

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

DESIGN, MANUFACTURE, INSPECTION, AND TESTING SHALL CONFORM TO SPECIFICATION:

INFORMATION TO BE COMPLETED: BY PURCHASER BY MANUFACTURER BY PURCHASER OR MANUFACTURER

APPLICABLE TO: PROPOSALS PURCHASE AS BUILT SERVICE: _____
 FOR SAUDI ARABIAN OIL COMPANY UNIT Q70 SITE _____
 No. SYSTEMS REQUIRED 1 SIZE, No. STAGES _____ MODEL _____
 MANUFACTURER _____ VENDOR _____ SERIAL NO. _____

VACUUM PUMP OR COMPRESSOR DATA - GENERAL

No. REQUIRED	2 X 100%	MOTOR ITEM NO	LATER
ITEM No.	Q70-K-151 A/B	MOTOR PROVIDED BY	COMP. VENDOR
No. MOTOR DRIVEN	2	MOTOR MOUNTED BY	COMP. VENDOR
No. TURBINE DRIVEN	-	MOTOR DATA SHT. NO.	LATER
		TURBINE ITEM NO	
		TURBINE PROVIDED BY	
		TURBINE MOUNTED BY	
		TURBINE DATA SHT. NO.	

SYSTEM DESCRIPTION

LIQUID RING VACUUM PUMP LIQUID RING COMPRESSOR

LIQUID RING SYSTEM (Appendix D)

ONCE THROUGH SYSTEM
 PARTIAL RECIRCULATION SYSTEM
 TOTAL RECIRCULATION

SERVICE: CONTINUOUS INTERMITTENT STARTS/DAY _____

INLET SYSTEM VOLUME _____ FT³
 REQUIRED EVACUATION TIME _____ MIN

RING LIQUID

TYPE / NAME OF LIQUID: Water + Hydrocarbon

SUPPLY TEMPERATURE
 NORMAL: _____ MAX _____ MIN _____ (°F)
 SUPPLY PRESSURE: _____ (PSIG)
 VAPOR PRESSURE: _____ (PSIG)
 SPECIFIC GRAVITY @ MAX. TEMPERATURE: _____
 SPECIFIC HEAT _____ (BTU/LB°F)
 VISCOSITY: _____ cP @ _____ (°F)
 MAX VISCOSITY @ MIN TEMPERATURE: _____ (cP)
 CORROSIVE/EROSIVE AGENT:
 CHLORIDE CONCENTRATION:
 H2S CONCENTRATION:
 TOXIC FLAMMABLE OTHER (3.5.2.11)

RING LIQUID PURGE SYSTEM (3.1.8):
 CIRCULATION RATE: _____ (GPM)
 MAKE-UP RATE: _____ (GPM)
 SYSTEM VOLUME: _____ (GAL)
 SYSTEM DESIGN PRESSURE: _____ (PSIG)
 GAS SOLUBILITY IN RING LIQ.: _____ LB/LB @ _____ "H2O & _____ °F

SITE AND UTILITY DATA

LOCATION:
 INDOOR HEATED UNDER ROOF
 OUTDOOR UNHEATED PARTIAL SIDES
 GRADE MEZZANINE _____
 ELECTRIC AREA CLASSIFICATION
 CL 1 GR IIA ZONE 2
 WINTERIZATION REQ'D TROPICALIZATION REQ'D.

STEAM COND'T.	DRIVERS		HEATING	
	PRE (PSIG)	TEMP (°F)	PRE (PSIG)	TEMP (°F)
MIN				
MAX				

ELECTR.	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	480	120	120 VAC	120 VAC
PHASE	3	1	1	1
HERTZ	60	60	60	60

ELEVATION 33 (FT) BAROMETER _____ (PSIA)
 AMBIENT TEMP RANGE - MAX 120 MIN 32 (°F)
 RELATIVE HUMIDITY - MAX _____ MIN _____ (%)

UNUSUAL CONDITIONS: DUST FUMES
 CORROSIVE DUE TO: _____

COOLING WATER TEMP. - INLET _____ NORM _____ (°F)
 MIN _____ MAX 115 MAX RETURN 127 (°F)
 PRESSURE-NORMAL 90 DESIGN 190 (PSIG)
 WATER SOURCE _____

INSTRUMENT AIR PRESSURE : MAX 125 MIN 80 (PSIG)

NOISE SPECIFICATIONS

APPLICABLE TO MACHINE: < 85 dB(A) as per SAES-A-105

APPLICABLE TO NEIGHBORHOOD: _____

ACOUSTIC HOUSING: YES NO

APPLICABLE SPECIFICATIONS

API 681, LIQUID RING VACUUM PUMP AND COMPRESSOR SYSTEMS FOR REFINERY SERVICE
 GOVERNING SPECIFICATION (IF DIFFERENT): _____

PAINTING (4.4.2)

MANUFACTURER'S STANDARD
 UNIFIED, SYSTEM SUPPLIER'S STANDARD:
 OTHER: (Note : 1)

SHIPMENT (4.4)

DOMESTIC EXPORT EXPORT BOXING REQ'D.
 OUTDOOR STORAGE MORE THAN SIX MONTH (4.4.1)

ISSUED FOR BID

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

OPERATING CONDITIONS (NOTE :2)

