



CONTRACT NO. : CS/2023

**SUPPLY, INSTALLATION & COMMISSIONING OF WIRELESS TRANSMITTERS
WITH ASSOCIATED ACTIVITIES AT SHUAIBA REFINERY**

SCOPE OF WORK & TECHNICAL SPECIFICATION

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1.0 Introduction

This Section covers the details of the scope of work to be executed by the Contractor under this Contract in compliance with the other terms & condition of the Contract.

The Company is planning to install wireless Transmitters in the East & West flare areas along with Repeaters and Gateways and establishing communication with Honeywell DCS at **Shuaiba Refinery** as per the scope of work and materials provide vide Appendix-1.

There are 2 flare units in the East side and 1 flare unit in the West side of Shuaiba Refinery. Each flare unit is provided with a dedicated Auto / Manual Flame Front Generator Ignition system for the pilots. The flame Front generator is used for ignition of the pilot and also for providing pilot on/off indication.

Each flare tip has 6 pilots and each pilot is provided with dual thermocouple for monitoring pilot tip temperature.

Refinery gas is used for ignition of the pilots, Strainers are provided in the gas line. The differential pressure transmitters installed across the strainers monitors the condition of the strainers.

The Wireless transmitters (to be supplied by the Contractor) will be utilized for providing in Honeywell DCS, the following information about each flare tip:

Pilot Temperature (6 No.)
Pilot on /Off Status (3 No.)
Pilot Ignition Failure (1 No.)
Pilot gas differential pressure (1 No.)
Pilot gas pressure (1 No.)

The Wireless Transmitter solution being offered by the Contractor will be Universal type, supporting many field Protocols, Efficient and Reliable even in the presence of Interference, Flexible and have capabilities to communicate with Wi-



Fi devices and other Industrial devices. Each wireless transmitter shall have diagnostic capabilities and report to DCS.

2.0 Scope of Work

The Contractor's scope shall be, but not limited to, as follows:

- 2.1 Contractor shall site survey the East and West Flare area installations to verify the location for the Wireless transmitters, Repeater and Gateways. The quantities of these materials to be supplied by the Contractor, have been provided vide Appendix-1/Section-IV, Part-III of the Contract.
- 2.2 The specification of the Wireless Transmitters, Gateways, Repeaters and Serial interface module and accessories have been provided vide Appendix-2/Section-IV. The wireless field devices must be microprocessor based with the capability to perform basic sensor diagnostics. The field device should include an LCD that displays at least the Process variable, PV, Device Tag, Battery voltage, Network identifier and status. The Electronics should support at up to 80 Deg C and Humidity level of 100 % without condensation. The Transmitters offered must be certified for use in Hazardous location, Intrinsically safe, for Class I , **Division 2 , Groups IIC** and Ambient Temperature limits -40 to 80 Deg C. **The Transmitter transmit rate shall be user selectable and configurable between 1 sec to 60 sec or more. Every field device can have an interval time different from the other device. Vendor to specify the availability of this feature in the technical specification.**
- 2.3 Vendor to offer the Instrument meeting the functional requirements detailed under specification of the materials and shall provide necessary Technical Catalogues/Specification sheets for the quoted items along with his Bid.
- 2.4 **The Wireless network between the field devices must have a mesh topology with a secure and robust redundant pathway for the information. It must have self healing capability and automatically re-establish communication.**
- 2.5 The wireless network solution offered by the Contractor shall have the capability to design a network with different type of wireless coverage at different areas in the plant. The network should have the capability to cover wireless field transmitters and other Wi-Fi devices simultaneously. **The system shall have the security to communicate only with the device configured and avoid interference from other Wi-Fi devices around which are not configured.**
- 2.6 The Gateway offered shall have capability to access/administer at least 50 devices connected in the field to the network. It must be possible to install more than 1 network in the field. The gateway should have at least 2 communication ports one communication port is dedicated for



