPT, 180 PSIG, 289 LBS. PSV-116A & -116B WAS 180 PSIG, 70 LBS. SEC. C4: COUPLING WAS "YORKFLEX". SEE SHEET 2 FOR REVISION.	CS10 0589	EES	ARS	C	2-08-10	AI: ON STAMP. EQUIPMENT WAS OM-5000. DI: MAIN MOTOR STARTER WILL BE SUPPLIED BY YORK. D3: PSV'S, PI'S & HV'S WERE -117. C4: COMPR. WAS	CS10 0589	EES	ARS	D	05-09-11	SEE SHEET 2 FOR REVISION.	CS11 0264	EES	ARS

DIMENSIONS ARE IN INCHES DO NOT SCALE TOLERANCES PER ENG. STD. M-282 WELDING PER ENG. STD. M-30 REF. DWG.		DWG-DIAG. FLOW REFRIGERANT-134a AND WATER		MATERIAL TYPE _____ ENG. STD. _____ PART NO. _____ CUT SIZE _____	
NAME DR. E.E. SPRINGLOAT APPR. A.R. SHANKO JR.	DATE 05-14-10 05-14-10	SIZE D	CAGE NO 66935	DRAWING NUMBER 077-31585-000	
WT. = _____ LBS.		ORIG. NO. 077-21594 REV. C		SHEET 1 OF 2	

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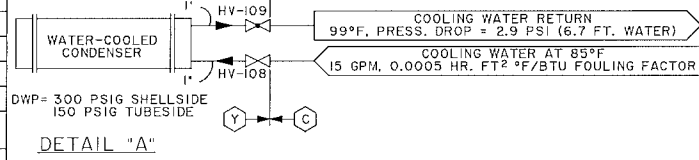
REFRIGERANT PUMPOUT SYSTEM FLOW MODEL RP4400, 60" X 22'-0" RECEIVER



- FOR UNIT OUTLINE SEE DWG. 077-1619C.
- FOR WIRING DIAGRAM SEE DWG. 077-1619D.
- REFER TO TABLE I FOR OPERATION SETTINGS.

TABLE I - OPERATION SETTINGS (ALSO REFER TO YORK FORM 50.40-0M)

CONTROL	TO REMOVE LIQUID FROM OM CHILLER		TO RECHARGE OM CHILLER	
	1	2	STEP 1 - GAS OFF	STEP 2 - LIQUID CHARGE
HV-K	OPEN	CLOSED	CLOSED	CLOSED
HV-L	CLOSED	OPEN	OPEN	OPEN
HV-M	OPEN	CLOSED	CLOSED	CLOSED
HV-J	CLOSED	OPEN	OPEN	OPEN
HV-I	OPEN	CLOSED	CLOSED	OPEN
COMPRESSOR	ON	ON	OFF	ON
WATER TO CONDENSER	OFF	ON	OFF	ON
HEATER	OFF	OFF	OFF	ON



OIL RETURN SYSTEM FLOW

OPERATING SEQUENCE

WHEN THE CHILLER SYSTEM STARTS TO RUN, THE OIL HEATER IN THE COMPRESSOR SUMP IS DE-ENERGIZED. THE OIL SEPARATOR DRUM IS EQUALIZED TO EVAPORATOR REFRIGERANT PRESSURE. AS THE EVAPORATOR PRESSURE DROPS TO DESIGN CONDITIONS, THE REFRIGERANT ENTRAINED IN THE OIL IN THE SEPARATOR WILL FLASH OFF. DUE TO THE HEAT APPLIED AND LOWER VAPOR PRESSURE, THIS WILL LEAVE LIQUID OIL IN THE BOTTOM OF THE SEPARATOR DRUM.

