



Toase-eh Park Sanati Gohar Ofogh
Petrochemical Co.
**CONCEPTUAL, BASIC and DETAIL DESIGN
ENGINEERING OF STYRENE PARK OFFSITE**



Document Title: Cause and Effect Diagram

Document No.: EI027-HSE-VD-PR-CE-001-R1

Rev.01

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STYRENE PARK OFFSITE

Document Title:
Cause and Effect Diagram

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REVISION RECORD SHEET

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1	X	X						41							
2	X	X						42							
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REFRIGERATION PACKAGE RU-0001A

EFFECT

CAUSE

NOTES	CUSTOMER P&ID No. EI027-HSE-VD-PR-PID-002 (SHEET No.)	INSTRUMENT	DESCRIPTION	CLASSIFICATION	CONDITION OF ACTIVATION	PLACE OF GENERATION SOURCE	TAG No.	EQUIPMENT TAG No.	DESCRIPTION	ACTION	CUSTOMER P&ID No. EI027-HSE-VD-PR-PID-002 (SHEET No.)	Rev. NOTES
9	7	HSS-RU0001A-01	Emergency stop (local panel RU0001A-LCP-01)	Unit trip	1	LCP	HSSHH-RU0001A-01	RU0001A-M-01	Compressor shutdown trip	Immediate stop of compressor	7	
9	7	ESD-RU0001A-01	ESD emergency shutdown	Unit trip	1	UCP	ESDHH-RU0001A-01	RU0001A-P-01	Oil pump shutdown trip	Immediate stop of oil pump	7	
			ESD emergency shutdown CLIENT	Unit trip	1	UCP	ESDHH-RU0001A-02		Separator oil heater stop	Immediate stop of separator oil heater		5
	2	PIT-RU0001A-01	Compressor Suction pressure low low	Unit trip	1,3	UCP	PISALL--RU0001A-01	RU0001A-M-01	Controlled stop of compressor	Sequential stop of compressor	7	
	2	PIT-RU0001A-01	Compressor Suction pressure high high	Unit trip	1,3	UCP	PISAHH--RU0001A-01	RU0001A-P-01	Controlled stop of pumps	Sequential stop of oil pump	7	
	3	PIT-RU0001A-03	Compressor Discharge pressure high high	Unit trip	1	UCP	PISAHH--RU0001A-03	LCV-RU0001A-01	Stop controlling Control valves	Initializing to stand-by position	6	
	2	PDI-RU0001A-01	Compressor Oil supply header diff. press. low low	Unit trip	1,3,4	UCP	PDISALL-RU0001A-01	SOV-RU0001A-01A/B/C/D	Close compressor capacity control	Initializing to stand-by position	2	7
	2	TIT-RU0001A-02	Oil header temperature High High	Unit trip	1	UCP	TISAHH-RU0001A-02	SOV-RU0001A-02/SOV-RU0001A-03	Closing solenoid valves Refrigeration	Initializing to stand-by position	6	
	4	PDI-RU0001A-03	Oil Filter differential pressure high high	Unit trip	1	UCP	PDISAHH-RU0001A-03	RU0001A-C-01	Return to home position command	Unloading slide valve before stop oil pumps	7	
10	3	TIT-RU0001A-03	Compressor Discharge temperature high high	Unit trip	1	UCP	TISAHH-RU0001A-03	RU0001A-C-01	Hold limiter of compressor capacity control	Forbid load command compressor capacity control	7	
	2	XL-RU0001A-01	Compressor motor operation failure	Unit trip	1,7	MCC	XLHH-RU0001A-01	RU0001A-C-01	Unload limiter of compressor capacity control	Forced unloading compressor capacity control	7	
3.6	2	II-RU0001A-01	Compressor motor high High Amperage	Unit trip	1	MCC	IISAHH-RU0001A-01	XA-RU0001A-01	Alarm indication	Alarm indication on LCP (common) and HMI (individual)	7	
1,3,9	2	XF-RU0001A-01	Compressor motor fault	Unit trip	10	MCC	XFHH-RU0001A-01	XA-RU0001A-02	Trip signal to plant (Package shut down / Trip)	Trip indication on LCP (common) and HMI (individual)	7	
3.6	2	PTC-RU0001A-13	Compressor main motor winding U temp. high high	Unit trip	1	MCC	TISAHH-RU0001A-13	Tag Nr N/A	Status indication	Status indication on HMI (individual)	7	
3.6	2	PTC-RU0001A-14	Compressor main motor winding V temp. high high	Unit trip	1	MCC	TISAHH-RU0001A-14	RU0001A-M-02	Aircooler fan A shutdown tip	Immediate stop of condenser fan A	5	
3.6	2	PTC-RU0001A-15	Compressor main motor winding W temp. high high	Unit trip	1	MCC	TISAHH-RU0001A-15	RU0001A-M-03	Aircooler fan B shutdown tip	Immediate stop of condenser fan B	5	
	6	LIT-RU0001A-01	Chiller Liquid level high high	Unit trip	1	UCP	LISAHH--RU0001A-01					
	6	LIT-RU0001A-01	Chiller Liquid level low low	Unit trip	1,2	UCP	LISALL--RU0001A-01					
	2	PIT-RU0001A-01	Compressor Suction pressure high	Unit Alarm	1,6	UCP	PISAH--RU0001A-01					
	2	PIT-RU0001A-01	Compressor Suction pressure low	Unit Alarm	1,6	UCP	PISAL--RU0001A-01					
	3	PIT-RU0001A-03	Discharge pressure high	Unit Alarm	1	UCP	PISAH--RU0001A-03					
	3	PIT-RU0001A-03	Discharge pressure low	Unit Alarm		UCP	PISAH--RU0001A-03					
	2	PDI-RU0001A-01	Compressor Oil supply header diff. press. low	Unit Alarm	1,4	UCP	PDISAL--RU0001A-01					
	2	PDI-RU0001A-01	Compressor Oil supply header diff. press. High	Unit Alarm	1,4	UCP	PDISAH--RU0001A-01					
	3	PDI-RU0001A-02	Oil separator section differential pressure high	Unit Alarm	1	UCP	PDISAH--RU0001A-02					
	4	PDI-RU0001A-03	Oil Filter differential pressure high	Unit Alarm	1	UCP	PDISAH--RU0001A-03					
	3	TIT-RU0001A-03	Compressor Discharge temperature high	Unit Alarm	1	UCP	TISAH--U0001A-03					
	2	TIT-RU0001A-02	Oil supply temperature high	Unit Alarm	1	UCP	TISAH--RU0001A-02					
	2	TIT-RU0001A-02	Oil supply temperature low	Unit Alarm	1	UCP	TISALRU0001A-02					
	3	LS-RU0001A-01	Oil separator level low	Unit Alarm	1	UCP	LISAL--RU0001A-01					



