

AEMA3322 – Maintenance Engineering Fall 2024

Project Report

Topic: Development of a CMMS for Preventive

Maintenance of Equipment in the

Maintenance Pilot Plant

	First	Name, Last Name	ID
Student #1	Abdul Wadood Fathah		60104538
Student #2	Deefa	Daben	60104329
Student #3	Alaa E	Beshir	60084497
Student #4	Raziuddin Syed		60099962
Group #:		4	
Submission Date:		17/11/2024	
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1. Introduction

The Maintenance Engineering project provided an opportunity to gain experience in understanding and managing the maintenance requirements of industrial equipment in the Pilot Plant located in Room 9.1.43. The project aim was to develop a Computerized Maintenance Management System (CMMS) for selected equipment in the Pilot Plant. As part of the project, our group selected six industrial equipment: Micro Motion Mass Flow Sensor, AMI Heat Exchanger, Fisher Type 2052 Control Valve, Heatrod Elements Heater, Aqua Cooling Chiller, and Lowara Pump.

Our work involved researching maintenance manuals and manufacturer guidelines to understand each equipment's preventative maintenance requirements. This information was utilized to enter data into the COGZ software and used to generate preventive maintenance work orders for a two-week period. We also made a CAD layout of the pilot plant, mapping the arrangement of equipment for visualization. This project deepened our understanding of industrial maintenance practices, developed our teamwork, research, and technical documentation skills in the field of maintenance engineering.

2. Plant information:

Purpose:

The Maintenance Pilot Plant located in Room 9.1.43 is a sophisticated, two-floored facility designed to simulate industrial processes and support the study, education, and practice of maintenance, operation, and troubleshooting of industrial equipment. This facility serves as a learning environment for students and professionals, providing hands-on experience and a deeper understanding of real-world industrial systems and their maintenance requirements.

Description:

The plant has three standard tanks and one large storage tank, which serve as reservoirs for fluids used in simulated processes, such as heat transfer and flow systems. These tanks are used to demonstrate the principles of fluid storage, transfer, and circulation. Multiple pumps facilitate the movement of fluids through the system, simulating the operational challenges encountered in industries like oil and gas, water treatment, and chemical processing. These pumps are also critical for learning the principles of fluid mechanics and pump maintenance.

An overhead crane is installed for safe and efficient handling of heavy equipment and machinery components. The facility features multiple actuators and control valves, which are used for regulating fluid flow and pressure within the system. The sensors installed throughout the plant monitor parameters such as temperature, pressure, and flow rate, ensuring precise control and data acquisition.

The plant includes heat exchanger, heater, and chiller, which are used to study heat transfer, fluid temperature regulation, and cooling processes. These components are crucial for understanding thermal dynamics and maintenance tasks required for such systems. The inclusion of a PID (Process and Instrumentation Diagram) controller provides an advanced setup for teaching control system dynamics, allowing for the tuning and optimization of automated processes.

The plant is equipped with a shutter system for secure access to machinery and operational areas. This contributes to the safe learning environment while simulating industrial workplace conditions. The overall setup helps students to gain hands-on experience with a variety of real-world equipment and processes, preparing them for roles in industrial operations, equipment maintenance, and system troubleshooting.

For further guidance and inquiries, the plant is supervised by Mr. Riad Friakh, an expert in Industrial Instrumentation from the College of Engineering & Technology. He can be contacted via Office: 09.1.44, Phone: 55574415 / 44952305, or Email: riad.friakh@udst.edu.qa.