communication with host computer and the other for connection to DCS system

- 2.7 The Host Computer offered by the Contractor will be Laptop PC based station and will be used to manage and configure the wireless transmitters and Gateways. The Licensed Software will be loaded in the Host Computer. The Software will assist in Network management and diagnostics of the devices connected in the network. Contractor will provide the specification of the Host computer along with details of Licensed software being offered.
- 2.8 The communication of the field devices must be highly secure using encrypted blocks with individual passwords for each device in order to access and join the network and a network identifier for the cases where more than one network is available in the field. The assignment can be performed from a remote located computer.
- 2.9 The Contractor shall include in its bid, all the associated costs, pertaining to the supply, installation & commissioning of the offered materials. All the accessories required for the installation and commissioning shall be included in the scope.
- 2.10 The field devices must be powered by an electrochemical battery, Intrinsically safe type and must be field replaceable. No special tools nor special procedures will be required to replace the battery. The battery life must be specified in the documentation and should not be less than 5 years.
- 2.11 The information from the wireless field device is to be integrated to Honeywell TPS DCS . The integration will be through a gateway installed in the field. The communication port required is serial port. The serial port should be RS-232/RS-485 connection to a **serial Interface module installed in Honeywell HPM cabinet in SIH 7 or 8 in East Flare area and in SIH 1 for West Flare Area.,** Supply, Installation of Module along with accessories and configuration in DCS is in the scope of Contractor.

3.0 Guarantee

Contractor shall guarantee the performance of the Wireless Transmitters and its accessories for a period of 12 months from the date of Commissioning. Should any fault occurs due to defective design, material, or workmanship during the first **Twelve (12) Calendar Months** from date of commissioning, Contractor shall make free of charge, all necessary or desirable alterations, repair and replacement of defective parts, to the satisfaction & acceptance of the Company .



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APPENDIX -1 (Bill of Materials to be Supplied by the Contractor)

S. N	DESCRIPTION	QTY
1	Supply of Wireless Temperature Transmitter as per specification	9
2	Supply of Wireless 4-20mA DC Analog Input Transmitter as per specification	9
3	Supply of Wireless Discreet Input Transmitter as per specification	9
4	Supply of Wireless Differential Pressure Transmitter as per Specification	3
5	Supply of Wireless Gauge Pressure Transmitter as per specification	3
6	Supply of Wireless Repeater unit with accessories as per specification	8
7	Supply of Wireless Gateway unit with accessories as per specification	2
HONEYWELL DCS INTERFACE		
8	Serial Interface IOP MODEL MU-PSIM11	2
9	Serial Interface FTA MODEL MC-TSIM12	2
10	FTA Cable 10 mts MODEL MU-KFTA10	2
11	FTA,LLAI MUX/SDI/SI Power Adapter CC MODEL MC-TLPA02	2
12	Power cable 10 mts MODEL MU-KSPR 10	2
HOST COMPUTER		
13	Laptop PC	1
14	License Software	1
15	Intrinsically safe battery pack along with batteries for Transmitters	6 sets
	Battery charger for charging the Battery	3 sets
16	Misc Hardware material like Power cable for Host Computer, Ethernet & SERIAL interface cables, converters etc...	1 lot
19	Installation of Wireless transmitters to stanchion support, Repeaters, Gateways Serial Interface Module in HPM DCS, wiring to gateway and serial interface card ,Configuration in DCS and Host Computer and Commissioning	1 lot
20	Preparation of Engg. drawings in Auto CAD Version 12 format providing the following in 3 sets of Soft Copy in CD & 3 Set Hard Copy and 1set in Transparency Media (H.P. MATTE FILM (PRODUCT CODE 51642 B) : Instrument layout in the Field Network Architecture Wiring drawings	



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APPENDIX -2 (Specifications of Materials to be Supplied by the Contractor)

TECHNICAL SPECIFICATION FOR ANALOG INPUT TRANSMITTER			
TYPE	ANALOG INPUT TRANSMITTER		
NO OF INPUT	ONE		
INPUT TYPE	4 – 20 mA/1-5 V		
AMBIENT TEMPERATURE	- 40 DEG C TO 85 DEG C		
ACCESSORIES	MOUNTING BRACKET (304 SS) WITH PLATE AND NUTS FOR 2 INCH PIPE MOUNTING		
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F OPENING FOR CONDUIT CONNECTION		
AREA CLASSIFICATION	CLASS 1 DIV2 GROUP IIC		
APPROVAL BODY	FM/CSA/ATEX		
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF		
INGRESS PROTECTION TYPE	NEMA 4X		
TRANSMITTER OUTPUT/	WIRELESS		
TRANSMITTER POWER	BATTEY POWER (LITHIUM BATTERIES) TRANSMITTER TO BE SUPPLIED WITH BATTERY REMOVED DURING SHIPPING		
BATTERY VOLTAGE	DRAIN TIME	VENDORTO SPECIFY	VENDORTO SPECIFY
BATTERY LIFE	MINIMUM 5 YRS		
ANTENNA TYPE	INTEGRAL OMNI DIRECTIONAL		
SIGNAL RANGE	NOMINAL 300 M		
WIRELESS OPTION	2.4 GHz DIRECT SEQUENCE SPREAD SPECTRUM		
WIRELESS PROTOCOL	WIRELESS HART/ ISA 100.11a		
LOCAL DISPLAY	LCD DISPLAY		
ROUTING/ NON ROUTING	CONFIGURABLE		
TRANSMITTER CONFIGURATION	CONFIGURATION LOCAL AS WELL AS VIA THE NETWORK		
ACCURACY	± 0.075 % OF CALIBRATED SPAN OR BETTER		