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REFRIGERATION PACKAGE RU-0001A

EFFECT

CAUSE

NOTES	CUSTOMER P&ID No. EI027-HSE-VD-PR-PID-002 (SHEET No.)	INSTRUMENT	DESCRIPTION	CLASSIFICATION	CONDITION OF ACTIVATION	PLACE OF GENERATION SOURCE	TAG No.	EQUIPMENT TAG No.	DESCRIPTION	ACTION	CUSTOMER PAID No. EI027-HSE-VD-PR-PID-002 (SHEET)	Rev. NOTES
	4	XL-RU0001A-03	Oil pump RU0001A-P-01 motor operation failure	Unit Alarm	1,7	MCC	XLH-RU0001A-03	RU0001A-M-01	Compressor shutdown trip	Immediate stop of compressor	7	
	4	XF-RU0001A-03	Oil pump RU0001A-P-01 motor fault	Unit Alarm	1,7	MCC	XFH-RU0001A-03	RU0001A-P-01	Oil pump RU0001A-P-01 shutdown trip	Immediate stop of oil pump	7	
	3	XL-RU0001A-02	Separator oil heater operation failure	Unit Alarm	1,7	MCC	XLH-RU0001A-02	RU0001A-H-01	Separator oil heater stop	Immediate stop of separator oil heater	7	5
2,3,9	3	XF-RU0001A-02	Separator oil heater fault	Unit Alarm	10	MCC	XFH-RU0001A-02	RU0001A-M-01	Controlled stop compressor	Sequential stop of compressor	7	
	6	LIT-RU0001A-01	Chiller liquid level high	Unit Alarm	1	UCP	LISAH-RU0001A-01	RU0001A-P-01	Controlled stop oil pumps	Sequential stop of oil pump	7	
	6	LIT-RU0001A-01	Chiller liquid level low	Unit Alarm	1	UCP	LISAL-RU0001A-01	LCV-RU0001A-01	Stop controlling Control valves	Initializing to stand-by position	6	
4.9	3	TS-RU0001A-01B	Separator oil heater over temp. limit switch	Interlock	1	UCP & FIELD	TSHH-RU0001A-01B	SOV-RU0001A-01A/B/C/D	Close compressor capacity control SOV	Initializing to stand-by position	2	7
3	2	II-RU0001A-01	Compressor High motor current hold limit	Interlock	1	MCC	II-RU0001A-01	SOV-RU0001A-02/SOV-RU0001A-03	Closing solenoid valves Refrigeration	Initializing to stand-by position	6	
	2	II-RU0001A-01	Compressor High motor current unload limit	Interlock	1	MCC	II-RU0001A-01	RU0001A-C-01	Return to home position command	Unloading slide valve before stop of pumps	7	
	3	PI-RU0001A-03	High discharge pressure hold limit	Interlock	1	UCP	PI-RU0001A-03	RU0001A-C-01	Hold limiter of compressor capacity control	Forbid load command of compressor capacity control	7	
	3	PI-RU0001A-03	High discharge pressure unload limit	Interlock	1	UCP	PI-RU0001A-03	RU0001A-C-01	Unload limiter of compressor capacity control	Forced unloading compressor capacity control	7	
	2	PI-RU0001A-01	Low suction pressure hold limit	Interlock	1	UCP	PI-RU0001A-01	XA-RU0001A-01	Alarm indication	Alarm indication on LCP (common) and HMI (individual)	7	
	2	PI-RU0001A-01	Low suction pressure unload limit	Interlock	1	UCP	PI-RU0001A-01	XA-RU0001A-02	Trip signal to plant (Package shut-down / Trip)	Trip indication on LCP (common) and HMI (individual)	7	
	5	VS-RU0001A-01A	Condenser motor RU0001A-M-02 vibration high high	Interlock	1	UCP	VSHH-RU0001A-01A	Tag Nr N/A	Status indication	Status indication on HMI (individual)	7	