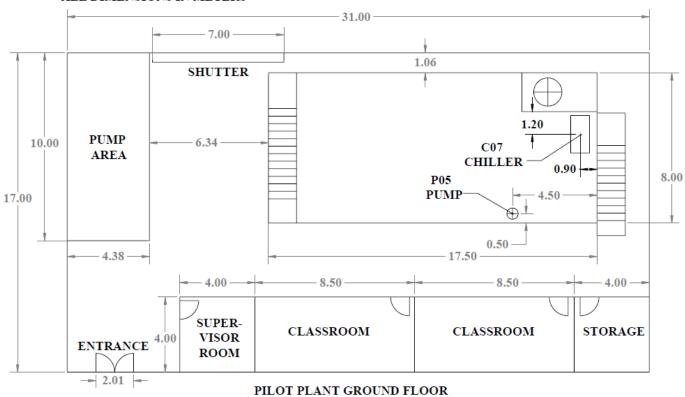


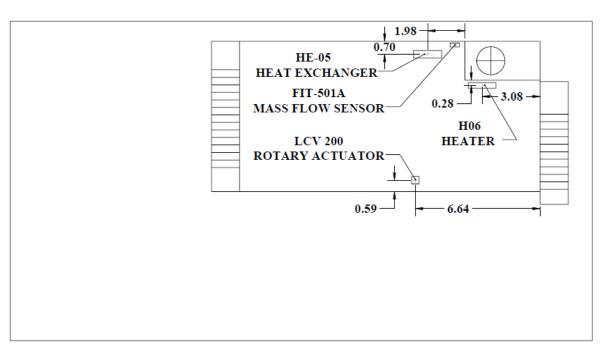
Figure 1 Pilot Plant



Figure 2 Pump Area

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PILOT PLANT TOP FLOOR

Figure 3 CAD Layout of the Pilot Plant

3. Equipment List:

A. 1.FIT – 501A EMERSON MICRO MOTION MASS FLOW SENSOR



Figure 4 FIT –501A Mass Flow Sensor

Table 3-1 FIT-501A Equipment Description

Equipment Number:	FIT – 501A
	This is a mass flow sensor used to measure the mass flow
Description:	rate of fluids. It's commonly applied in industrial
	environments for accurate flow measurement of fluids.
Model:	R100S128NCANEZYZZ
Serial Number:	15038658
Year of Manufacturing:	2018
Manufactured By:	Micro Motion (a part of Emerson), Made in the Netherlands

Table 3-2 FIT-501A Spare Parts List

No.	Part No.	Description
1	FUSE5A	5 AMP FUSE FOR CENTLEC BOOSTER AMP
2	KITHDWRBRDMT	MOUNTING HARDWARE KIT
3	UI9739DISP	UI DISPLAY
4	KITHDWRSCRMOD	TRASNSMITTER MODULE MOUNTING SCREWS

Vendor: GlobalSources Industrial Services

Address: Industrial Area Road Doha, Zone 56, Street 900 State of Qatar, P.O.Box: 10360

Contact: Phone- +974 4468 5501, E-mail- admin@globalsources.qa

Purpose:

Primary Function: Measures mass flow rate accurately for various industrial applications. Secondary Functions: Can also be used for monitoring fluid temperature and pressure conditions within the specified limits.

B. HE-05 AMI EXCHANGER LTD. HEAT EXCHANGER





Figure 5 HE-05 Heat Exchanger

Table 3-3 HE-05 Equipment Description

Equipment Number:	HE-05
	A heat exchanger used for transferring heat between two
Description:	fluids, commonly applied in industrial cooling and heating
	processes.
Model:	50L
Serial Number:	17184
Manufactured By:	AMI Exchanger Ltd.

Table 3-4 HE-05 Spare Parts List

No.	Part No.	Description
1	APVSR6AG	ENDPLATE GASKET PRESSURE PLATE

Vendors: Hotline Trading LLC

Address: P.O. Box: 120866, Al Qusais, Damascus Street, Flat No :302 Dubai, U.A.E.

Contact: Phone- +971 42582117, E-mail- manuel@hltllc.com

Purpose:

Primary Function: Transfers heat between fluids to regulate temperature in systems. Secondary Functions: Enhances system efficiency and maintains optimal operating conditions.

C. LCV 200 FISHER TYPE 2052 SIZE 1 CLASS 30 A



Figure 6 LCV 200 Rotary Actuator

Table 3-5 LCV 200 Equipment Description

Equipment Number:	LCV 200
	A control valve used to regulate fluid flow, commonly used
Description:	in industrial process control systems for precise flow
	adjustments.
Model:	Fisher Type 2052, Size 1, Class 30 A
Serial Number (S/N):	F001838669
Year of Manufacturing:	2018
Manufactured By:	Emerson Process Management

Table 3-6 LCV 200 Spare Parts List

No.	Part No.	Description	
1	GE51941X012	SPARE PARTS KIT	

Vendors: Teyseer Industrial Supplies & Services Co. W.L.L.

Address: Building No: 121 (Gate No 55), Street No: 105, AL Wakalat Street, Industrial Area

Contact: Phone- 4458 5437, E-mail- tissco@tissco-qatar.com

P.O. Box: 40523

Purpose:

Primary Function: Controls fluid flow within the process system, allowing for precise

regulation.

Secondary Functions: Can assist in pressure management and maintaining system stability.

D. H06 HEATER HEATROD ELEMENTS



Figure 7 H06 Heater

Table 3-7 H06 Equipment Description

Equipment Number:	H06
	An industrial heating element used to generate and transfer
Description:	heat within a system, often applied in heating processes
	requiring high thermal output.
KW Rating:	48 kW
Order No.:	46787
Manufactured By:	HeatRod Elements

Table 3-8 H06 Spare Parts List

No.	Part No.	Description
1	HRI1224A	HEAVY DUTY INDUSTRIAL IMMERSION
2	1/4INCH BSP	IMMERSION HEATER O-RING

Vendor: Master Heat Technologies

Address: PO Box: 17115, 1st Floor, Office No. 2, Shahama Complex, Zone 55, Street 180,

Building 45, Aziziya, Doha, QATAR

Contact: Phone- +974 5535 9440, E-mail- info@masterheattechnology.com

Purpose:

Primary Function: Provides heat for industrial processes requiring consistent and controlled thermal energy.