TECHNICAL SPECIFICATION FOR DISCREET INPUT TRANSMITTER			
TYPE	DISCREET INPUT TRANSMITTER		
NO OF INPUT	MIN 2 NO MAX 6 NO		
INPUT TYPE	ON/ OFF CONTACT RESISTIVE		
AMBIENT TEMPERATURE	- 40 DEG C TO 85 DEG C		
ACCESSORIES	MOUNTING BRACKET (304 SS) WITH PLATE AND NUTS FOR 2 INCH PIPE MOUNTING		
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F OPENING FOR CONDUIT CONNECTION		
AREA CLASSIFICATION	CLASS 1 DIV2 GROUP IIC		
APPROVAL BODY	FM/CSA/ATEX		
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF		
INGRESS PROTECTION TYPE	NEMA 4X		
TRANSMITTER OUTPUT	WIRELESS		
TRANSMITTER POWER	BATTEY POWER (LITHIUM BATTERIES) TRANSMITTER TO BE SUPPLIED WITH BATTERY REMOVED DURING SHIPPING		
BATTERY VOLTAGE	DRAIN TIME	VENDORTO SPECIFY	VENDORTO SPECIFY
BATTERY LIFE	MINIMUM 5 YRS		
ANTENNA TYPE	INTEGRAL OMNI DIRECTIONAL		
SIGNAL RANGE	NOMINAL 300 M		
WIRELESS OPTION	2.4 GHz DIRECT SEQUENCE SPREAD SPECTRUM		
WIRELESS PROTOCOL	WIRELESS HART/ ISA 100.11a		
LOCAL DISPLAY	LCD DISPLAY		
ROUTING/ NON ROUTING	CONFIGURABLE		
TRANSMITTER CONFIGURATION	CONFIGURATION LOCAL AS WELL AS VIA THE NETWORK		



ACCURACY	± 0.075 % OF CALIBRATED SPAN OR BETTER
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TECHNICAL SPECIFICATION FOR PRESSURE TRANSMITTER			
TYPE	GAUGE PRESSURE TRANSMITTER		
RANGE	0-50 PSI		
BODY RATING	4500 PSI		
BODY MATERIAL	316 STAINLESS STEEL		
WETTED PARTS MATERIAL	316 STAINLESS STEEL		
FILL FLUID	SILICONE		
AMBIENT TEMPERATURE	- 40 DEG C TO 85 DEG C		
PROCESS CONNECTION	½ IN NPT WITH ADAPTER		
MANIFOLD	2 WAY SS 316 , 3000 LBS RATING , ½ IN NPT (F) CONNECTION BOTH ENDS PROCESS AND TRANSMITTER END		
ACCESSORIES	MOUNTING BRACKET (304 SS) WITH PLATE AND NUTS FOR 2 INCH PIPE MOUNTING		
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F) OPENING FOR CONDUIT CONNECTION		
AREA CLASSIFICATION	CLASS 1 DIV2 GROUP IIC		
APPROVAL BODY	FM/CSA/ATEX		
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF		
INGRESS PROTECTION TYPE	IP 66/ NEMA 4X		
TRANSMITTER OUTPUT	WIRELESS		
TRANSMITTER POWER	BATTEY POWER (LITHIUM BATTERIES) TRANSMITTER TO BE SUPPLIED WITH BATTERY REMOVED DURING SHIPPING		
BATTERY VOLTAGE	DRAIN TIME	VENDORTO SPECIFY	VENDORTO SPECIFY
BATTERY LIFE	MINIMUM 5 YRS		
ANTENNA TYPE	INTEGRAL OMNI DIRECTIONAL		
SIGNAL RANGE	NOMINAL 300 M		
WIRELESS OPTION	2.4 GHz DIRECT SEQUENCE SPREAD SPECTRUM		
WIRELESS PROTOCOL	WIRELESS HART/ ISA 100.11a		
LOCAL DISPLAY	LCD DISPLAY		
ROUTING/ NON ROUTING	CONFIGURABLE		
TRANSMITTER CONFIGURATION	CONFIGURATION LOCAL AS WELL AS VIA THE NETWORK		
ACCURACY	± 0.075 % OF CALIBRATED SPAN OR BETTER		