	5	VS-RU0001A-01B	Condenser motor RU0001A-M-03 vibration high high	Interlock	1	UCP	VSHH-RU0001A-01B	RU0001A-M-02	Aircooler fan A shutdown tip	Immediate stop of condenser fan A	5	
	5	XL-RU0001A-04A	Condenser motor RU0001A-M-02 motor operation failure	Unit Alarm	1,7	MCC	XLH-RU0001A-04A	RU0001A-M-03	Aircooler fan B shutdown tip	Immediate stop of condenser fan B	5	
1	5	XF-RU0001A-04A	Condenser motor RU0001A-M-02 motor fault	Unit Alarm	10	MCC	XFH-RU0001A-04A					
	5	XL-RU0001A-04B	Condenser motor RU0001A-M-03 motor operation failure	Unit Alarm	1,7	MCC	XLH-RU0001A-04B					
1	5	XF-RU0001A-04B	Condenser motor RU0001A-M-03 motor fault	Unit Alarm	10	MCC	XFH-RU0001A-04B					

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- NOTES:**
- 1 Include any electrical faults detected by MCC. (e.g. over load, over current, low/high voltage, ground fault, open phase, reverse phase, etc.)
 - 2 Include any electrical faults detected by MCC, and "Separator oil heater over temp. limit switch". status and "Separator oil heater box cut-out switch" status.
 - 3 Activate by "fault signal" from MCC. Safety interlock to be created by MCC.
 - 4 Activate "fault signal" to PLC. Alarm indication to be created commonly by "fault signal".
 - 5 Local reset switch in the heater terminal box.
 - 6 Cable directly connected to MCC from local equipment.
 - 7 Caused by unit stop status and compressor stop status.
 - 8 UCP: Unit control panel (PLC panel) / LCP: Local control panel / Local: Local equipment. MCC: Motor control centre / CCR: Central control room.
 - 9 Source of trip must be cleared by reset , before possible reset on the HMI (UCP).
 - 10 Only one compressor is able to operate at the same time. In case of indicated trip, stand-by compressor can be started
 - 11 Main motor start permissive 3/2 cold/hot start-ups
 - 12 This diagram is prepared for RU-0001A and is typical for RU-0001B with changing suffix of all tag numbers from "A" to "B". e.g. PG-RU0001B-01

- Condition of activation :**
- 1 Activate after delay timer has expired (if delay timer is applicable).
 - 2 Activate when unit status is "in operation". ("In operation" = status from compressor started by start order until stop order has been received).
 - 3 Activate when compressor motor running confirmation is activated.
 - 4 Activate when oil pump motor running confirmation is activated.
 - 5 Activate after 60 second from when unit status is "in operation".
 - 6 Activate after 60 second from when compressor motor running confirmation is activated.
 - 7 Activated by No running confirmation from MCC after start signal delivered, or Remaining running confirmation from MCC after stop signal delivered.
 - 8 Activated by No running confirmation of oil pumps when compressor running.
 - 9 Activated by both oil pump has motor fault and/or operation failure.
 - 10 Activated by fault status signal from MCC.
 - 11 Signal from Control room