WHEN THE HEATER "HTH-120" HAS BROUGHT THE OIL TEMPERATURE UP TO 100°F. THE TEMPERATURE CONTROL SENSOR "TT-120" SIGNALS THE CHILLER CONTROLLER TO ENERGIZE THE CONDENSER GAS SUPPLY SOLENOID "FCV 120". WITH HIGH PRESSURE GAS APPLIED TO THE JET PUMP EJECTOR, LIQUID REFRIGERANT AND OIL FROM THE BOTTOM OF THE EVAPORATOR ENTER THE OIL SEPARATOR DRUM. THE FLOW OF THIS OIL RICH REFRIGERANT FROM THE EVAPORATOR MUST BE THROTTLED USING VALVE "HV-122". IN ORDER TO PROVIDE A HEAT BALANCE WITH THE OIL HEATER IN THE DRUM, VALVE "HV-122" SHOULD THEREFORE BE ADJUSTED TO MAINTAIN AN OIL TEMPERATURE OF APPROXIMATELY 110° TO 120°F.

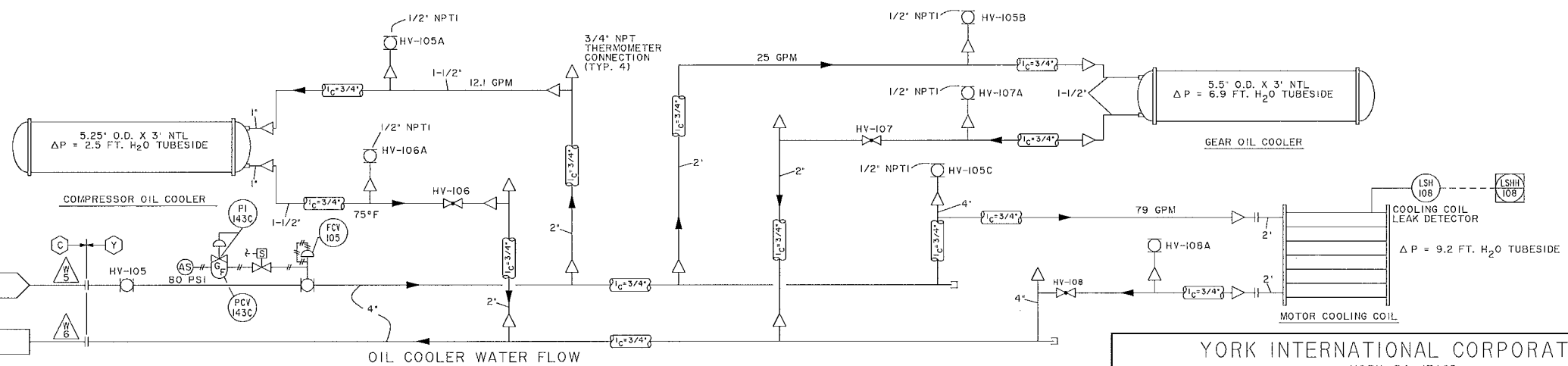
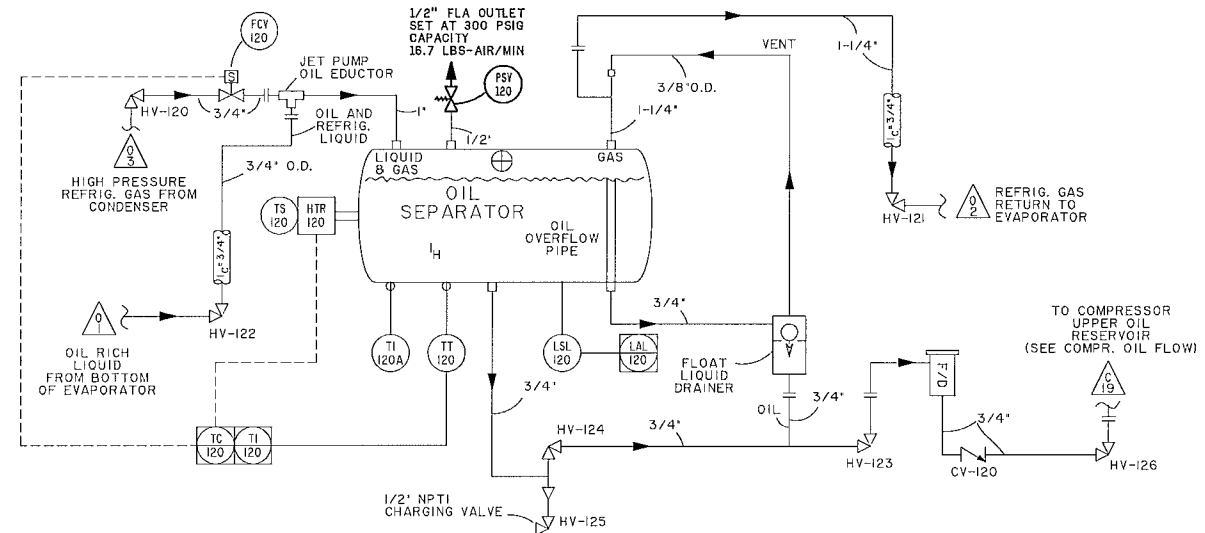
THE OIL RISES TO THE TOP SURFACE OF THE LIQUID IN THE DRUM, AND EXITS VIA THE CONNECTION OUT THE SIDE, AND INTO A FLOAT VALVE. THIS FLOAT VALVE RETURNS THE WARMED OIL TO THE COMPRESSOR SUMP, AFTER PASSING THRU A FILTER DRIER.