(ALL DATA ON PER UNIT BASIS)	NORMAL	MAXIMUM	AT START UP	OTHER CONDITIONS	
				A	B
<input checked="" type="radio"/> GAS HANDLED	Water Vapour + Hydrocarbons	Water Vapour + Hydrocarbons			
<input type="radio"/> SCFM (14.7 PSIA & 60°F DRY)					
<input checked="" type="radio"/> MASS FLOW (LB/MIN) (WET/DRY)	0.2363	0.5231			
INLET CONDITIONS -					
<input checked="" type="radio"/> PRESSURE (PSIA)	15.17 (0.47 psig)	15.17 (0.47 psig)			
<input checked="" type="radio"/> TEMPERATURE (° F)	212.5	174.6			
<input type="radio"/> RELATIVE HUMIDITY (%)					
<input type="radio"/> MOLECULAR WEIGHT (%)					
<input type="checkbox"/> Cp / Cv (K ₁) OR (Z _{avg})					
<input type="checkbox"/> COMPRESSIBILITY (Z ₁) OR (Z _{avg})					
<input type="checkbox"/> INLET VOLUME FLOW (CFM) (WET/DRY)					
DISCHARGE CONDITIONS -					
<input checked="" type="radio"/> PRESSURE (PSIA)	20 psig	25 psig			
<input checked="" type="radio"/> TEMPERATURE (° F)	VTA	VTA			
<input type="checkbox"/> Cp / Cv (K ₁) OR (Z _{avg})					
<input type="checkbox"/> COMPRESSIBILITY (Z ₁) OR (Z _{avg})					
<input type="checkbox"/> BHP REQUIRED (ALL LOSSES INCLUDED)					
<input type="checkbox"/> BHP REQUIRED AT RV SETTING					
<input type="checkbox"/> SPEED (RPM)					
<input type="radio"/> GUARANTEE POINT					
<input type="checkbox"/> PERFORMANCE CURVE NO					

GAS CHARACTERISTICS: TOXIC FLAMMABLE OTHER:

GAS ANALYSIS: <input checked="" type="radio"/> MOL % <input type="radio"/>	MW	NORMAL	MAXIMUM	START UP	OTHER COND.		REMARK (2 9 1 13)
					A	B	
AIR	28.966						
OXYGEN	32.000						
NITROGEN	28.015	0.009	5.775				
WATER VAPOR	18.016	97.561	43.916				
CARBON MONOXIDE	28.010						
CARBON DIOXIDE	44.010	0.087	0.089				
HYDROGEN SULFIDE	34.076	0.003	0.001				
HYDROGEN	2.016						
METHANE	16.042	1.169	48.644				
ETHYLENE	28.062						
ETHANE	30.068	0.181	0.828				
PROPYLENE	42.078						
PROPANE	44.094	0.098	0.187				
I - BUTANE	58.120	0.030	0.045				
N - BUTANE	58.120	0.069	0.072				
I - PENTANE	72.146	0.076	0.059				
N - PENTANE	72.146	0.059	0.041				
N - HEXANE		0.149	0.085				
N - HEPTANE		0.509	0.258				
OCTANE		0.000	0.000				
BENZENE		0.000	0.000				
TOLUENE		0.000	0.000				
P-XYLENE		0.000	0.000				
CS2		0.000	0.000				
TRIETHYLENE GLYCOL		0.000	0.000				

REMARKS : VTA- VENDOR TO ADVISE

NOTE:1: VENDOR'S PAINTING STANDARD IS ACCEPTABLE FOR COMPRESSOR, MOTOR ETC, WHICH SHALL BE SUITABLE FOR THE PROCESS AND

ENVIROMENTAL CONDITON IN SAUDI ARABIA VENDOR'S PAINTING SPECIFICATION SHALL BE SUBMITTED TO BUYER FOR REVIEW AUXILIARY STATIC EQUIP

SUCH AS BASE PLATE, PIPING ETC SHALL BE PAINTED IN ACCORDANCE WITH SAUDI ARAMCO STANDARD SAES-H-001, SAES-H-100, SAES-H-101, SAES-H-101V

AND APPLICABLE COATING SYSTEM SHALL BE APCS-28

NOTE:2- THIS IS THE SAME COMPOSITION AS INDICATED IN PARA 3 3 1 OF DATA SHEET Q70-U-PP-315213 (TEG Off Gas Compression System Package).