TECHNICAL SPECIFICATION FOR TEMPERATURE TRANSMITTER			
TYPE	TEMPERATURE TRANSMITTER		
RANGE	0 TO 2400 DEG F		
INPUT TYPE	T/C (TYPE J,K,E,B,N,R,S,T) 3 WIRE PT 100 RTDI		
ACCURACY	± 0.10 % OF RANGE IN Mv OR BETTER		
COLD JUNCTION ACCURACY	± 0.5 DEG C		
AMBIENT TEMPERATURE	- 40 DEG C TO 85 DEG C		
ACCESSORIES	MOUNTING BRACKET (304 SS) WITH PLATE AND NUTS FOR 2 INCH PIPE MOUNTING		
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F) OPENING FOR CONDUIT CONNECTION		
AREA CLASSIFICATION	CLASS 1 DIV 2 GROUP IIC		
APPROVAL BODY	FM/CSA/ATEX		
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF		
INGRESS PROTECTION TYPE	NEMA 4X		
TRANSMITTER OUTPUT	WIRELESS		
TRANSMITTER POWER	BATTEY POWER (LITHIUM BATTERIES) TRANSMITTER TO BE SUPPLIED WITH BATTERY REMOVED DURING SHIPPING		
BATTERY VOLTAGE	DRAIN TIME	VENDORTO SPECIFY	VENDORTO SPECIFY
BATTERY LIFE	MINIMUM 5 YRS		
ANTENNA TYPE	INTEGRAL OMNI DIRECTIONAL		
SIGNAL RANGE	NOMINAL 300 M		
WIRELESS OPTION	2.4 GHz DIRECT SEQUENCE SPREAD SPECTRUM		
WIRELESS PROTOCOL	WIRELESS HART/ ISA 100.11a		
LOCAL DISPLAY	LCD DISPLAY		
ROUTING/ NON ROUTING	CONFIGURABLE		
TRANSMITTER CONFIGURATION	CONFIGURATION LOCAL AS WELL AS VIA THE NETWORK		
ACCURACY	± 0.075 % OF CALIBRATED SPAN OR BETTER		



TECHNICAL SPECIFICATION FOR DIFFERENTIAL PRESSURE TRANSMITTER			
TYPE	DIFFERENTIAL PRESSURE TRANSMITTER		
RANGE	0-50 PSI		
BODY RATING	4500 PSI		
BODY MATERIAL	316 STAINLESS STEEL		
WETTED PARTS MATERIAL	316 STAINLESS STEEL		
FILL FLUID	SILICONE		
AMBIENT TEMPERATURE	- 40 DEG C TO 85 DEG C		
PROCESS CONNECTION	½ IN NPT WITH ADAPTER		
MANIFOLD	3 WAY SS 316 , 6000 LBS RATING, FLANGED TYPE ON BOTH ENDS (PROCESS AND TRANSMITTER END)		
ACCESSORIES	OVAL FLANGE 2 NO WITH BOLTS AND GASKETS AND MOUNTIC BRACKET (304 SS) WITH PLATE AND NUTS FOR 2 INCH PIPE MOUNTING		
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F) OPENING FOR CONDUIT CONNECTION		
AREA CLASSIFICATION	CLASS 1 DIV2 GROUP IIC		
APPROVAL BODY	FM/CSA/ATEX		
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF		
INGRESS PROTECTION TYPE	NEMA 4X OR BETTER		
TRANSMITTER OUTPUT	WIRELESS		
TRANSMITTER POWER	BATTEY POWER (LITHIUM BATTERIES) TRANSMITTER TO BE SUPPLIED WITH BATTERY REMOVED DURING SHIPPING		
BATTERY VOLTAGE	DRAIN TIME	VENDORTO SPECIFY	VENDORTO SPECIFY
BATTERY LIFE	MINIMUM 5 YRS		
ANTENNA TYPE	INTEGRAL OMNI DIRECTIONAL		
SIGNAL RANGE	NOMINAL 300 M		
WIRELESS OPTION	2.4 GHz DIRECT SEQUENCE SPREAD SPECTRUM		
WIRELESS PROTOCOL	WIRELESS HART/ ISA 100.11a		
LOCAL DISPLAY	LCD DISPLAY		
ROUTING/ NON ROUTING	CONFIGURABLE		
TRANSMITTER CONFIGURATION	CONFIGURATION LOCAL AS WELL AS VIA THE NETWORK		
ACCURACY	± 0.075 % OF CALIBRATED SPAN OR BETTER		