Secondary Functions: Can assist in temperature regulation and maintain optimal conditions for other system components.

E. C07 AQUA COOLING CHILLER



Figure 8 C07 Chiller

Table 3-9 C07 Equipment Description

Equipment Number:	C07
	A cooling chiller used for industrial processes to
Description:	regulate and maintain low temperatures, typically
	applied in environments requiring controlled cooling.
Model:	CFT.045/ETS.HW
Serial No.:	E05BM1138
Year of Manufacturing:	2018
Manufactured By:	Hitema International

Table 3-10 C07 Spare Parts List

No.	Part No.	Description
1	36694952009	PREVENTIVE MAINTENANCE KIT
2	1302987000	INHIBITOR (COOLANT)
3	1100434000	4 CONTAINERS (5-GAL CONTAINER) REFRIGERANT

Vendor: MP Qatar Trading W.L.L.

Barwa Village, Building No: 15, Office No: 21, Al Wakra. P.O. Box: 35306, Doha-Qatar

Contact: Phone- (+974) 4477 0579, E-mail- mpqteam@mpqatar.com.qa

Purpose:

Primary Function: Provides cooling for process systems to maintain stable and regulated temperatures.

Secondary Functions: Enhances energy efficiency and protects equipment by preventing overheating.

F. P05 PUMP LOWARA



Figure 9 P05 Hydraulic Pump

Table 3-11 P05 Equipment Description

Equipment Number:	P05
Description:	A pump used for fluid transfer in industrial applications,
Description.	commonly applied in water circulation and transfer systems.
Power:	2.09 kW
Code:	1016LD191
Seal:	Q1BEGGE
Year of Manufacturing:	2018
Manufactured By:	Lowara

Table 3-12 P05 Spare Parts List

No.	Part No.	Description
1	150760640	IMPELLER
2	KL01AFP	KIT MECHANICAL SEAL
3	KL02ACK	KIT O-RING

Vendor: Al Ali Mechanical Services

East of Industrial Area, Zone 56, Street 100, Building 19, Unit 8, Doha-Qatar Contact: E-mail- <u>info@alalimechanicalservices.com</u>, Phone- +974 44505031

Purpose:

Primary Function: Transfers and circulates fluids within the system.

Secondary Functions: Can be used to maintain pressure in pipelines and systems.

4. Maintenance requirements:

1. FIT – 501A EMERSON MICRO MOTION MASS FLOW SENSOR

Task No.	Description	Frequency	Duration	Downtime
1	Calibration to ensure Measurement accuracy.	Quarterly	1.5 hr.	2 hr.
2	Cleaning Surface and Ensure connections are secure	Monthly	0.5 hr.	0.5 hr.

2. HE-05 AMI EXCHANGER LTD. HEAT EXCHANGER

Task No.	Description	Frequency	Duration	Downtime
1	Inspect: Visuals checks for leaks	Monthly	0.5 hr.	0 hr.
2	Cleaning to prevent fouling	Yearly	6 hr.	8 hr.
3	Inspect Gaskets and Seal, and replace if	Semi-	3 hr.	4hr.
	necessary	annually	J III.	 + 111.

3. LCV 200 FISHER TYPE 2052 ROTARY ACTUATOR

Task No.	Description	Frequency	Duration	Downtime
1	Inspection: Visual Inspection for wear, leaks and alignment.	Weekly	1.5 hr.	2 hr.
2	Replace worn out gasket	Yearly	2.5 hr.	3 hr.
3	Cleaning of valve components to prevent clogging	Monthly	1 hr.	1.5 hr.
4	Replacing Diaphragm	Yearly	2 hr.	2.5 hr.

4. H06 HEATER HEATROD ELEMENTS

Task No.	Description	Frequency	Duration	Downtime
1	Inspection: Check for wear, corrosion, and electrical connections	Daily	0.5 hr.	0 hr.
2	Cleaning to remove dust or contaminants	Quarterly	2 hr.	4 hr.
3	Insulation checks to ensure safety, prevent heat loss and maintain efficiency. Electrical connection inspection to ensure no loose or corroded connections	Semi- annually	1 hr.	2 hr.