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

LIQUID RING MACHINE CONSTRUCTION FEATURES

SPEEDS	SHAFT												
<input type="checkbox"/> ROTATION, VIEWED FROM DRIVEN END <input type="checkbox"/> MAX CONTINUOUS: _____ (RPM) <input type="checkbox"/> TRIP _____ (RPM) <input type="checkbox"/> MINIMUM STABLE SPEED _____ (RPM) <input type="checkbox"/> LATERAL (DAMPED) CRITICAL SPEEDS - _____ (RPM) FIRST: _____ RPM: _____ MODE _____ <input type="radio"/> TYPICAL LATERAL ANALYSIS REQUIRED (2.7.1.7) <input type="radio"/> UNDAMPED STIFFNESS MAP REQUIRED <input type="radio"/> TRAIN TORSIONAL ANALYSIS REQUIRED (2.7.1.12) <input type="checkbox"/> FIRST TORSIONAL CRITICAL SPEED: _____ (RPM) <input type="checkbox"/> VIBRATION- ALLOWABLE TEST LEVEL: _____ (MILS)	<input type="checkbox"/> MATERIAL DIA OF ROTOR _____ (IN) COUPLING _____ (IN) SHAFT END: <input type="checkbox"/> TAPERED <input type="checkbox"/> CYLINDRICAL <hr/> <h3 style="text-align: center;">SHAFT SLEEVES (2.5.5)</h3> <input type="checkbox"/> AT SHAFT SEALS - MATERIAL: _____ <hr/> <h3 style="text-align: center;">BEARING HOUSINGS</h3> <input type="checkbox"/> CAST IRON <input type="checkbox"/> DUCTILE IRON <input type="checkbox"/> STEEL SEALS: <input type="radio"/> LIP TYPE <input checked="" type="radio"/> LABYRINTH (2.8.2.5) <input checked="" type="radio"/> VIBRATION PROBE PROVISIONS (2.8.2.6) (if required)												
<h3 style="text-align: center;">MATERIALS INSPECTION REQUIREMENTS (4.2.2)</h3> <input type="radio"/> CHARPY TESTING (2.9.4) <input type="radio"/> RADIOGRAPHY REQUIRED FOR: _____ <input type="radio"/> MAGNETIC PARTICLE REQUIRED FOR: _____ <input checked="" type="radio"/> LIQUID PENETRANT REQUIRED FOR: <u>Castings & Welded Fabrication</u>	<h3 style="text-align: center;">BEARINGS AND LUBRICATION</h3> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">BEARINGS</th> <th style="width: 25%;">TYPE</th> <th style="width: 25%;">NO</th> <th style="width: 25%;">CLEARANCE</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> RADIAL</td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> THRUST</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>LUBRICATION:</p> <input type="checkbox"/> GREASE <input type="checkbox"/> FLOOD <input checked="" type="radio"/> RING OIL <input type="checkbox"/> FLINGER <input type="checkbox"/> PURGE OIL MIST <input type="radio"/> OIL MIST <input type="radio"/> CONSTANT LEVEL OILER <input type="radio"/> PRESSURE <input type="radio"/> 1 1/2 NPS MINIMUM OIL FILL & DRAIN (2.8.2.4) <input checked="" type="radio"/> OIL VISCOSITY ISO GRADE: ISO VG 46 <input type="radio"/> OIL HEATER - <input type="radio"/> ELECTRIC <input type="radio"/> STEAM <input type="radio"/> OIL PRESSURE TO BE GREATER THAN COOLANT PRESSURE	BEARINGS	TYPE	NO	CLEARANCE	<input type="checkbox"/> RADIAL				<input type="checkbox"/> THRUST			
BEARINGS	TYPE	NO	CLEARANCE										
<input type="checkbox"/> RADIAL													
<input type="checkbox"/> THRUST													
<h3 style="text-align: center;">CASING</h3> <input type="checkbox"/> MODE _____ <input type="checkbox"/> CASING SPLIT <input checked="" type="checkbox"/> MATERIAL (2.9.2.5): <u>Minimum CARBON STEEL(NOTE 3)</u> <input type="checkbox"/> THICKNESS: _____ (IN) CORR ALLOW.: _____ (IN) <input type="checkbox"/> MANIFOLD MATERIAL: _____ <input type="checkbox"/> PORT PLATE/CONE MATERIAL _____ <input type="checkbox"/> MAX WORKING PRESSURE: _____ (PSIG) <input type="checkbox"/> MAX DESIGN PRESSURE: _____ (PSIG) <input type="checkbox"/> TEST PRESS. HELIUM: _____ HYDRO: _____ (PSIG) <input type="checkbox"/> OPER. TEMP. MAX: _____ MIN: _____ (°F) <input type="checkbox"/> MAX CASING CAPACITY: _____ (ICFM) <input checked="" type="radio"/> CASING STUDS REQUIRED (2.2.6.2) <input checked="" type="radio"/> CASING DISASSEMBLY JACKSCREWS (2.2.7) <input checked="" type="radio"/> SPOT FACED MOUNTING HOLES (2.2.8) <input checked="" type="radio"/> CASING VERTICAL JACKSCREWS AND DOWEL PILOT HOLES (2.2.9) <input type="checkbox"/> RADIOGRAPHY QUALITY <input type="radio"/> SYSTEM RELIEF VALVE SET POINT (2.2.2): _____ (PSIG)	<h3 style="text-align: center;">VIBRATION DETECTORS</h3> <input type="radio"/> See attached API 670 Data sheet <input type="radio"/> TYPE: _____ <input type="radio"/> API 670 <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL _____ <input type="radio"/> No. AT EACH SHAFT BEARING: _____ TOTAL NO: _____ <input type="radio"/> OSCILLATOR - DETECTORS SUPPLIED BY: _____ <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL: _____ MONITOR SUPPLIED BY (3.2.4.6): _____ <input type="radio"/> LOCATION _____ ENCLOSURE: _____ <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL: _____ <input type="checkbox"/> SCALE RANGE _____ <input type="checkbox"/> ALARM SET @ _____ MILS <input type="radio"/> SHUTDOWN <input type="checkbox"/> SET @ _____ MILS <input type="radio"/> TIME DELAY: _____ SEC												
<h3 style="text-align: center;">ROTORS</h3> <input type="checkbox"/> No.: _____ <input type="checkbox"/> SOLID <input type="checkbox"/> HOLLOW <input type="checkbox"/> DIAMETER _____ (IN) <input type="checkbox"/> No. VANES PER ROTOR: _____ TYPE: <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED <input type="checkbox"/> OTHER: _____ <input type="checkbox"/> TYPE FABRICATION: _____ <input type="checkbox"/> MATERIAL: _____ <input type="checkbox"/> MAX. YIELD STRENGTH _____ (PSI) <input type="checkbox"/> BRINELL HARDNESS - MAX: _____ MIN: _____	<h3 style="text-align: center;">AXIAL POSITION DETECTOR</h3> <input type="radio"/> See attached API 670 DS <input type="radio"/> TYPE: _____ <input type="radio"/> NOS REQUIRED <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL _____ <input type="radio"/> OSCILLATOR - DEMODULATOR SUPPLIED BY: _____ <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL: _____ MONITOR SUPPLIED BY (3.2.4.6): _____ <input type="radio"/> LOCATION _____ ENCLOSURE: _____ <input type="radio"/> Mfr: _____ <input type="checkbox"/> MODEL: _____ <input type="checkbox"/> SCALE RANGE _____ <input type="checkbox"/> ALARM SET @ _____ MILS <input type="radio"/> SHUTDOWN <input type="checkbox"/> SET @ _____ MILS <input type="radio"/> TIME DELAY: _____ SEC												