TECHNICAL SPECIFICATION FOR WIRELESS GATEWAY	
TYPE	WIRELESS GATEWAY
STANDARD	802.11a 802.11b/g MODBUS TCP OPC HART READY FOR ISA100.11a
EXTERNAL PORTS AND CONNECTIONS	2-10/100Mbps Ethernet port 1-IEEE 802.11a/b/g(2.4 GHZ/5.8 GHz)access point external antenna port 1-2.4GHz industrial device transmitter external antenna port 1-Ground cable 1-Shielded power cable
POWER	24 V DC
AMBIENT TEMPERATURE	-40 DEG C TO 60 DEG C
AREA CLASSIFICATION	CLASS 1 DIV2 GROUP IIC
APPROVAL BODY	FM/CSA/ATEX
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF
INGRESS PROTECTION TYPE	NEMA 4X
FREQUENCY BAND	2.412-2.462 GHz
TRANSMIT POWER	VENDOR TO SPECIFY
SECURITY	INFRA RED BASED SECURITY KEY 128-BIT AES ENCRYPTION
COMPLIANCE	VENDOR TO SPECIFY
COMMUNICATION PATH LENGTH	APPROX 3000 FEET
NO OF DEVICES PER GATEWAY	50



WARRANTY	18 MONTHS FROM DATE OF SUPPLY OR 12 MONTHS FROM DATE OF COMMISSIONING
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TECHNICAL SPECIFICATION FOR WIRELESS REPEATER	
TYPE	WIRELESS REPEATERS
FIELD PROTOCOL	ISA100.11A/ WIRELESS HART
POWER	24 V DC
AMBIENT TEMPERATURE	-40 DEG C TO 60 DEG C
EXTERNAL PORTS AND CONNECTION	2 X EXTERNAL ANTENNA PORTS FOR 2.4 GHz ISA 100.11a/ WIRELESS HART FIELD INSTRUMENTS
TRANSMITTER HOUSING	EPOXY POLYESTER, LOW COPPER ALUMINIUM WITH ½ IN NPT (F OPENING FOR CONDUIT CONNECTION
AREA CLASSIFICATION	CLASS 1 DIV 1 GROUP A ,B,C,D
APPROVAL BODY	FM/CSA/ATEX
APPROVAL TYPE	INTRINSICALLY SAFE , NON INCENDIVE / EXPLOSION PROOF
INGRESS PROTECTION TYPE	NEMA 4X
NO OF FIELD DEVICES CONNECTION	MINIMUM 20 NO DEVICES AT 1 SEC REPORTING RATE OR BETTER
MODULATION TECHNIQUE	DSSS/OQPSK
FREQUENCY BAND AND OPERATING CHANNELS	2.4 -2.483 GHz VENDOR TO SPECIFY IN CASE OF ANY OTHER BAND
DATA RATE	VENDOR TO SPECIFY
SECURITY	128-BIT AES ENCRYPTION
COMPLIANCE	CEMARK/RADIO APPROVALS/EUROPEAN UNION-ETSI

Notes

1. The specifications provided hereof are only for Contractor’s reference /guidance.
2. The specifications not provided hereof for the materials listed vide Appendix-1, shall be considered, to meet their functional requirements specified in the Scope of Work (Section-III, part-III) and details shall be submitted along with the Bidder’s Offer.
3. During the execution phase of the Contract, the materials required to be supplied by Contractor, shall be subjected to prior approval by the Company.