5. C07 AQUA COOLING CHILLER

Task No.	Description	Frequency	Duration	Downtime
1	Inspection: Visual inspection for leaks, unusual noises, and general wear.	Monthly	1.5 hr.	2.5 hr.
2	Cleaning of coils, filters, and other components.	Quarterly	4 hr.	6.5 hr.
3	Coolant level check to ensure optimal cooling efficiency.	Daily	0.75 hr.	1 hr.
4	Check for secure and corrosion free connections.	Yearly	0.5 hr.	0.75 hr.
5	Pump Motor Lubrication.	Year	2 hr.	2.5 hr.

6. P05 PUMP LOWARA

Task No.	Description	Frequency	Duration	Downtime
1	Inspection: Visual Check for leaks, unusual noises, and alignment.	Monthly	1.5 hr.	2 hr.
2	Cleaning to prevent clogging or build up	Quarterly	1.5 hr.	2 hr.
3	Seal and Bearing check: To prevent leaks and wear	Semi- annually	1.5 hr.	2 hr.
4	Electrical connections: Check for secure connections	Semi- annually	0.5 hr.	0.5 hr.
5	Check condition of impeller	Yearly	2 hr.	2.5 hr.

5. Reference Links

1. FIT – 501A EMERSON MICRO MOTION MASS FLOW SENSOR

- a) https://www.emerson.com/documents/automation/installation-manual-micro-motion-g-series-coriolis-flow-density-sensors-en-9545242.pdf
- b) <a href="https://www.emerson.com/en-us/catalog/automation-solutions/measurement-instrumentation/flow/micro-motion-coriolis/coriolis-spare-parts?fetchFacets=true#facet:&partsFacet:&modelsFacet:&facetLimit:&searchTerm:&partsSearchTerm:&modelsSearchTerm:&productBeginIndex:0&partsBeginIndex:0&modelsBeginIndex:0&orderBy:&partsOrderBy:&modelsOrderBy:&pageView:grid&minPrice:&maxPrice:&pageSize:&facetRange
- c) https://web-material3.yokogawa.com/IM01U10B00-00EN-R.pdf
- d) https://www.globalsources.qa/index.html

2. HE-05 AMI EXCHANGER LTD. HEAT EXCHANGER

- a) https://dascohex.com/wp-content/uploads/2022/11/13.-Installation-Manual-for-ST-H-Ex2022_English.pdf
- b) https://www.ami-exchangers.co.uk/
- c) https://www.ami-exchangers.co.uk/products/spare-parts/

3. LCV 200 FISHER TYPE 2052 ROTARY ACTUATOR

a) https://www.emerson.com/documents/automation/instruction-manual-fisher-2052-diaphragm-rotary-actuator-en-123354.pdf

4. H06 HEATER HEATROD ELEMENTS

- a) https://www.heatrod.com/industrial/industrial-flow-heaters
- b) https://manuals.plus/heatrod-elements/ss7-incoloy-immersion-heater-manual

5. C07 AQUA COOLING CHILLER

- a) https://neurophysics.ucsd.edu/Manuals/Neslab/CFT-25%20Recirculating%20Chiller.pdf
- b) https://www.hitema.ir/wp-content/uploads/2020/01/ENR-DOC.pdf
- c) https://mp-qatar.com/products/hvac/chillers
- d) https://www.johnsoncontrols.com.au/-/media/jci/be/united-states/replacement-parts-and-supplies/chiller/files/new/2018/baltimore-parts-genuine-parts-catalog.pdf?la=en&hash=53322CBC3B0F0054E66696BB4F4503EB4C6C06E5

6. P05 PUMP LOWARA

- a) https://spark.xylem.com/f_SparePartList.aspx?Params=NLCjo8Bc2eDhX5aeOU6 https://spark.xylem.com/f_SparePartList.aspx?Params=NLCjo8Bc2eDhX5aeOU6 https://spark.xylem.com/f_SparePartList.aspx?Params=NLCjo8Bc2eDhX5aeOU6 https://spark.xylem.com/f_SparePartList.aspx?Params=NLCjo8Bc2eDhX5aeOU6
- b) https://www.xylem.com/siteassets/brand/lowara/resources/manual/001080194en-esv.pdf
- c) https://www.xylem.com/en-qa/products--services/genuine-parts/genuine-lowara-parts/
- d) https://www.alalimechanicalservices.com/water-pumps.html

7. Work Share table

	Contribution
Abdul Wadood Fathah	 Selected equipment from the maintenance pilot plant. Researched maintenance needs for each piece of equipment by finding their manuals and interviewing plant supervisors. Entered Data for the selected equipment into the COGZ maintenance management software. Prepared Project report, summarizing the findings of the maintenance project. Created a detailed CAD drawing of the pilot plant layout.
Deefa Daben	 Selected equipment from the maintenance pilot plant. Researched maintenance needs for each piece of equipment by finding their manuals. Entered Data for the selected equipment into the COGZ maintenance management software. Prepared Project report, summarizing the findings of the maintenance project.
Raziuddin Syed	 Researched maintenance needs for each piece of equipment by finding their manuals. Entered Data for the selected equipment into the COGZ maintenance management software.
Alaa Beshir	 Researched maintenance needs for each piece of equipment by finding their manuals. Entered Data for the selected equipment into the COGZ maintenance management software. Prepared Project report, summarizing the findings of the maintenance project.