REMARKS :

NOTE : 3 : VENDOR COULD SUGGEST SUITABLE MATERIAL COMPITABLE WITH PROCESS FLUID.

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

	<input type="checkbox"/> NO	<input type="checkbox"/> SIZE	<input type="checkbox"/> FACING	<input type="checkbox"/> RATING	<input type="checkbox"/> POSITION	<input type="checkbox"/> FLANGED STUDDED OR THREADED (2.3)	<input type="checkbox"/> MATING RING & GASKET BY VENDOR (2.3.8.4)
SYSTEM INLET							
SYSTEM DISCHARGE							
MACHINE INLET							
MACHINE DISCHARGE							
MACHINE DRAIN							
COOLING WATER							
RING LIQUID INLET							
VENTS							

<input type="checkbox"/> ALLOWABLE FORCES AND MOMENTS ON LIQ. RING M/C (Note 4)						<input type="checkbox"/> WEIGHTS (LBS)	
INLET			DISCHARGE			LIQUID RING MACHINE: _____ DRIVER: _____	
FORC	MOM'T	FORC	MOM'T	FORC	MOM'T	SEPARATOR: _____	
LB	FT-LB	LB	FT-LB	LB	FT-LB	COMPLETE UNIT _____	
AXIAL						MAX MAINTENANCE: _____	
VERTICAL						TOTAL SHIPPING: _____	
HORIZ. 90°							

<input type="checkbox"/> SPACE REQUIREMENTS (FT & INCHES)						LENGTH	WIDTH	HEIGHT
INLET			DISCHARGE			COMPLETE UNIT _____		
FORC	MOM'T	FORC	MOM'T	FORC	MOM'T	LIQ. RING M/C & DRIVER _____		
LB	FT-LB	LB	FT-LB	LB	FT-LB	SEPARATOR VESSEL _____		
AXIAL								
VERTICAL								
HORIZ. 90°								

COUPLINGS AND GUARDS	
<p>COUPLING - TYPE: NON LUBRICATED, FLEXIBLE</p> <p>Mfr. / MODEL No.: _____</p> <p>FURNISHED BY: COMPRESSOR VENDOR</p> <p><input type="checkbox"/> SPACER LENGTH: _____ RATING (Kw/1000 rpm): _____</p> <p><input checked="" type="checkbox"/> LIMITED END FLOAT REQUIRED (3.4.8)</p> <p>GUARD TYPE: <input checked="" type="radio"/> FULLY ENCLOSED <input type="radio"/> SEMI-OPEN <input type="radio"/> NON-SPARK</p> <p>FURNISHED BY: COMPRESSOR VENDOR</p> <p><input checked="" type="radio"/> VENDOR MOUNT HALF COUPLING</p> <p><input type="radio"/> DYNAMICALLY BALANCED (3.4.7)</p>	<p><input type="radio"/> SEE ATTACHED API - 671 DATA SHEETS LUBRICATING REQUIREMENTS</p> <p><input checked="" type="radio"/> NON-LUBE <input type="radio"/> GREASE <input type="radio"/> OTHER</p> <p><input checked="" type="checkbox"/> BELT DRIVE</p> <p><input type="checkbox"/> BELT TYPE / No.: _____</p> <p><input type="checkbox"/> BELT Mfr.: _____</p> <p><input type="checkbox"/> BELT SERVICE FACTOR (3.5.1): _____</p> <p><input type="checkbox"/> ISO GRADE 63 SHEAVE BALANCE (3.5.4.7): _____</p>

MOUNTING PLATES	
<p><input checked="" type="radio"/> BASEPLATES FURNISHED BY (3.6.1.1)</p> <p><input type="radio"/> MACHINE AND DRIVER <input checked="" type="radio"/> COMPLETE SYSTEM</p> <p><input checked="" type="radio"/> DRIP PAN (3.6.2.6) <input type="radio"/> MACHINE & DRIVER</p> <p><input type="radio"/> COLUMN MOUNTING (3.6.1.1) <input checked="" type="radio"/> FOR COMPLETE SYSTEM</p> <p><input type="radio"/> CONTINUOUSLY GROUTED (3.6.1.1) <input checked="" type="radio"/> SUB-SOLE PLATES REQUIRED</p> <p><input type="checkbox"/> STAINLESS STEEL SHIM THICKNESS: _____ IN.</p> <p><input checked="" type="radio"/> PRIMER FOR EPOXY GROUT REQUIRED (3.6.1.2.5)</p> <p style="padding-left: 20px;">TYPE: APCS-28 OF SAES-H-001</p> <p><input checked="" type="radio"/> MACHINED MOUNTING PADS (3.6.2.9)</p> <p><input checked="" type="radio"/> NON-SKID DECKING (3.6.2.10)</p>	<p><input checked="" type="radio"/> SOLEPLATES FURNISHED BY:</p> <p>FOR: <input checked="" type="radio"/> MACHINE <input checked="" type="radio"/> DRIVER <input type="radio"/> OTHER:</p> <p><input type="checkbox"/> THICKNESS: _____ IN</p> <p><input type="radio"/> SUB-SOLE PLATES REQUIRED</p> <p><input type="radio"/> LEVELING (CHOCK) BLOCKS REQUIRED</p> <p><input type="checkbox"/> STAINLESS STEEL SHIM THICKNESS: _____ IN.</p> <p><input checked="" type="radio"/> PRIMER FOR EPOXY GROUT REQUIRED (3.6.1.2.5)</p> <p style="padding-left: 20px;">TYPE: APCS-26 OF SAES-H-001</p>