THE OIL SEPARATOR HEATER HAS AN INTERNAL THERMOSTAT "TS-120" SET AT 150° WHICH CYCLES THE HEATER ON OR OFF. IF NECESSARY, TO KEEP THE OIL IN THE SEPARATOR WARM AND PREVENT THE ABSORPTION OF REFRIGERANT WHEN THE CHILLER IS OFF, AND TO PREVENT OVERHEATING AND POSSIBLE CARBONIZING OF THE OIL IN THE DRUM, THE OIL HEATER IS 1635 WATTS, AND OPERATES ON 120 VAC.

THE FLOAT "LSL-120" PROTECTS THE IMMERSION HEATER FROM ENERGIZING WITHOUT BEING COVERED BY LIQUID. THE CHILLER CONTROLLER WILL DEENERGIZE THE HEATING ELEMENT AND REGISTER AN ALARM IF THE FLOAT LEVEL IS NOT SATISFIED.

WHEN CHANGING THE COMPRESSOR OIL, VALVE "HV-124" ON THE OIL RETURN UNIT SHOULD BE OPENED TO DRAIN THE OIL FROM THE SEPARATOR INTO THE COMPRESSOR SUMP. WHEN RECHARGING WITH FRESH OIL, FILL THE OIL SEPARATOR TO THE OVERFLOW, USING 1/2" NPT CHARGING VALVE "HV-125".

ENSURE FLOAT "LSL-120" IS SATISFIED WHEN CHARGING WITH OIL.



REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.	REV. LEV.	DATE	REVISION RECORD	CHG. NO.	DR.	CK.
-		NEW	CS10 0369	EES	ARS	B	CONT'D.	FLOW DIAG: SUPPLY & RETURN WAS 3\"/>									
A	06-30-10	SEC A6: DELETED STRAINER FROM WATER SUPPLY. HV-105, -106, -107, -108 & FCV-105 WERE FLANGE VALVES. PSV-130A & PSV-130B: WAS 225 PSIG & 214 LBS-AIR/MIN. STORAGE REC. WAS 225 PSIG. SEE SHEET I FOR REVISION.	CS10 0369	EES	ARS	C	2-08-10	A5: PIPING FOR COMPR. OIL CLR. WAS 1-1/2\"/>									
B	09-28-10	A6: ADDED SOLENOID VALVE. OIL COOLER WATER	CS10 0369	EES	ARS	D	2-20-10	SEE SHEET I FOR REVISION.	CS10 0369	EES	ARS						

YORK INTERNATIONAL CORPORATION
YORK, PA. 17405

DIMENSIONS ARE IN INCHES DO NOT SCALE TOLERANCES PER ENG. STD. M-282 WELDING PER ENG. STD. M-30 REF. DWG.

DWG-DIAG. FLOW REFRIGERANT-134c AND WATER

MATERIAL TYPE _____ ENG. STD. _____ PART NO. _____ CUT SIZE _____

NAME DR. E.E. SPRINGFIELD DATE 05-14-10 APPR. A.R. SHANKO JR. DATE 05-14-10 SCALE: N.T.S.

SIZE D CAGE NO 66935 DRAWING NUMBER 077-31585-000

WT. = _____ LBS. ORIG. NO. 077-21594 REV. C SHEET 2 OF 2