8. Appendix:

Work Orders Generated using COGZ See Attached File.

Preventive Maintenance Work Order

W	DRK ORDER NO 50,496					PRIORITY			
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*	2	CLEANING: CL	EANING OF COILS,	FILTERS, AND OTHER COMPONENTS			-		
*	3	COOLANT LEV	/EL CHECK TO ENS	URE OPTIMAL COOLING EFFICIENCY.					
*	4	CHECK FOR S	SECURE AND CORR	OSION-FREE CONNECTIONS.					
*	5	PUMP MOTOR	RLUBRICATION				_		
						Total Time:			
	Time	Date	Initials	ADDITIONAL LABOR	Time	Date		Initials	
	Part Nu	umber	Description	ADDITIONAL PARTS	Location	QTY	/ Use	d	
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	P	ART: GRP4 11	00434 000	4 CONTAINER (5 GAL CONTAINER) RE	FRIGERANT				
	P/	ART: GRP 4 1	3 02987 000	INHIBITOR (COOLANT)					
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Preventive Maintenance Work Order

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Time	Date	Initials	ADDITIONAL LABOR	Time	Date		Initials
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PART:	GRP4 KIT	HDWRSCRMOD	TRASNSMITTER MODULE MOUNTING	SCREWS			
PART:	GRP4 KIT	HDWRBRDMT	MOUNTING HARDWARE KIT				
PART:	GRP4 UI9	739DISP	UI DISPLAY				
PART:	GRP4 FUS	SE5A	5 AMP FUSE FOR CENTLEC BOOSTE	R AMP			
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Preventive Maintenance Work Order

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PART:	GRP4 KIT	HDWRSCRMOD	TRASNSMITTER MODULE MOUNTING	SCREWS			
PART:	GRP4 KIT	HDWRBRDMT	MOUNTING HARDWARE KIT		-		
PART:	GRP4 UI9	739DISP	UI DISPLAY				
PART:	GRP4 FU	SE5A	5 AMP FUSE FOR CENTLEC BOOSTE	R AMP			
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Comments							
Approved By	•		Inspected Ry:				

Preventive Maintenance Work Order

	CORDER NO	,		SCHEDULED** 2/02/20 PRIORITY WO REQUEST #					
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		P4 HEAT EXCHANGI P4 9.1.43 PILOT PLA	EIHE-05 AMI EXCHANGER LTD. HEAT EXCHAN	NGER	ENTERED STARTED				
	I 50L		NT REQUESTED BY. SERIAL 17184		DEPT	•	/ / GRP4 MAINT.		
		II EXCHANGER LTD.			SHIFT		DAY		
		ER: PREVENTIVE			STATUS:		DAT		
	Q# DESCRIPT					DO TIME	INITIALS		
		APPLY ALL SAF	ETY PROCEDURES BEFORE STARTING YOU	IR WORK	THINK SAFET	Y!!!			
*	1 INSPECTION	ON: VISUAL CHECKS	FOR LEAKS, CORROSION, AND DAMAGE.						
*	3 INSPECT O	SASKET AND SEAL,	AND REPLACE IF NECESSARY	EPLACE IF NECESSARY					
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	PART: GRP	4 APVSR6AG	ENDPLATE GASKET PRESSURE PLATE						
Cor	WHEN YOU GUARDS A AREA AND	UR WORK IS COMPL ARE IN PLACE. LOOP RETURN ANY UNU	NE MAKE SURE THAT YOU USE YOUR LOCK LETED TEST RUN YOUR EQUIPMENT. TEST A K FOR POTENTIAL HAZARDS AND CORRECT SED PARTS TO THEIR PROPER LOCATIONS. OR ANY WORK THAT YOU CANNOT COMPLE	ALL SAFET IF NEEDE NOTIFY Y	TIES AND MAKE D. CLEAN YOU	SURE AL R WORK	L		
Αр	orovea By:		Inspected By:						