REMARKS :

NOTE : 4 : THE MAXIMUM ALLOWABLE EXTERNAL FORCES AND MOMENTS SHALL BE 2 x NEMA SM 23 NOZZLE LOADS.

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

MECHANICAL SEAL / PACKING (NOTE 5)

<p>SEAL DATA</p> <p><input type="radio"/> SPECIAL DATA SHEET: _____</p> <p><input checked="" type="checkbox"/> API MATERIAL CLASS CODE (TABLE H-4): _____</p> <p><input checked="" type="checkbox"/> MANUFACTURER: AS PER MANUFACTURER STANDARD.</p> <p><input type="checkbox"/> SIZE AND TYPE: _____</p> <p><input type="checkbox"/> MANUFACTURER CODE: _____</p> <p>PACKING DATA -</p> <p><input type="checkbox"/> MANUFACTURER: _____</p> <p><input type="checkbox"/> TYPE: _____</p> <p><input type="checkbox"/> SIZE AND No. RINGS: _____</p> <p><input type="checkbox"/> PACKING INJECTION REQUIRED</p> <p><input type="checkbox"/> FLOW: _____ (GPM) @ _____ PSIG</p> <p><input type="checkbox"/> LANTERN RING: _____</p> <p><input type="checkbox"/> MAX SEALING PRESSURE: _____ PSIG</p>	<p>SEAL CONSTRUCTION</p> <p><input type="radio"/> NO SLEEVE</p> <p><input type="radio"/> PUMPING RING</p> <p><input checked="" type="radio"/> CARTRIDGE MOUNT</p> <p><input type="radio"/> HOOKED SLEEVE OR NON-CARTRIDGE</p> <p><input type="checkbox"/> SLEEVE MATERIAL: _____</p> <p><input type="checkbox"/> GLAND MATERIAL: _____</p> <p><input checked="" type="radio"/> AUXILIARY SEAL DEVICE BY COMPRESSOR VENDOR</p> <p><input checked="" type="checkbox"/> JACKET REQUIRED</p> <p>GLAND TAPS:</p> <p><input type="checkbox"/> (F)FLUSH <input type="checkbox"/> (D)RAIN <input type="checkbox"/> (B)ARRIER</p> <p><input type="checkbox"/> (C)COOLING <input type="checkbox"/> (V)ENT</p> <p><input type="checkbox"/> (H)HEATING <input type="checkbox"/> (Q)UENCH</p> <p><input checked="" type="checkbox"/> FULLY CONFINED GLAND PLATE GASKET (2.6.11)</p>
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MECHANICAL SEAL / PACKING

<p>SEAL FLUIDS -</p> <p>NOTE: IF FLUSH LIQUID IS PUMPAGE LIQUID (AS IN FLUSH PIPING PLANS 11 TO 41), FOLLOWING FLUSH LIQUID DATA IS NOT REQUIRED</p> <p><input type="radio"/> TEMPERATURE SUPPLY: _____ MIN: _____ MAX: _____ (°F)</p> <p><input type="radio"/> Density _____ @ _____ (°F)</p> <p><input type="radio"/> NAME OF FLUID _____</p> <p><input type="radio"/> SPECIFIC HEAT: _____</p> <p><input type="radio"/> VAPOR PRESSURE: _____ (psia) @ _____ (°F)</p> <p><input type="radio"/> TOXIC <input type="radio"/> FLAMMABLE <input type="radio"/> OTHER: _____</p> <p><input type="checkbox"/> FLOWRATE MAX: _____ MIN: _____ (gpm)</p> <p><input type="checkbox"/> REQ'D PRESS.: MAX: _____ MIN: _____ (psig)</p> <p><input type="checkbox"/> REQ'D TEMP.: MAX: _____ MIN: _____ (°F)</p>	<p>QUENCH FLUID -</p> <p><input type="radio"/> NAME OF FLUID _____</p> <p><input type="radio"/> FLOW RATE: _____ gpm</p> <p>BARRIER FLUID -</p> <p><input type="radio"/> TEMPERATURE SUPPLY: _____ MIN: _____ MAX: _____ (°F)</p> <p><input type="radio"/> SPECIFIC GRAVITY _____ @ _____ (°F)</p> <p><input type="radio"/> NAME OF FLUID _____</p> <p><input type="radio"/> VAPOR PRESSURE: _____ (psia) @ _____ (°F)</p> <p><input type="radio"/> TOXIC <input type="radio"/> FLAMMABLE <input type="radio"/> OTHER: _____</p> <p><input type="checkbox"/> FLOW RATE: MAX: _____ MIN: _____ (gpm)</p> <p><input type="checkbox"/> REQ'D PRESS.: MAX: _____ MIN: _____ (psig)</p> <p><input type="checkbox"/> REQ'D TEMP.: MAX: _____ MIN: _____ (°F)</p>
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SEAL FLUSHING PIPING