Preventive Maintenance Work Order

	GRP4B (GRP4 H	GRP4 IRFAN IEAT EXCHANGEIHE	E-05 AMI EXCHANGER LTD. HEAT EXC				 EST # OR	
		.1.43 PILOT PLANT	REQUESTED BY.		STARTED)	/ / GRP4 MAINT.	
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MANUFACTURER.			LINE		SHIFT		DAY	
		PREVENTIVE WO	KK .		STATUS:		INITIALO	
SEQ# DESCRI	PHON				DATE	DO TIME	INITIALS	
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					Total Time:			
Time	Date	Initials	ADDITIONAL LABOR	Time	Date		Initials	
Part Number		Description	ADDITIONAL PARTS	Location	QTY	′ Use	ed	
COMPONENT:	MAIN ⁻	T. KIT	GENERAL MAINTENANCE KIT		COMMENT:			
PART: GI	RP4 AP	VSR6AG	ENDPLATE GASKET PRESSURE PLAT	E				
WHEN` GUARD AREA A	OUR V S ARE ND RE	WORK IS COMPLETI IN PLACE. LOOK FO TURN ANY UNUSED	MAKE SURE THAT YOU USE YOUR LO ED TEST RUN YOUR EQUIPMENT. TES OR POTENTIAL HAZARDS AND CORRE O PARTS TO THEIR PROPER LOCATIO ANY WORK THAT YOU CANNOT COM	ST ALL SAFET CT IF NEEDEI NS. NOTIFY Y	IES AND MAKE D. CLEAN YOU	SURE AL R WORK	L	
Comments								
Approved By:			Inspected By:					

Preventive Maintenance Work Order

		Freventive maintenance wo	ik Oluei			
ORK ORDER NO 50,	494			SCHEDUL PRIORITY		
				WO REQL		
SSIGNED TOGRP4A	GRP4 KHAI FD			SUPERVIS		
QUIPMENTGRP4 H	ENTERED	11/17/202	24 2:45 PN			
OCATIONGRP4 9	.1.43 PILOT PLAN	requested by.		STARTED		/
ODEL48 KW			DEPT		GRP4 MAINT	
ANUFACTURER.HEATR	OD ELEMENTS	LINE		SHIFT		DAY
ORK ORDER HEADER:	PREVENTIVE W	ORK		STATUS:		
SEQ# DESCRIPTION				DATE	DO TIME	INITIALS
	APPLY ALL SAFET	Y PROCEDURES BEFORE STARTING YOU	UR WORK	THINK SAFET	Y!!!	
1 INSPECTION: 0	CHECKS FOR WEA	AR, CORROSION, AND ELECTRICAL CONN	IECTIONS.			
				Total Time: _		
Time Date	Initials	ADDITIONAL LABOR	Time	 Date		Initials
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
Part Number	Description	ADDITIONAL PARTS	Location	QTY	Used	<u>t</u>
COMPONENT: MAIN	Г. KIT	GENERAL MAINTENANCE KIT		COMMENTS		
PART: GRP4 HR	11224A	HEAVY DUTY INDUSTRIAL IMMERSION				
PART: GRP4 2 1	/4INCH BSP	IMMERSION HEATER O-RING				
WHEN YOUR V GUARDS ARE AREA AND RE	VORK IS COMPLE IN PLACE. LOOK F TURN ANY UNUSE	E MAKE SURE THAT YOU USE YOUR LOC TED TEST RUN YOUR EQUIPMENT. TEST FOR POTENTIAL HAZARDS AND CORRECT D PARTS TO THEIR PROPER LOCATIONS R ANY WORK THAT YOU CANNOT COMPL	ALL SAFET I IF NEEDEI 3. NOTIFY Y	IES AND MAKE D. CLEAN YOUF	SURE ALI R WORK	-
Comments						
Approved By:		Inspected By:				

^{*} Previously Uncompleted ** PM Generated Up To Date or Due Date'AGE 1

Preventive Maintenance Work Order

WORK ORDER NO 50,495									LED** Y UEST #			
		GRP4CGRP						SUPERVISOR				
		GRP4 HEAT			TROD ELEMENTS		HEATER	ENTERE				
OCATION 10DEL			3 PILOT PLANT		REQUESTED B SERIAL			STARTEI DEPT	/ / GRP4 MAINT.			
		40 KW R.HEATROD E	FLEMENTS		LINE			SHIFT		DAY		
	_		REVENTIVE WO	DRK	LII 12			STATUS:		D/ (1		
		CRIPTION						DATE		INITIALS		
		APP	LY ALL SAFET	Y PROC	EDURES BEFOR	E STARTING \	YOUR WORK	THINK SAFE	TY!!!			
2	CLEA	NING: CLEAN	IING TO REMO	VE DUS	T OR CONTAMIN	ANTS.			_			
3	INSU	I ATION CHEC	K TO ENSURE	SAFFT	Y, PREVENT HEA	AT LOSS AND I	MAINTAIN					
	EFFI		TRICAL CONN		I INSPECTION TO							
								Total Time:				
Time		Date	Initials		ADDITION	AL LABOR	Time	Date		Initials		
Part Nui	ımber		Description		ADDITION	AL PARTS	Location	QT	Y Use	ed be		
COMP	ONEN	IT: MAINT. KI	Т	GENEF	RAL MAINTENANG	CE KIT		COMMENTS		·		
PA	ART:	GRP4 HRI122	24A	HEAVY	DUTY INDUSTRI	IAL IMMERSIO	N					
PA	ART:	GRP4 2 1/4IN	CH BSP	IMMER	SION HEATER O	-RING						
	WHE GUA ARE	N YOUR WOF RDS ARE IN P A AND RETUR	RK IS COMPLET LACE. LOOK F N ANY UNUSE	TED TES OR POT D PARTS	SURE THAT YOU ST RUN YOUR EC ENTIAL HAZARD S TO THEIR PRO ORK THAT YOU	UIPMENT. TES S AND CORRE PER LOCATIO	ST ALL SAFET ECT IF NEEDE NS. NOTIFY Y	TIES AND MAK D. CLEAN YOU	E SURE AL JR WORK			
Commen	nts											
Approve	ea By:				Inspec	cted Bv:						