<p>PLAN: 23 / 61</p> <p>AUXILIARY PLAN: _____</p> <p>PIPE ASSEMBLY</p> <p><input type="radio"/> UNIONS</p>	<p><input type="radio"/> TUBING</p> <p><input checked="" type="radio"/> PIPING</p> <p><input type="radio"/> TUBING</p> <p><input type="radio"/> PIPING</p> <p><input type="radio"/> THREADED</p> <p><input type="radio"/> FLANGED</p>	<p><input type="radio"/> CARBON STEEL</p> <p><input checked="" type="radio"/> STAINLESS STEEL</p> <p><input type="radio"/> CARBON STEEL</p> <p><input type="radio"/> STAINLESS STEEL</p> <p><input type="radio"/> SEAL WELDED</p> <p><input type="radio"/> SOCKET WELDED</p>	<p><input type="radio"/> TYPE TUBE FITTINGS:</p> <p><input type="radio"/> FLOW INDICATOR (PLAN 52/53)</p> <p><input type="radio"/> HEAT EXCHANGER (PLAN 52/53)</p> <p><input type="radio"/> PRESSURE SWITCH (PLAN 52/53)</p> <p><input type="radio"/> PRESSURE GAUGE (PLAN 52/53)</p> <p><input checked="" type="radio"/> TEMPERATURE INDICATOR (PLANS 21, 22, 23, 32, 41)</p>
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COOLING WATER PIPING

<p><input type="radio"/> COOLING WATER PLAN: _____</p> <p><input type="radio"/> GALVANIZED PIPING REQUIRED</p> <p><input type="radio"/> COPPER TUBING REQUIRED</p> <p><input type="radio"/> STAINLESS STEEL TUBING REQUIRED</p> <p><input type="radio"/> INLET VALVE</p> <p><input type="radio"/> OUTLET VALVE</p> <p><input type="radio"/> SIGHT FLOW INDICATORS</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 60%;">COOLING WATER REQUIREMENTS -</th> <th style="width: 20%;">FLOW (GPM)</th> <th style="width: 20%;">TEMP (°F)</th> </tr> <tr> <td>SEAL WATER JACKET/BEARING HOUSING</td> <td></td> <td></td> </tr> <tr> <td>SEAL HEAT EXCHANGER</td> <td></td> <td></td> </tr> <tr> <td>RING LIQUID COOLER</td> <td></td> <td></td> </tr> <tr> <td>TOTAL COOLING WATER</td> <td></td> <td></td> </tr> </table>	COOLING WATER REQUIREMENTS -	FLOW (GPM)	TEMP (°F)	SEAL WATER JACKET/BEARING HOUSING			SEAL HEAT EXCHANGER			RING LIQUID COOLER			TOTAL COOLING WATER		
COOLING WATER REQUIREMENTS -	FLOW (GPM)	TEMP (°F)														
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SEAL HEAT EXCHANGER																
RING LIQUID COOLER																
TOTAL COOLING WATER																

PIPING SYSTEM (3.7) (NOTE 6)

<p><input checked="" type="radio"/> VAPOR INLET PIPING (3.7.1.14)</p> <p><input checked="" type="radio"/> PRESSURE CONTROL VALVE</p> <p><input checked="" type="radio"/> CHECK VALVE <input type="radio"/> EJECTOR</p> <p><input type="radio"/> BLOCK VALVE</p> <p><input checked="" type="radio"/> MATERIAL: <input checked="" type="radio"/> STEEL</p> <p><input type="radio"/> SS <input type="radio"/> OTHER: _____</p>	<p><input checked="" type="radio"/> LRVP DISCH. PIPING</p> <p><input checked="" type="radio"/> CHECK VALVE</p> <p><input checked="" type="radio"/> RELIEF VALVE: SET PRESS. _____</p> <p><input checked="" type="radio"/> MAT: <input checked="" type="radio"/> STEEL</p> <p><input type="radio"/> SS <input type="radio"/> OTHER: _____</p>	<p><input checked="" type="radio"/> RING LIQUID PIPING</p> <p><input type="radio"/> AUTOMATIC SHUT-OFF VALVE</p> <p><input type="radio"/> MAKE-UP CONTROL VALVE</p> <p><input checked="" type="radio"/> DRAIN PIPING <input type="radio"/> DRAIN TRAP</p> <p><input type="radio"/> CART. TYPE FILTER <input type="radio"/> DUPLEX</p> <p><input checked="" type="radio"/> MATERIAL: <input checked="" type="radio"/> STEEL <input type="radio"/> SS <input type="radio"/> OTHER: _____</p> <p><input checked="" type="radio"/> BLOCK VALVES</p> <p><input checked="" type="radio"/> MAKE-UP PIPING</p> <p><input checked="" type="radio"/> Y-TYPE STRAINER</p> <p><input checked="" type="radio"/> SWITCH VALVE</p>
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REMARK:

NOTE : 5 : AS PER API 682 AMENDED BY SAUDI ARAMCO STANDARD 31-SAMSS-012.

NOTE : 6 : INTERCONNECTED PIPING WITHIN SKID SHALL BE AS PER PIPING CLASS 1CS2P OF SPECIFICATION Q76-A-PP-116002

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

INSTRUMENTATION (NOTE 7, 8 & 9, 10 & 11)			
<input type="radio"/> PROCESS CONTROL METHOD: <input type="radio"/> SUCTION THROTTLING FROM _____ TO _____ PSIG <input type="radio"/> SPEED VARIATION FROM _____ TO _____ % <input type="radio"/> DISCHARGE BLOWOFF TO _____ <input type="radio"/> BYPASS FROM DISCHARGE TO INLET		SIGNAL - SOURCE: _____ TYPE: <input type="radio"/> ELECTRONIC, RANGE _____ To _____ mA <input type="radio"/> PNEUMATIC: _____ psig <input type="radio"/> OTHER: _____ INSTRUMENT MOUNTING <input type="radio"/> LOCAL PANEL <input type="radio"/> REMOTE PANEL <input type="radio"/> LOCALLY (ON PIPE OR EQUIPMENT OR ON LOCAL GAGE BOARD)	

INSTRUMENT SUPPLIER			
	MANUFACTURER	SIZE	TYPE
PRESSURE GAGES			
TEMPERATURE GAGES			
LEVEL GAGES			
DIFF. PRESSURE GAGES			
PRESSURE TRANSMITTERS			
DIFF. PRESSURE TRANSMITTERS			
TEMPERATURE TRANSMITTERS			
LEVEL TRANSMITTERS			
CONTROL VALVES			
PRESSURE RELIEF VALVES			
THERMAL RELIEF VALVES			
SIGHT FLOW INDICATORS			
FLOW TRANSMITTERS			
VIBRATION EQUIPMENT			
CONSTANT LEVEL OILERS			
SOLENOID VALVES			
ANNUNCIATOR		No.POINTS:	

PRESSURE GAGE REQUIREMENTS				TEMPERATURE GAGE REQUIREMENTS			
	LOCALLY MOUNTED	LOCAL PANEL	REMOTE PANEL		LOCALLY MOUNTED	LOCAL PANEL	REMOTE PANEL
1st STAGE INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1st STAGE INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2nd STAGE INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2nd STAGE INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1st STAGE DISCHARGE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1st STAGE DISCHARGE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2nd STAGE DISCHARGE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2nd STAGE DISCHARGE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1st STAGE LIQ. RING INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1st STAGE LIQ. RING INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2nd STAGE LIQ. RING INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2nd STAGE LIQ. RING INLET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OTHER:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ALARM & SHUTDOWN SWITCHES (3.2.5.1) (TABLE 2) (Note : 9)					
	PRE- ALARM	SHUTDOWN		PRE- ALARM	SHUTDOWN
<input type="radio"/> HIGH GAS DISCHARGE TEMP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/> HIGH RING LIQUID LEVEL	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/> HIGH LIQ. RING OUTLET TEMP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/> HIGH VIBRATION	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/> HIGH GAS OUTLET PRESS.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/> LOW MECH. SEAL FLUID PRESS	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/> LOW RING LIQUID FLOW	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/> PANEL PURGE FAILURE	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/> LOW RING LIQUID LEVEL	<input type="checkbox"/>	<input type="checkbox"/>			

REMARKS:

NOTE : 7 : ALL INSTRUMENTATION SHALL BE AS PER P&ID Q70-PP-319021 SHEET 008 & 009.

NOTE : 8 : LOCAL INSTRUMENT PANEL SHALL BE PROVIDED FOR THE COMPLETE PACKAGE CONSISTING OF TEG OFF GAS COMPRESSOR(S), TEG OFF GAS SEPARATOR AND TEG CONDENSED LIQUID COOLER BY VENDOR.

NOTE : 9 : FIELD INSTRUMENTATION SHALL BE PROVIDED BY VENDOR. ALL FIELD TRANSMITTERS & CONTROL VALVES CONNECTED TO DCS SHALL HAVE FF PROTOCOL. ALL FIELD TRANSMITTERS & ESD VALVES (ZVS) CONNECTED TO ESD SHALL HAVE 4-20 mA HART PROTOCOL.

NOTE : 10 : ALL ALARMS AND SHUTDOWNS SHALL BE AS PER P&ID Q70-PP-319021 SHEET 008 & 009 HOWEVER VENDOR COULD SUGGEST ADDITIONAL ALARMS & SHUTDOWN FOR PROPER FUNCTIONS OF EQUIPMENTS.

NOTE : 11 : SAEFTY RELIEF VALVES SHALL COMPLY WITH 34-SAMSS-611 & 34-SAMSS-612.

NOTE : 12 : THIS DATA SHEET IS TYPICAL FOR Q70-K-251 A/B, Q70-K-351 A/B & Q70-K-451 A/B.

LIQUID RING COMPRESSOR AND VACUUM PUMP DATA SHEET

INSTRUMENTATION (CON'T) (NOTE : 7 & 10)

SWITCH CLOSURES

ALARM CONTACTS SHALL: OPEN CLOSE TO SOUND ALARM AND BE NORMALLY ENERGIZED DE-ENERGIZED
 SHUTDOWN CONTACTS SHALL: OPEN CLOSE TO TRIP AND BE NORMALLY ENERGIZED DE-ENERGIZED

NOTE: NORMAL CONDITION IS WHEN COMPRESSOR IS IN OPERATION.