Preventive Maintenance Work Order

AS	SIGNE	RDER NO 50 D TOGRP4A	WO REQ	Y UEST # ISOR		
				P05 PUMP LOWARA		D 11/17/2024 2:45 Pi
		N GRP4 9 2.09 kW).1.43 PILOT PLAN ,	IT REQUESTED BY. SERIAL Q1BEGG E	STARTEI DEPT) GRP4 MAIN
		TURER.LOWAF		LINE QTBEGG E	SHIFT	DA
		_	PREVENTIVE W		STATUS:	
	SEQ#	DESCRIPTION		•	DATE	DO TIME INITIALS
			APPLY ALL SAFE	TY PROCEDURES BEFORE STARTING YOUR WO	RK THINK SAFE	TY!!!
*	1	INSPECTION: '	VISUAL CHECK FO	OR LEAKS, UNUSUAL NOISES, AND ALIGNMENT.		
*	2	CLEANING: CL	EANING TO PRE\	/ENT CLOGGING OR BUILDUP.		
*	3	SEAL AND BEA	ARING CHECK: TO	PREVENT LEAKS AND WEAR.		
*	4	ELECTRICAL (CONNECTIONS: C	HECK FOR SECURE CONNECTIONS.		
					Total Time:	
	Time	Date	Initials	ADDITIONAL LABOR Ti	me Date	Initials
	Part Nu	ımher	Description	ADDITIONAL PARTS Location	n QT`	Y Used
			'			
	COMP	PONENT: MIAN	T. KIT	GENERAL MAINTENANCE KIT	COMMENTS	
	PA	ART: GRP4 15	0760640	IMPELLER		
	PA	ART: GRP4 KL	01AFP	KIT MECHANICAL SEAL		
	PA	ART: GRP4 KL	02ACK	KIT O-RING		
		WHEN YOUR V GUARDS ARE AREA AND RE	WORK IS COMPLE IN PLACE. LOOK TURN ANY UNUS	IE MAKE SURE THAT YOU USE YOUR LOCKOUT A ETED TEST RUN YOUR EQUIPMENT. TEST ALL SA FOR POTENTIAL HAZARDS AND CORRECT IF NEI ED PARTS TO THEIR PROPER LOCATIONS. NOTIF IR ANY WORK THAT YOU CANNOT COMPLETE.	FETIES AND MAK EDED. CLEAN YOU	E SURE ALL JR WORK
	Comme	nts				
	Approve	ed By:		Inspected By:		

Preventive Maintenance Work Order

ASSIGNED TO EQUIPMENT OCATION	GRP4 9.1	RP4 JASSIM 'DRAULIC PUMFP(.43 PILOT PLANT	05 PUMP LOWARA REQUESTED BY. SERIAL Q1BEGG E LINE	REQUESTED BY. SERIAL Q1BEGG E			2/02/2026 24 2:45 PM / / GRP4 MAINT. DAY
VORK ORDE	R HEADER:	PREVENTIVE WO	RK		STATUS:		
SEQ# DE	SCRIPTION				DATE	DO TIME	INITIALS
5 CH		PPLY ALL SAFETY	/ PROCEDURES BEFORE STARTING YO	OUR WORK		ΓΥ!!! 	-
					Total Time:		
Time	Date	Initials	ADDITIONAL LABOR	Time	Date		Initials
Part Number	er	Description	ADDITIONAL PARTS	Location	QTY	/ Use	<u>d</u>
COMPONENT: MIANT. KIT PART: GRP4 150760640			GENERAL MAINTENANCE KIT		COMMENTS		
PART	: GRP4 KL0	1AFP	KIT MECHANICAL SEAL				
PART	: GRP4 KL02	2ACK	KIT O-RING				
WH GL AR MA Comments	HEN YOUR W JARDS ARE IN REA AND RETI AKE OUT A W	ORK IS COMPLET I PLACE. LOOK FO JRN ANY UNUSED	MAKE SURE THAT YOU USE YOUR LO ED TEST RUN YOUR EQUIPMENT. TES OR POTENTIAL HAZARDS AND CORREC O PARTS TO THEIR PROPER LOCATION ANY WORK THAT YOU CANNOT COMP	T ALL SAFET CT IF NEEDE IS. NOTIFY Y	TIES AND MAKE D. CLEAN YOU	E SURE AL IR WORK	L
Approved B	sy:		Inspected By:				

^{*} Previously Uncompleted ** PM Generated Up To Date or Due Date'AGE

Preventive Maintenance Work Order

	11040	fillive mailitelialice vv	ork Oraci		
ORK ORDER NO 50,49	92			SCHEDULED PRIORITY WO REQUES	
SIGNED TOGRP4BGF	SUPERVISO TYPENTERED 1				
CATIONGRP4 9.1	STARTED				
DEL TYPE 205	52 SIZE 1 CLASS30A	SERIAL F001838669		DEPT	GRP4 MAI
NUFACTURER.EMERSO		LINE		SHIFT	Г
ORK ORDER HEADER: I	PREVENTIVE WORK			STATUS:	
SEQ# DESCRIPTION				DATE DO	TIME INITIALS
		CEDURES BEFORE STARTING Y WEAR, LEAKS, AND ALIGNMEN			!
		,		Total Time:	
Time Date	Initials	ADDITIONAL LABOR	Time	Date	Initials
Part Number	Description	ADDITIONAL PARTS	Location	QTY	Used
COMPONENT: MAINT. PART: GRP4 GE5	101111010	RAL MAINTENANCE KIT E PARTS KIT		COMMENTS	
WHEN YOUR WO GUARDS ARE IN AREA AND RETU MAKE OUT A WO	ORK IS COMPLETED TES I PLACE. LOOK FOR POT JRN ANY UNUSED PART	SURE THAT YOU USE YOUR LO ST RUN YOUR EQUIPMENT. TES FENTIAL HAZARDS AND CORRE S TO THEIR PROPER LOCATIO ORK THAT YOU CANNOT COM	ST ALL SAFETII CT IF NEEDED NS. NOTIFY YO	ES AND MAKE SU . CLEAN YOUR W	JRE ALL VORK
Comments					
Approved By:		Inspected By:			

^{*} Previously Uncompleted ** PM Generated Up To Date or Due Date'AGE 1

Preventive Maintenance Work Order

W	ORK O	RDER NO 50,	493	SCHEDULED** PRIORITY WO REQUEST #					
		ED TOGRP4C					SUPERVISOR		
				EMERSON PROCESS MANAGEM	MENT FISHER				
			.1.43 PILOT PLANT	REQUESTED BY.		STARTE)	/ /	
			052 SIZE 1 CLASS30A	SERIAL F001838669		DEPT		GRP4 MAINT.	
			ON PROCESS MNGMNT.	LINE		SHIFT		DAY	
			PREVENTIVE WORK			STATUS:			
	SEQ#	DESCRIPTION				DATE		INITIALS	
			APPLY ALL SAFETY PRO	CEDURES BEFORE STARTING Y	OUR WORK	THINK SAFE ⁻	TY!!!		
*	2	REPLACE WOF	RN OUT GASKET						
*	3	CLEANING OF	VALVE COMPONENTS TO	O PREVENT CLOGGING.					
*	4	REPLACING DI	APHRAGM				-		
						Total Time:			
	Time	Date	Initials	ADDITIONAL LABOR	Time	Date		Initials	
	Part N	lumber	Description	ADDITIONAL PARTS	Location	QTY	⁄ Use	d	
		IPONENT: MAINT		RAL MAINTENANCE KIT		COMMENT:			
	Г	ART. GRF4 GE	31941A012 SPAR	E PARTS KIT					
	0	WHEN YOUR V GUARDS ARE AREA AND RE MAKE OUT A V	VORK IS COMPLETED TE IN PLACE. LOOK FOR PO TURN ANY UNUSED PAR	E SURE THAT YOU USE YOUR LO EST RUN YOUR EQUIPMENT. TES ITENTIAL HAZARDS AND CORRE TS TO THEIR PROPER LOCATION WORK THAT YOU CANNOT COM	ST ALL SAFET CT IF NEEDE NS. NOTIFY Y	TIES AND MAKE D. CLEAN YOU	E SURE AL R WORK	L	
	Comme	enis							
	Approv	ved By:		Inspected By:					