MISC. INSTRUMENTATION (NOTE : 7)	INSPECTION & TESTING																																																																																																																																																																				
<input type="radio"/> RING LIQUID SIGHT FLOW INDICATOR <input type="radio"/> RING LIQUID LEVEL GAGE <input type="radio"/> VIBRATION & SHAFT POSITION PROBES & OSCILLATOR-DEMODULATORS <input type="radio"/> VIBRATION & SHAFT POSITION READOUT EQUIPMENT VIBRATION READOUT LOCATION: <input type="checkbox"/> LOCAL PANEL <input type="checkbox"/> SEPARATE PANEL <input type="checkbox"/> CONTROL ROOM <input type="radio"/> ANNUNCIATOR SYSTEM <input type="radio"/> PANEL & ANNUNCIATOR PURGE <input type="radio"/> INSTRUMENT BLOCK VALVES (EXCEPT SHUTDOWN INSTRUMENTS) <input type="radio"/> INSTRUMENT BLOCK VALVES FOR SHUTDOWNS <input checked="" type="radio"/> LIQUID FILLED PRESSURE GAGES <input type="radio"/> ALARM HORN & ACKNOWLEDGEMENT SWITCH <input checked="" type="radio"/> TEST LAMP PUSHBUTTON <input type="radio"/> PERMISSIVE START WITH PILOT LIGHT <input type="radio"/> PILOT LIGHT INCOMING CIRCUITS <input checked="" type="radio"/> START-STOP SWITCHES <input type="radio"/> BEARING METAL TEMPERATURE SENSORS (2 8 2 7) <input type="radio"/> RADIAL - NUMBER: _____ <input type="radio"/> AXIAL - NUMBER: _____ <input checked="" type="radio"/> PRE-ALARM & SHUTDOWN INSTRUMENTS SHALL BE SEPARATE <input checked="" type="radio"/> ELECTRICAL & INSTRUMENT CONNECTIONS WITHIN THE CONFINES OF THE BASE SHALL BE BROUGHT OUT TO TERMINAL BOXES	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;"></th> <th style="width: 10%; text-align: center;">REQ'D</th> <th style="width: 10%; text-align: center;">WITNESS</th> <th style="width: 10%; text-align: center;">OBS</th> </tr> </thead> <tbody> <tr> <td>SHOP INSPECTION</td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>CLEANINESS (4.2.3.2)</td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>PMI</td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>QC PROGRAM REVIEW (4.1.7)</td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>HYDROSTATIC</td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input checked="" type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>MECH. 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RING STABILITY TEST (4.3.6.4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
PANEL FUNCTIONAL TEST	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
GAS LEAK TEST DISCH PRESS (4.3.4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
	<input type="radio"/> BEFORE	<input checked="" type="radio"/> AFTER	MECHANICAL RUN																																																																																																																																																																		
PERFORMANCE TEST	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>																																																																																																																																																																		
CONTRACT LIQUID RING SYSTEM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
COMPLETE UNIT TEST (4.2.3.3)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>																																																																																																																																																																		
HARDNESS TESTS (4.2.3.3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
GEAR TEST (4.3.6.2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
SOUND LEVEL TEST (4.3.6.3)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>																																																																																																																																																																		
GEAR TEST (4.3.6.2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																																																																																																																																																		
SOUND LEVEL TEST (4.3.6.3)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>																																																																																																																																																																		
<input checked="" type="radio"/> ADVANCE NOTICE REQ'D: 20 DAYS (4.1.4)																																																																																																																																																																					
<input checked="" type="radio"/> INSPECTION CHECKLIST REQ'D (4.1.6)																																																																																																																																																																					
<input type="checkbox"/> TOTAL UTILITY CONSUMPTION																																																																																																																																																																					
COOLING WATER:			GPM																																																																																																																																																																		
STEAM, NORMAL:			LB/HR																																																																																																																																																																		
STEAM, MAX:			LB/HR																																																																																																																																																																		
INSTRUMENT AIR:			GPM																																																																																																																																																																		
KW (DRIVER):			HP																																																																																																																																																																		
KW (AUXILIARIES):			HP																																																																																																																																																																		
HEATERS:			HP																																																																																																																																																																		
PURGE (AIR OR NITROGEN):			GPM																																																																																																																																																																		
<p style="text-align: center;">MISCELLANEOUS</p> <input type="radio"/> ANTI-FUNGAL PROTECTION & CORROSION RESISTANT COATINGS FOR ELECTRICAL MATERIALS (3.2.6.6) <input checked="" type="radio"/> THERMAL RELIEF VALVES <input type="radio"/> RING LIQUID LEVEL CONTROL VALVE <input checked="" type="radio"/> REVIEW OF PURCHASER'S PIPING (3.7.1.15) & FOUNDATION <input checked="" type="radio"/> REVIEW OF PURCHASER'S CONTROL SYSTEM <input checked="" type="radio"/> DYNAMIC ROTOR BALANCING (ISO GRADE: <u>2.5</u>) <input type="radio"/> SPECIAL SKID CLEARANCES OR SAFE ACCESS AREAS (2.1.7): <input type="radio"/> AIR RUN-IN REQUIRED (2.1.14) <input type="radio"/> SPARE ROTOR REQUIRED (4.4.2.8) <input checked="" type="radio"/> UNITS OF MEASURE (DWGS., NAMEPLATES, ETC.): (2.10.3): <p style="text-align: center;">US CUSTOMARY UNIT (USC)</p> <input type="radio"/> 5 YEAR RETENTION OF FINAL ASSEMBLY CLEARANCES (4.2.1.1 e) <input checked="" type="radio"/> COORDINATION MEETING REQUIRED (5.1.3)																																																																																																																																																																					

REMARKS:
