OIL & NATURAL GAS CORPORATION LIMITED

B-22 FIELD DEVELOPMENT PROJECT

DATA SHEETS FOR DCS/PLC

Rev. No	Date	Purpose	Prepared by	Reviewed by	Approved by
0	30.04.07	ISSUED FOR BIDS	JD	SD	KSJ

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1. NOTES:

a) Information filled-in by Consultant/Owner specifies the minimum system requirements.

b) Vendor shall provide unambiguous information against all items marked as `*' in the following data sheets.

c) Vendor shall complete the information against all items marked as `**' in the following data sheets.

d) Note that information provided against all items marked as '**' and `*' must be such that the system performance is not degraded.

e) Vendor shall categorically confirm all items marked as '#' in the following data sheets. In case no specific confirmation is indicated, it shall be considered as vendor's unconditional compliance.

2. DISTRIBUTED DIGITAL CONTROL SYSTEM

* MODEL NO. _____

1.# a) Type of system distribution Geographical [ ] Functional [X]

b) Location Control Room [X]

2.* System Size

a) Considering all inputs as closed loops_____

b) Considering all inputs as open loops _____

3.** System availability for the specified configuration 99.99% [X] Offered _____

4.* Max communication bus length

Standard: _____m With bus Expander: _____m

5.* Maximum number of sub systems on the communication sub system

	No. of Nodes	No. of Consoles	Computer Interface	Other Sub-Systems
STANDARD				
WITH BUS EXPANSION				

6.** Type of sub system(s) :

a) Controller & data acquisition sub system [X] Model No._____

b) Controller sub system [ ] Model No._____

c) Data acquisition sub system [ ] Model No._____

d) Communication sub system [X] Model No._____

e) Operator interface sub system [X] Model No._____

f) Engineer interface sub system [X] Model No._____

g) Programmable logic controller [X] Model No._____

h) Supervisory computer [ ] Model No._____

i) Foreign device interface [X] Model No._____

j) Personal computer [X] Model No._____

k) Hardwired instruments [X] Model No._____

l) Unit History Node (UHN) [ ] Model No._____

	m) Field multiplexer	[ ] Model No._____
	n) OPC Server	[X] Model No._____
7.*	Foreign Device interfaces required for:	
	ESD Programmable logic controller	[X]
	PLC based F&G system	[X]
	Compressors Control System (Note-A)	[X]
	MOL Pumps Control System (Note-A)	[X]
	MIP Pumps Control System (Note-A)	[X]
	GTG Control System (Note-A)	[X]
	Fine Filter Control System (Note-A)	[X]
	Chlorinator Package Control System (Note-A)	[X]
	Vibration & Temperature Monitoring system(Note-A)	[X]
	ASC for Compressor Control System (Note-A)	[X]
	Others ----------	

Note-A : Contractor shall indicate the list of foreign device interfaces as per the final configuration of the equipment selected.

8.#	On line self-diagnostic message	Required	[X]	Module level	[X]
	Local Level		[ ]	Engg.Console	[X]

9.#	Redundant floating power supply required for	
	a) Controller & data acquisition sub system	[X]
	b) Controller sub system	[ ]
	c) Data acquisition sub system	[ ]
	d) Communication sub system	[X]
	e) Operator interface sub system (individual power supply)	[X]
	f) Engineers interface sub system (individual power supply)	[X]
	g) Programmable logic controller (PLC) (individual)	[X]
	h) Foreign device interface	[X]
	i) Hardwired inst. including Barriers (individual if 110VAC)	[X]
	j) Field multiplexer (FMX)	[ ]

k) Racks requiring 24 V DC power supply [X]

l) Miscellaneous Instruments [X]

10.** Power supply availability

a) AC Voltage for system

Details	Supplied	Permissible
Voltage	110 V ± 10 % UPS	
Frequency	50 Hz. ± 3%	
Max. Static Transfer Time	5 msec	

b) DC Voltage for PLC output devices – 24V+/- 5% [X]

c) AC Voltage for lighting - 240V, 50HZ [X]

11.**# UPS System Requirement

a)* UPS System sizing factor _____

b)**# Type of UPS for DCS system Isolated [X]

Grounded [ ] Ungrounded [X]

c)**# Type of UPS for equipments Ungrounded [X]

Other than the system Isolated [X]

(use isolation transformer)

12.*# Earthing Requirements

a) Type of Earthing system

Type of Earthing System	Reqd.	Resistance upto Earth Pit	Remarks
Safety Barrier Earth	YES		
System Earth	YES		
Electrical Earth	YES		

b) No. of Earth pits Common [ ] Separate [X]

Others _____

c) Connectivity between electrical & instrument earthing system Required [X] By vendor [X]

13.*	Installation details					
	a) Type of foundation required	Firm	[ ]	On false floor	[X]	
	b) Max. loading for foundation design _____ Kg/m²					
14.#	Operating Environment	Control Room	[X]	Safe area	[X]	
		Controlled atmosphere			[X]	

3. COMMUNICATION SUB-SYSTEM

* Model No._____

1.*	Communication Topology	Bus Structure	[ ]			
		Closed ring	[ ]	Any other_____		
		STAR	[ ]			
2.#	Redundancy in Communication	Required	[X]			
3.#	Type of Bus redundancy	Active	[X]	Others_____		
4.#	Switch-over of communication Buses	Auto only	[ ]	Auto & manual	[X]	
5.*	Type of communication bus	Co-axial	[ ]	Fibre optics	[ ]	
				Others_____		
6.*	Type of communication	Floating Master	[ ]			
		Fixed Master	[ ]			
		Periodic reporting	[ ]			
		Exception reporting	[ ]			
		Deterministic	[ ]			
		Non-Deterministic	[ ]			
				Others_____		
7.*	Type of protocol	_____				
8.*	Communication speed	_____				
9.*	Message error checking method	CRC	[ ]	DEM	[ ]	
				Others_____		
10.**#	a) Bus Controller	Required	[ ]	Not required	[ ]	
	b) Redundant bus controller	Required (if `a' is required)	[X]			

11.#	a) Redundant Communication interface required for the following subsystems:			
	Controller & Data-acquisition Subsystem			[X]
	Controller Subsystem			[ ]
	Data-acquisition Subsystem			[ ]
	Communication Subsystem			[X]
	Operator Interface Subsystem			[X]
	Engineer Interface Subsystem			[X]
	Programmable Logic Controller (ESD and F&G PLC)			[X]
	OPC Server			[X]
	b) #Single communication interface required for the following subsystems:			
	Personal Computer			[ ]
	Compressors Control System (Note-A)			[X]
	GTG Control System (Note-A)			[X]
	MOL Pumps Control System (Note-A)			[X]
	MIP Pumps Control System (Note-A)			[X]
	Fine Filter Control System (Note-A)			[X]
	Chlorinator Package Control System (Note-A)			[X]
	Vibration & Temperature Monitoring System (Note-A)			[X]
	ASC for Compressor Control System (Note-A)			[X]
	Other	_____		[ ]
	Note-A : Contractor shall indicate the list of foreign device interfaces as per the final configuration of the equipment selected.			
12.#	Switch-over to redundant communication interface	Auto only	[ ] Auto & Manual	[X]
13.#	Power supply for communication interface		Redundant floating	[X]
14.	Communication Loading	60%	[X] (Note-1, 2)	
15.*	Communication Bus Model No.	_____		
16..#	Type of Communication cable			
	Within control room	Copper cable	[X] Fibre Optic cable	[ ]
	Outside Control room	Fibre Optic cable	[X]	

17#	Communication Cable mechanical protection					
	Within control room	Closed GI tray	[ ]	GI Conduit	[X]	
	Outside Control room	GI Conduit	[X]	Closed HDPE pipe	[ ]	

Note-1: The communication network loading shall not exceed 60% for networks following deterministic protocols. Networks following non-deterministic protocols i.e. IEEE 802.3 shall be based on maximum allowable loads recommended by manufacturer. (Typically the loading shall be of the order of 15% at maximum throughput).

Note-2: The loading of all communication interface units or communication processors shall not exceed 60%.

4. CONTROLLER & DATA-ACQUISITION SUBSYSTEM

*Model No._____

A.	OFFERED SYSTEM DETAILS					
1.#	Offered subsystem:					
a)	Combined Controller & Data-acquisition		[X]			
b)	Separate Controller and separate Data-acquisition		[ ]			
c)	Partly Combined and Partly Separate Controller & Data-acquisition		[ ]			
2.#	Type of Controller	Single loop	[ ]	Multi-loop	[X]	
3.a)*	Controller Sub-system		Model No._____			
b)*	Data-acquisition subsystem		Model No._____			
c)*	Controller & Data-acquisition when offered combined		Model No._____			
B.	GENERAL					
1.*	Number of controllers per 19" Rack (Nest)		_____			
2.*	Number of 19" Racks (Nests) per cabinet		_____			
3.*	Number of Controller cabinets		_____			
4.*	Cabinet-wise MTBF		_____ hours			
5.*	Cabinet-wise MTTR		_____ hours			
C.	SPECIFICATION					
1.#	Type	µp based	[X]	Configurable	[X]	
2.#	Enclosure		General purpose		[X]	

3.#	a)Type of controller	Single loop	[ ]	Multi-loop	[X]	
i)	Single loop controller	Indicating	[ ]	Blind	[ ]	
		Facia size_____				
	Display	Bar graph	[ ]	Digital	[ ]	
	Architecture	Split	[ ]	Unit	[ ]	
	Mounting	Flush	[ ]	Rack	[ ]	
				Multi-case	[ ]	
	Scan time	Variable	[ ]	Fixed	[ ]	
		Maximum 500 ms	[ ]	Other _____		
	Control cycle time			_____		
	Configuration from	Local level	[ ]	Central level	[ ]	
	Tuning from	Local level	[ ]	Central level	[ ]	
	MTBF			_____ hours		
	MTTR			_____ hours		
	Model No.			_____		
ii)**#	Multi-loop controller	Indicating	[ ]	Blind	[X]	
				Facia size_____		
	Display	Bar graph	[ ]	Digital	[ ]	
	Mounting	Flush	[ ]	Rack	[X]	
				Multi-case	[ ]	
	Number of loops per controller			Available_____		
	With 60 % loading	Maximum 100		[X] Actual Offered_____		
	Back-up controller	Required		[X] 1:1 Redundancy		
		Provided	[ ]	Not provided	[ ]	
		One for Three	[ ]	One for One	[ ]	
				Other_____		
	Switch-over time	1 s	[X]	Offered_____		
	Scan time	Variable	[ ]	Fixed	[ ]	

	DP, Pressure, Flow	Maximum 500msec	[X]	Offered_____		
	Temperature, Level	Maximum 1 sec	[X]	Offered_____		
	Control cycle time			_____		
	Configuration from	Central level	[X]	Local level	[ ]	
	Tuning from	Central level	[X]	Local level	[ ]	
	MTBF			_____ hours		
	MTTR			_____ hours		
	Model No.			_____		
b)#	Control Modes	Manual	[X]	Auto	[X]	
		Cascade	[X]	Computer	[X]	

c)**# Tuning constants

Tuning Constant	Required	Offered	Remarks
PROPORTIONAL BAND	1 - 800 %		
INTEGRAL RATE	0.05 - 100 repeats/ min.		
DERIVATIVE TIME	0.01 - 10 min.		
DEAD TIME	0.07 - 10 min.		
LEAD LAG TIME	0.005 - 10 min.		

d)#	Reverse/ Direct selection	Required	[X]			
e)#	Anti-Reset wind up feature	Required	[X]			
f)#	Output status on controller failure	Flunk	[X]	Freeze	[X]	
		Engineer Configurable			[X]	
4.**#	DATA-ACQUISITION SUBSYSTEM					
	Mounting	Rack	[X]			
	Number of Inputs per processor	Analog	[X]	Maximum 16	[X]	
				Offered_____		
		Digital	[X]	Maximum 32	[X]	
				Offered_____		
	Redundancy	Required	[X]			

(Redundancy required for inputs more than 16 Analog or 32 Digital)

		One for One	[ ]		
		One for N	[ ] (Define 'N')		
		Others_____			
	Switch-over time	1 second	[X]	Offered_____	
	Scan time	Variable	[ ]	Fixed	[ ]
		1 s	[X]	Other_____	
	Control cycle time			_____	
	Configuration from	Central level	[X]	Local level	[ ]
	Tuning from	Central level	[X]	Local level	[ ]
	MTBF			_____ hours	
	MTTR			_____ hours	
	Model No.			_____	
5.	CONTROL PROCESSOR				
a)*#	Back up control processor	Required	[X]		
	Provided	[ ]	Not Provided		[ ]
	One for one	[X]			
	Any Other	_____			
b)*#	Switch over time	1 Sec.	[X]	Any Other _____	
c)*#	Processor cycle time				
	For Flow and Pressure	250 msec	[X]	Any Other_____	
	For Level and Temp.	500 msec	[X]	Any Other_____	
d)*	No. of Control blocks	_____			
e)*	Execution rate	_____ sec/control block			
f)*	Updation rate of back up processor	Per Scan	[ ]	Any Other_____	
g)*#	Mounting	Rack	[X]		
h)*	MTBF Value _____				
i)*	MTTR Value _____				
j)*	Model No. _____				

6.	DATA ACQUISITION PROCESSOR		
a)*#	Back up control processor	Required	[X] (for more than 16 Analog or 32 Digital inputs)
	One for one	[ ]	
	One for N	[ ]	N=_____
			(Define 'N')
b)*#	Switch over time	1 Sec.	[X]
c)*	No. of Data Acquisition(DA) Blocks	_____	
d)*	Execution rate	_____	sec/DA block
e)*	Updation rate of back up processor	Per Scan	[ ] Any Other_____
f)*	Control cycle time	_____	sec
g)*#	Mounting	Rack	[X]
h)*	MTBF Value _____		
i)*	MTTR Value _____		
j)*	Model No. _____		
7.#	Input isolation	Required	[X]
8.#	Output isolation	Required	[X]

9.**# Type of Input Modules:

Type of module	Model No.	Isolation	No. of inputs per module
4-20 mA DC(2 wire) (with HART protocol) [X]			
0-20 mA DC(2 wire) [ ]			
4-20 mA DC(non 2 wire) [X]			
1-5 V DC [X]			
0.25-1.25 V DC [ ]			
OTHER_____			
THERMOCOUPLES (T/E/K PER ANSI MC96.1) [X]			
RTD (PT 100 PER DIN 43760) [X]			

(PT 100 PER DIN 43760)			
CONTACT POTENTIAL FREE[X]			
RS 232C/RS 422/RS 485 [X]			
BCD [X]			

10.**#a) Type of Output Modules:

Type of module	Model No.	Isolation	No. of outputs per module
4-20 mA DC(2 wire) [X] (with HART protocol)			
Other [ ]			

b) Type of Discrete Outputs:

Type of module	Model No.	Isolation	No. of outputs per module
POTENTIAL FREE CONTACT [X]			

11.** Power supply for Transmitters 24 V DC [X] Other_____

With Controller [ ]

Redundant common power supply system [ ]

12.**# Intrinsically safe Yes [X] No [ ]

With External barrier [X]

Without External barrier [ ]

13.* Maximum number of alarm settings _____

14.**# A/D Converter resolution 1500 steps [X] Actual_____

15.**# D/A Converter resolution 1500 steps [X] Actual_____

16.**# Load Driving capability 750 Ω [X] Actual_____

17.# Load Driving capability of transmitter @ 24 V DC 600 Ω [X]

18.**# Maximum allowable source resistance for:

Thermocouple input module 2000 Ω

RTD input module _____ Ω

19.#	On-line Diagnostic message available at			Local level		[X]
				Centralised level		[X]
20.**#	Memory type for Configuration	Retentive	[X]	Volatile		[ ]
	If Retentive	Erasive	[X]	Non-erasive		[ ]
		*Erasing by_____				
	If Volatile	Battery back-up	[X]			
		*Battery type_____	*Battery life_____			
		Chargeable	[X]			
		Continuous trickle charge				[X]
		Configuration protection time 72 hours				[X] Note 3
		Battery drain indication				[X]
		*Retentive memory back up				[X]

Note 3: Battery back-up shall be provided to protect the controller configuration data for a period of 10 hours or more or the system shall tolerate black out condition for at least one cycle without data corruption/ data loss and auto boot in case of power black out condition.

21.#	CPU/MEMORY LOADING		
	a) CPU loading	60%	[X]
	b) Memory Utilisation	60%	[X]
	c) I/O processor loading	60%	[X]
	(if separate from processor carrying out control function)		
	d) Communication processor loading	60%	[X]

22.** ALGORITHMS

ALGORITHMS	REQUIRED	OFFERED FOR		REMARKS
		SINGLE LOOP	MULTI-LOOP	
BASIC FUNCTIONS				
Manual loader	[X]	[ ]	[ ]	
Cascade(with set point tracking)	[X]	[ ]	[ ]	
High alarm limit	[X]	[ ]	[ ]	
Extra High Alarm	[X]	[ ]	[ ]	

Low Alarm	[X]	[ ]	[ ]
Extra Low Alarm	[X]	[ ]	[ ]
Rate of change alarm	[X]	[ ]	[ ]
Deviation Alarm	[X]	[ ]	[ ]
Output High	[X]	[ ]	[ ]
Output Low	[X]	[ ]	[ ]
High Dev. from set point	[X]	[ ]	[ ]
Low Dev. from set point	[X]	[ ]	[ ]
CONTROL ALGORITHMS			
Proportional Control	[X]	[ ]	[ ]
PI	[X]	[ ]	[ ]
Error Square PID	[X]	[ ]	[ ]
Adaptive Gain	[X]	[ ]	[ ]
Ratio Control	[X]	[ ]	[ ]
PID with Dead Band	[X]	[ ]	[ ]
ARITHMATIC			
Additional Subtraction	[X]	[ ]	[ ]
Multiplication	[X]	[ ]	[ ]
Division	[X]	[ ]	[ ]
Absolute value	[X]	[ ]	[ ]
Square Root	[X]	[ ]	[ ]
Average	[X]	[ ]	[ ]
Summation (Integration)	[X]	[ ]	[ ]
Bias	[X]	[ ]	[ ]
Ramp Function	[X]	[ ]	[ ]
LINEARIZATION			
Square Root Extraction	[X]	[ ]	[ ]
Flow Computation(Pressure & Temp. compensation)	[X]	[ ]	[ ]
Thermocouple Linearisation & compensation	[X]	[ ]	[ ]
RTD Linearisation	[X]	[ ]	[ ]
Polynomial	[X]	[ ]	[ ]
DYNAMIC			

Lead/Lag	[X]	[ ]	[ ]
Dead time	[X]	[ ]	[ ]
Timer	[X]	[ ]	[ ]
Feed Forward	[X]	[ ]	[ ]
LIMITER			
Low Output Limiter	[X]	[ ]	[ ]
High Output Limiter	[X]	[ ]	[ ]
Alarm Limiter	[X]	[ ]	[ ]
Set point Limiter	[X]	[ ]	[ ]
SELECTOR			
Low Selector	[X]	[ ]	[ ]
High Selector	[X]	[ ]	[ ]
Mean value Selector	[X]	[ ]	[ ]
Auto Ranging for Dual transmitters	[X]	[ ]	[ ]
Over-ride	[X]	[ ]	[ ]
LOGIC			
And	[X]	[ ]	[ ]
Or	[X]	[ ]	[ ]
Nor	[X]	[ ]	[ ]
Not	[X]	[ ]	[ ]
MISCELLANEOUS FUNCTIONS			
Bump-less transfers between all control nodes	[X]	[ ]	[ ]
Direct or Reverse outputs	[X]	[ ]	[ ]

All algorithms available as standard firmware blocks shall be carried out using the above blocks.

5. OPERATOR INTERFACE SUB-SYSTEM

*Model No._____

A. GENERAL

1.# Number of Operator Consoles — One [ ] Two [ ] Three [X] Other_____

2.# Inter-changeability between operator consoles — Required [X]

			Not Required	[ ]
3.#	On-line system diagnostics on Console CRTs	Required	[X]	
			Module level	[X]
4.#	On-line configuration change		Required	[X]
5.**	High voltage isolation	Reqd. [X] Other_____	Optical Barrier	[ ]
6.*	MTBF		_____	hours
7.*	MTTR		_____	hours

B. OPERATOR CONSOLE

1.*	Console's basic electronics	Redundant common	[ ]		
	Individual electronics for each CRT	[ ]		Other_____	
	µp Type	16 bit	[ ]	32 bit	[ ]
			Other_		
	µp Make/ model			_____	
	Memory size			_____	MB
2.**#	Type of Database	Global at operator console	[ ]		
		Functionally separate			[ ]

Data Storage Devices:

S.No.	ITEM MODEL No.	FUNCTION	REDUNDANCY	REMARKS
1.	Hard Disk Drive		REQUIRED [X]	
2.	CD ROM Drive		REQUIRED [X]	
3.	Floppy Disk Drive		REQUIRED [X]	
4.	Others			

Redundancy is required if common electronics for all CRTs is provided.

3.**# Number of Devices (per console)

S.No.	TYPE OF DEVICE	NO. OF DEVICES REQUIRED	NO. OF DEVICES POSSIBLE	REMARKS
1.	CRT/TFT	THREE		
2.	KEYBOARD SETS	ONE/CRT		

3.	ALARM & EVENT PRINTER	ONE		
4.	LOG PRINTER	ONE		
5.	HARD COPY UNIT	ONE@		@ Common for all consoles
6.	TAPE DRIVE	ONE		
7.	FLOOPY,CD & WINCHESTER DRIVES	ONE EACH		

4.# Inter-changeability between CRTs Required [X]

5.# Switch-over of peripherals on console electronics' failure Auto [X]

6.* Data base update rate _____ s

7.** Users' memory requirement Min. 512 KB [X]

System capacity_____ KB

8. Keyboard Set

a)# Type of keyboard Membrane type [X] Other_____

b)# Number of Operators' keyboards One per CRT [X] Other_____

c)# Number of Engineer's keyboards per operator console One [X]

Two [ ]

d)* Number of maintenance keyboards One [ ]

Other_

e)**# Keyboard Security against unauthorized access Required [X] Key-lock [X]

Other_____

f)**# Maximum number of keystrokes for accessing views as per standard display hierarchy:

S.NO	TYPE OF VIEW	REQUIRED	OFFERED	REMARKS
1.	GROUP VIEW	TWO		
2.	LOOP VIEW	THREE		
3.	LOOP IN ALARM	TWO		
4.	GRAPHICS VIEW	TWO		

g)# Dual function keys for single keystroke access Required [X]

h)**#	Number of dual function keys per CRT	48	[X]	Offered_____
i)**#	a) Number of devices for cursor control	Three/ CRT	[X]	
	b) Devices for cursor control	Keyboard	[X]	Mouse [X]
	Touch-screen / Trackball		[X]	Light pen [ ]
				Other_____
10.**#	CRTs and Displays			
a)#	Size of CRT	21" diagonal	[X]	
b)#	Type of CRT	Colour	[X]	Other TFT
c)	Number of background colours	Seven (7)	[X]	Actual_____
d)	Number of foreground colours	Seven (7)	[X]	Actual_____
e)	Number of display characters	80 x 40 line	[X]	Actual_____
f)		Number of characters Actual_____		Minimum 96 ASCII [X]
g)	Character construction character 5x7 dots [X]			Actual_
	Pattern 7x8 dots		[X]	Actual_____
h)	Length of tag number (characters) 9 alphanumeric		[X]	Other_____
i)	Length of description (characters) 15 alphanumeric		[X]	Other_____
j)#	Display update rate	2 sec	[X]	Other_____
k)#	Dynamic graphics	Required	[X]	On each CRT [X]
l)#	Control through dynamic graphics	Required	[X]	

m)** CRT displays and Call-up time

S.NO.	TYPE OF DISPLAY	REQUIRED	CALL-UP TIME(S)*	REMARKS
1.	OVERVIEW	YES		
2.	GROUP DISPLAY	YES		
3.	LOOP DISPLAY	YES		
4.	DYNAMIC GRAPHICS	YES		
5.	REAL-TIME TREND	YES		
6.	HISTORIC TREND	YES		
7.	ALARM SUMMARY	YES		
8.	ALARM HISTORY	YES		

9.	CONFIGURATION	YES		
10.	DIAGNOSTIC	YES		

n)* Additional vendor standard displays

S.NO.	TYPE OF DISPLAY	AVAILABLE	OFFERED	REMARKS

o)**# Display Hierarchy

SL. NO.	DESCRIPTION	REQUIRE-MENT	SYSTEM CAPABILITY	REMARKS
1.	NO. OF OVERVIEW PAGES	AS REQD.		
2.	NO. OF GROUPS/OVERVIEW	AS REQD.		
3.	NO. OF LOOPS/GROUP	8		
4.	NO. OF GRAPHIC PAGES	AS REQD.		
5.	NO. OF POINT IN ALARM SUMMARY	AS REQD.		
6.	NO. OF POINTS IN AALRM HISTORY	AS REQD.		
7.	NO. OF TRENDS PER DISPLAYS	AS REQD.		
8.	NO. OF MULTI-TREND DISPLAYS	AS REQD.		
9.	OTHERS	AS REQD.		

p)* Zooming facility Available [ ]

q)** Windowing facility Required [X] (Note-4)

Note 4 : Opening of more than four windows on the same screen shall be restricted by the system.

r)**# Trending functions:

i) Real-time trend

Number of parameters Required ALL TAGS System capacity_____

Time base Maximum 10 s [ ] Other_____

Time period 10 Min. [ ] Other_____

ii) Historical trend

Number of parameters Required ALL TAGS System capacity_____

	Time base	1 min.	[ ]	Other_____	
	Time period	31 Days	[ ]	Other_____	
s)*	Dynamic graphic generation:				
	Number of standard symbols available			_____	
	Number of user defined symbols			_____	
11.**	Logging Function				
	a) Number of tags to be logged	Required ALL TAGS		System capacity_____	
	b) Number of log reports	Required_____		System capacity_____	
	Alarm History per shift	[X]		Event logging	[X]
	Hourly logs	[X]		Shiftly logs	[X]
	Daily logs	[X]		Weekly logs	[X]
	Shutdown report	[X]		Trip initiated log	[X]
				Others(Note-5)	MIS

Note-5 : Other log reports shall be furnished during detailed engineering.

	c)# Log formats			User definable	[X]
12.**#	Memory type for Configuration	Retentive	[X]	Volatile	[ ]
	If Retentive	Erasive	[X]	Non-erasive	[ ]
				*Erasing by_____	
	If Volatile			Battery back-up	[X]
		*Battery type_____		*Battery life_____	
		Chargeable			[X]
		Continuous trickle charge			[X]
		Configuration protection time 72 hours			[X]
		Battery drain indication			[X]
		*Retentive memory back up[X]			
13.*	System boot-up from	Operator console	[ ]	Engineer console	[ ]
		Other_____			
14..#	Auto boot-up on power On			Required	[X]

15.**# Assignable trend recording:

a) Number of points to be recorded	Required_____	System capacity_____		
b) Number of pens per recorder	Maximum 3	[ ]	Other_____	
c) Recorder size	6" x 6"	[ ]	Other_____	
d) Recording speed	1"/ hour	[ ]	Other_____	
e) Selection of Operator assignable tag from	Operator Console	[ ]		

16.*# Storage disks

a)* Type of storage disk	Floppy	[X]	Winchester	[X]
	Optical	[X]	CD	[X]

b)** Number of disks and capacity

SL. NO.	TYPE OF DISC	NUMBER (MINIMUM)	MEMORY CAPACITY PER DISK	REMARKS
1.	FLOPPY	TWO PER CONSOLE		
2.	WINCHESTER	TWO PER CONSOLE		
3.	OPTICAL	TWO PER CONSOLE		
4.	CD	TWO PER CONSOLE		
5.	OTHER			

17.* Any other feature available as a standard:

a)_____

b)_____

c)_____

d)_____

e)_____

18.# CPU Loading 60 % [X]

19.# Memory Utilisation 60 % [X]

6. ENGINEER INTERFACE SUB-SYSTEM

*Model No._____

1.# Number of Engineering Console Three [X] Note 6

Note 6 : Engineering console for Sulphur block shall be in DHDT Control Room.

2.#	Number of CRTs per Engg.Console	Two	[ ]	One	[X]
3.*	Type of electronics	Individual per CRT	[ ]	Common	[ ]
	Number of CRT's per electronics			_____	
	µP type	32 bit	[ ]	16 bit	[ ]
	Memory size			_____	
	Model No.			_____	
4.#	Number of engineering keyboards	One per CRT	[X]	Other_____	
5.#	Number of Operation keyboards	One per CRT	[X]	Other_____	
6.*	Maintenance keyboard	Required	[ ]		
7.#	Functional Capability	Same as operator interface subsystem			[X]
8.#	Basic functions of Engineering Console				
a)	System configuration and reconfiguration		[X]		
b)	Group & multi-groups alarm inhibiting		[X]		
c)	Plant views with/ without plant operation		[X]		
d)	Graphic page compilation		[X]		
e)	Setting/ resetting real-time clock		[X]		
f)	Loop tuning on selectable basis		[X]		
g)	System maintenance and diagnostics		[X]		
9.#	CRT specification	As operator interface subsystem			[X]
10.#	Keyboard specification	As operator interface subsystem			[X]
11.**#	High voltage isolation	Required	[X]		
	Protection type	Optical barrier	[X]	Other_____	
12.#	Peripheral requirements:				
	i) Printer (C&M)	Required	[X]		
	ii) Hard copy unit	Required	[ ]		
	iii) Other	_____			
13.#	Data base station (DBS)	Required	[ ]		

	i) Capacity	Actual_____		Used_____	

Engineering console shall have dual disc.

7. LOGGING PRINTER

*Model No. _____

1.**	Type of hard copy unit	Electrostatic	[ ]	Laser Jet Printer	[X]
		Coloured	[X]		
2.**	Printing Speed	6 PPM or more	[X]	Actual_____	
3.#	Screen selection from	Operator console	[X]	Engg. console	[X]
	PLC console	[ ]			
4.**	Maximum distance from operator console	AS PER CONTROL ROOM LAYOUT			
	Limitation (if any)	_____			
5.**	Number of channels	Required_____		Offered_____	
6.	a) Electrostatic:				
	i)* Paper type	_____			
	ii)** Paper size	A4	[X]	Offered_____	
	iii)* High voltage protection type	Optical barriers	[X]	Other_____	
	b)* Printer	Type_____		Speed_____	
	i)** Resolution	640 dpi	[ ]	Actual_____	
	ii)** Paper Width	254 mm	[ ]	Actual_____	
	iii) Paper Type	Continuous fanfold	[ ]	Actual_____	
	iii)** Paper Feed	Friction	[ ]	Pin Feed	[ ]
	iv)** Acoustic Cover	Required	[X]		
	v)** Noise level (in dBA) while printing at a distance of 1 m:				
		Required	< 65 dBA		
		Offered	_____		
		with cover	[ ]	without cover	[ ]
7.*	Cord length offered	As per actual layout		Max. possible_____ m	
8.#	Mounting	Self contained with Integral stand			[X]

8. ALARM/EVENT PRINTER

*Model No._____

1.**	Type of Printer	Serial	[X]	Actual_____	
2.**	Number of character type	96 ASCII	[X]	Actual_____	
3.**	Printing speed	120 cps	[X]	Actual_____	
4.**	Number of print columns	Minimum 132	[X]	Actual_____	
5.**	Paper width	381 mm	[X]	Actual_____	
6.#	Paper type	Continuous fanfold	[X]		
7.**	Number of copies	Three	[X]	Actual_____	
		Other_____			
8.#	Acoustic cover	Required	[X]		
9.#	Paper feed	Friction feed	[X]	Pin Feed	[ ]
10.#	Bi-directional printing feature	Required	[X]	Required	[X]
11.#	Identification of alarms and events	Required	[X]	By dual colours	[X]
		Other_____			
12.#	Test pattern generation	Required	[X]		
13.*	Cord length offered	As per Control room layout		Max.possible_____ m	
14..#	Mounting	Self contained with Integral stand			[X]
15.**	Noise level (in dBA) while printing at a distance of 1 m:				
	a) Required	< 65 dBA			
	b) Offered	_____			
	with cover	[ ]		without cover	[ ]

9. CONFIGURATION AND MAINTENANCE PRINTER

*Model No. _____

1.**	Type of hard copy unit	Electrostatic	[ ]	Laser Jet Printer	[X]
	Coloured	[X]			
2.**	Printing Speed	6 PPM or more	[X]	Actual_____	

3.#	Screen selection from	Operator console	[X]	Engg. console	[X]
	PLC console	[ ]			
4.**	Maximum distance from operator console	AS PER CONTROL ROOM LAYOUT			
	Limitation (if any)	_____			
5.**	Number of channels	Required_____		Offered_____	
6.	a) Electrostatic:				
	i)* Paper type	_____			
	ii)** Paper size	A4	[X]	Offered_____	
	iii)* High voltage protection type	Optical barriers	[X]	Other_____	
	b)* Printer	Type_____		Speed_____	
	i)** Resolution	640 dpi	[ ]	Actual_____	
	ii)** Paper Width	254 mm	[ ]	Actual_____	
	iii) Paper Type	Continuous fanfold	[ ]	Actual_____	
	iii)** Paper Feed	Friction	[ ]	Pin Feed	[ ]
	iv)** Acoustic Cover	Required	[X]		
	v)** Noise level (in dBA) while printing at a distance of 1 m:				
	Required	< 65 dBA			
	Offered	_____			
		with cover	[ ]	without cover	[ ]
7.*	Cord length offered	As per actual layout	Max. possible_____ m		
8.#	Mounting	Self contained with Integral stand			[X]

10. HARD COPY UNIT

*Model No. _____

1.**	Type of hard copy unit	Electrostatic	[ ]	Laser Jet Printer	[X]
	Coloured	[X]			
2.**	Printing Speed	6 PPM or more	[X]	Actual_____	
3.#	Screen selection from	Operator console	[X]	Engg. console	[X]
	PLC console	[ ]			

4.**	Maximum distance from operator console	AS PER CONTROL ROOM LAYOUT			
	Limitation (if any)	_____			
5.**	Number of channels	Required_____		Offered_____	
6.	a) Electrostatic:				
	i)* Paper type	_____			
	ii)** Paper size	A4	[X]	Offered_____	
	iii)* High voltage protection type	Optical barriers	[X]	Other_____	
	b)* Printer	Type_____		Speed_____	
	i)** Resolution	640 dpi	[ ]	Actual_____	
	ii)** Paper Width	254 mm	[ ]	Actual_____	
	iii) Paper Type	Continuous fanfold	[ ]	Actual_____	
	iii)** Paper Feed	Friction	[ ]	Pin Feed	[ ]
	iv)** Acoustic Cover	Required	[X]		
	v)** Noise level (in dBA) while printing at a distance of 1 m:				
	Required	< 65 dBA			
	Offered	_____			
	with cover	[ ]		without cover	[ ]
7.*	Cord length offered	As per actual layout		Max. possible_____ m	
8.#	Mounting	Self contained with Integral stand			[X]

11. HARDWIRED CONSOLE

*Model No. _____

1. Number of Hardwired console per operator console:

SL.NO.	OPERATOR CONSOLE	NUMBER OF HARDWIRED CONSOLES	REMARKS
1.	OPERATOR CONSOLE - 1	AS REQUIRED	
2.			
3.			

2. Instrument Located on Hardwired consoles: (AS REQUIRED)

TYPE OF INSTRUMENT	NO REQUIRED WITH OPERATOR CONSOLE

	OPERATOR CONSOLE - 1	OPERATOR CONSOLE - 2	OPERATOR CONSOLE - 3
ASSIGNABLE RECORDERS			
INDICATING CONTROLLERS			
INDICATORS			
RECORDERS			
TOTALIZERS			
HARDWIRED ANNUNCIATORS	YES		
INDICATING LAMPS	YES		
SWITCHES	YES		
PUSHBUTTONS	YES		
TELEPHONE SETS	YES		
HAND SETS FOR COMMUNICATION SYSTEM	YES		
OTHERS			

3.# Power supply for Instruments(except lamps, switches, pushbuttons)110 V, 50 Hz [X]

4.# Power supply for switches,lamps,pushbuttons etc. 110 V DC [ ] 24 V dc [X]

12. PROGRAMMABLE LOGIC CONTROLLER (ESD and F&G)

*Model No. _____

1# Functional requirement Plant Shutdown and Interlocks [X]

2# System Configuration Type

2.1# Single PLC

a) Redundant dual processor [ ]

b) Minimum Redundant dual processor with dual I/O [X] I/O auto-testing [X]

SIL-3 TUV Approved as per IEC-61508 [X]

3.	PROCESSOR SYSTEM				
3.1**#	Functional capability	Logic Functions	[X]		
		Timing Functions	[X]	Range:0-99,999 s	
		Least count: 0.01 s			
	*Other available as standard_____				
3.2#	Interfacing capability	I/O Racks	[X]	DCS Bus	[X]
		PLC Console	[ ]	Printer	[X]
				Other_____	
3.3*	Memory capacity	_____			
3.4*	Memory used	_____			
3.5*	Spare memory available	_____			
3.6**#	Memory type	Retentive	[X]	Volatile	[ ]
	If Retentive	Erasive	[X]	Non-erasive	[ ]
		*Erasing by_____			
	If Volatile	Battery back-up	[X]		
	*Battery type_____	*Battery life____			
	Chargeable		[X]		
		Continuous trickle charge			[X]
		Configuration protection time 72 hours			[X]
		Battery drain indication			[X]
		Retentive memory back up	[X]		
3.7**	Scan Time	250 ms	[X]	Actual_____ ms	
		20 ms	[ ]		
3.8*	Power supply redundancy/ processor	Individual	[ ]		
		Redundant Floating	[ ]		
3.9.#	Outputs on processor system failure	Freeze	[X]	Open	[X]
		Close	[X]	Configurable	[X]

(Outputs shall be configured to open on processor failure, unless otherwise specified)

3.10* Maximum distance between processor & console AS PER CONTROL ROOM

Allowable_____m

4# INPUT/ OUTPUT SYSTEM

4.1# Type Discrete [X] Other_____

4.2# Mounting 19" Rack [X] Other_____

4.3 SINGLE or DUAL I/O CONFIGURATION

4.3.1# Online replacement of I/O modules Required [X]

4.3.2# I/O status Indication Required [X] Local level [X]

PLC Console [ ]

4.3.3** Input Isolation Required [X] Optical [X]

Other_____

Output Isolation Required [X] Optical [X]

Other_____

4.3.4* I/O Capability

TYPE OF MODULE		MODEL No.	CAPACITY	I/O's USED
INPUT	4-20 mA			
	1-5 V DC			
	Contact			
OUTPUT	4-20 mA			
	Contact			

4.3.5# Input Type Intrinsic safe [X] Non-Intrinsic Safe [X]

With external barriers [X]

4.3.6* Maximum distance between I/O rack & processor AS PER CONTROL ROOM LAYOUT

Allowable_____m

4.3.7# Dual I/O Required [X] Not Required [ ]

Auto testing of I/O's Required [X]

4.3.8** Power Supply/ I/O rack Individual [ ] Dual Redundant [X]

4.3.9**	I/O Rack to processor link	Individual	[ ]	Dual Redundant	[X]
4.3.10*	Remote I/O capability	Available	[ ]	Not Available	[ ]
4.3.11	Input Module				
	a)# Input Type	Volt free contact	[X]	4-20 mA	[X]
	contact rating	1.5 A @ 220 V dc	[X]	2 A @ 24 V dc	[X]
		5 A @ 220 V ac	[X]	Other_____	
	b)# Maximum number of Inputs per module:				
	Single I/O	Eight	[ ]	Offered_____	
		Other_____			
	Dual I/O	Sixteen	[X]	Offered_____	
		Other_____			
	c) Input Interrogation voltage	110 V dc	[ ]	24 V dc	[X]
		Other_____			
	d) Transmitter power supply	24 V dc	[X]	With I/O module	[ ]

e)

TYPE OF MODULE	MODEL No.	INPUTS / MODULE	INPUT IMPEDENCE (Ω)	INRUSH CURRENT (A)
4-20 mA [ ]				
24 V dc [ ]				
110 V dc [ ]				

4.3.12.	Output module				
	a)# Output Type	Volt free contact	[X]	4-20 mA (Note-1)	[ ]
	Contact rating	1.5 A @ 220V dc	[X]	2 A @ 24 V dc	[X]
		5 A @ 220 V ac	[ ]		
	b)** Maximum number of Outputs per module:				
	Single I/O	Eight	[ ]	Offered_____	
				Other_____	
	Dual I/O	Sixteen	[X]	Offered_____	

Other_____

c)*

OUTPUT CONTACT RATING	MODEL No.	NUMBER OF OUTPUTS/MODULE
110 V, 0.5 A dc (INDUCTIVE)		
110 V, 5.0 A ac		
24 V, 2.0 A dc		

Note –1 : If necessary Vendor should provide interposing relays to meet the ratings specified here and higher ratings if necessary in logic/ladder diagrams.

d) Output Load Capability 600 Ω [X]

4.4 **I/O System for Triple Modular Redundant (TMR) Configuration: (IF APPLICABLE)**

4.4.1 Process I/O modules

4.4.1.1# Online replacement Required [X] With hot slots [ ]

4.4.1.2* I/O Capability

TYPE OF MODULE	MODEL No.	CAPACITY	I/O's USED
INPUT			
OUTPUT			

4.4.1.3# Input Type Intrinsic safe [X] Non-intrinsic safe [X]

4.4.1.4# Number of I/O channels per I/O Three [X]

4.4.1.5* Maximum distance between I/O rack & processor _____m

4.4.1.6# Power supply per I/O Rack Dual Redundant [ ] Triplicate [X]

4.4.1.7# I/O Rack to processor link Triplicate [X]

4.4.2. I/O Conditioning modules:

4.4.2.1# Online replacement Required [X]

4.4.2.2# I/O status indication Required [X]

4.4.2.3** Input isolation Required [X] Optical [X]

Other_

Output isolation Required [X] Optical [X]

Other_____

4.4.2.4* I/O Capability

E OF MODULE	MODEL No.	CAPACITY	I/O's USED
INPUT			
OUTPUT			

4.4.2.5* Maximum distance between Conditioning rack & I/O rack _____ m

4.4.2.6# I/O Conditioning module redundancy Required [X] Not required [ ]

4.5.2.7# Auto-testing Required [X]

4.4.2.8# Power supply per I/O rack Dual [ ] Other_____

4.4.2.9# Input conditioning module:

a)# Input Type Volt free contact [ ]

Contact rating 1.5 A @ 220 Vdc [X] 24 V ,2 A dc [X]

5 A @ 220 V ac [X] Other_____

b)** Maximum number of Inputs per module Thirty-two [ ] Other_____

c) Input Interrogation voltage 110V DC [ ] Other_____

d)

TYPE OF MODULE	MODEL No.	INPUTS / MODULE	INPUT IMPEDENCE (Ω)	INRUSH CURRENT (A)
110 V dc [ ]				
24 V dc [ ]				

4.5.2.10 Output module:

a)# Output Type Volt free contact [ ]

Contact rating 110 V, 0.5 A DC [ ] 24 V 2 A DC [ ]

Other_

b)** Maximum number of Outputs per module Thirty-two [ ]

c)*

OUTPUT CONTACT RATING	MODEL No.	NUMBER OF OUTPUTS/MODULE
110 V, 0.5 A dc (INDUCTIVE)		
110 V, 5.0 A ac		
240 V, 2.0 A dc		

5.	PLC CONSOLE		*Model No._____	
5.1	Number of CRTs	One	[X]	Other_____
	Type	Colour	[X]	Monochromatic [ ]
	Size	21" Diagonal	[X]	Other_____
	*Character Size	_____		
	*Screen Capacity	_____		
5.2	Redundant Link between processor system & console			Required [ ]
5.3	Number of Keyboards	One per CRT	[X]	
	Type	Membrane	[X]	Offered_____
5.4	Printer	Required One	[X]	Model_____
	Paper width	Approx. 381 mm	[ ]	Offered_____
	Printing speed	_____ cps		
	Number of copies	Three	[ ]	Offered_____
5.5	Programme storage	Required	[X]	On Floppy disk [ ]
		Capacity_____ MB		Access time_____ ms
		Other_____		
5.6	System Boot-up on power-on	Auto	[X]	
5.7	Software features:			
	a) Online Programming	Required	[X]	
	b) Online Programme modification	Required	[X]	
	c) Disable/Force facility	Required	[X]	
	d) Power flow on Ladder/ logic	Required	[X]	
	e) First out alarm Capability	Required	[X]	
	f) Self diagnostics	Required	[X]	
	g) I/O mapping	Required	[X]	
	h) Plant operation	Required	[ ]	
	i) Alarm Printing	Required	[X]	
	j) Documentation	Required	[X]	

	k) Ladder Logic Monitoring	Required	[X]
	l) Graphic capability	Required	[X]
	m) Shutdown Report Generation & printing	Required	[X]
		Number of pages	_____

5.8* Additional special software:

a)_____

b)_____

c)_____

d)_____

e)_____

5.9 Interface with DCS *Model No._____

a)** Type of Interface Serial [ ] Bi-directional [ ]

RS-232 C [ ] Other_____

b)* Protocol Type MODBUS [ ] Other_____

c)* Module details:

CONFIGURATION	INTERFACE MODEL No.	NUMBER OF MODULES	NUMBER OF ADAPTERS PER MODULE
DUAL PROCESSOR			
TWO INDEPENDENT PLC's			
TRIPLE MODULAR REDUNDANT			

d)* Total time taken to Display alarms generated by PLC on DCS operator console_____s

5.10# Power Supply

a) System	110 V ac,50 Hz UPS	[X]
b) Interrogation voltage	24 V dc	[X]
c) Output Contact Voltage	24 V dc	[X]
d) AC Voltage Distribution	Vendor's scope	[X]
e) DC Voltage Distribution	Vendor's Scope	[X]
f) Dual redundant 24 V dc	Vendor's Scope	[X]

13. FOREIGN DEVICE INTERFACE

A)	INTERFACE WITH PLC			*Model No._____		
1.**	Type of Interface	Serial	[ ]	Bi-directional	[ ]	
		RS-232 C/422/485	[ ]	Other_____		
2.	Type of Redundancy:					
a)#	For Dual redundant processor/ TMR system	Dual Redundant	[X]			
		Active	[X]			
	** Switchover time	_____s				
b)	For two PLC configuration	One per PLC	[ ]			
3.*	Input capability:	Number of digital inputs	_____			
4.*	Standard interface software available for	MODBUS	[ ]			
		Other_____				
5.*	Proven interface software available for following PLC's:					
	a) Make_____			Model No._____		
	b) Make_____			Model No._____		
	c) Make_____			Model No._____		
	d) Make_____			Model No._____		
6.#	Functional Requirements:					
	Type of communication	Simplex	[ ]	Duplex	[X]	
	Automatic Time synchronization	Required	[X]			
	Transfer of PLC diagnostics	Required	[X]			
	Interface diagnostics available at	Central level	[X]	Local level	[X]	
	Single message transfer in case of two PLC			Required	[ ]	
				Other _____		
B)	INTERFACE WITH OTHER FOREIGN DEVICES			*Model No._____		
1.**#	Type of Interface	Serial [ ] Other_____		RS-232 C/422/485	[ ]	
2.#	Communication Protocol	MODBUS	[X]	Vendor Standard	[ ]	
3.#	Type of Redundancy	Dual Redundant	[X]	Active	[X]	

	** Switchover time	_____ s				
4.*	Input capability:	Number of Analog inputs _____				
	Number of Digital inputs _____					
5.*	Standard interface software available for			MODBUS PROTOCOL	[X]	
				Other _____		
6.*	Proven interface software available for following vendors:					
	a) Make _____			Model No. _____		
	b) Make _____			Model No. _____		
	c) Make _____			Model No. _____		
	d) Make _____			Model No. _____		
7.#	Functional Requirements:					
	Type of communication	Simplex	[ ]	Duplex	[X]	
	Automatic Time synchronization			Required	[X]	
	Transfer of device diagnostics			Required	[X]	
	Transfer of device data & validation codes			Required	[X]	
	Transfer of calibration data			Required	[X]	
	Interface diagnostics available at	Central level	[X]	Local level	[X]	
				Other _____		
8.*	Time taken to transfer data from Device to DCS operator console _____ s					
	Note-Contractor shall fill up this sheet separately for each foreign device.					
C)	Interface with Anti Surge Control system					
1.*#	Type of Interface	Serial	[x]	RS 232/485	[x]	
		Any other _____				
2.#	Communication Protocol	Vendor Standard	[x]	MOD BUS	[ ]	
3.#	No. of AS control system	Two	[x]			
	Interfaces	Maximum				
4.*	Input capability	No. of Analog inputs _____				
		No. of Digital inputs _____				

5.*	Proven interface available for anti-surge control system				
	a) Make_____		Model No._____		
	b) Make_____		Model No._____		
	c) Make_____		Model No._____		
	d) Make_____		Model No._____		
6.#	Functional Requirement				
	Type of communication		Duplex		[x]
	Automatic Time Synchronisation		Reqd.		[x]
	Transfer of AS control		Reqd.		[x]
	system diagnostics				
	Interface diagnostics available at	Central level	[x]	Local level	[x]
			Any other_____		
7.*	Time taken to transfer data		_____		
	from AS system to operator console				
8.*	Model No.	_____			
D)	Interface with Vibration Monitoring system				
1.*#	Type of Interface	Serial	[x]	RS 232	[ ]
	RS 422/485	[x]	Any other_____		
2.#	Communication Protocol	Vendor Standard	[x]	MOD BUS	[X]
3.#	No. of VM System	As per Input/Output summary			[x]
	Interfaces				
4.*	Input capability	No. of Analog inputs _____			
	`	No. of Digital inputs _____			
5.*#	Proven interface software		Make- Bentley Nevada		[x]
	available for VM system		Any other_____		
6.#	Functional Requirement				
	Type of communication		Simplex		[x]
	Automatic Time Synchronisation		Reqd.		[x]

	Transfer of VM System diagnostics		Reqd.		[x]
	Interface diagnostics available at	Central level	[x]	Local level	[x]
	Any other	_____			
7.*	Time taken to transfer data from VM system to operator console	_____			
8.*	Model No.	_____			

14. HARDWIRED INSTRUMENTS

A) INDICATOR/ INDICATING CONTROLLER/ RECORDER **(NOT APPLICABLE)**

1#	Type	Digital	[ ]	Other_____	
		µp based	[ ]	Configurable	[ ]
		Other_____			
2#	Mounting	Flush	[ ]	Multi-case	[ ]
		Other_____			
3#	Enclosure	General purpose	[ ]		
4#	Intrinsic safe	Yes	[ ]	IEC Class_____	
		With external Barriers	[ ]		
5#	Power supply for transmitters with instrument	24 V dc	[ ]	Other_____	
		[ ] Redundant common		[ ]	
6#	Input	4-20 mA dc(2-wire)	[ ]		
7#	Self diagnostic feature	Required	[ ]	Local level	[ ]
			Other_		
8#	Communication with DCS	Available	[ ]	Not available	[ ]
9.	Indicator		*Model No._____		
	a)# Number of inputs per instrument	One	[ ]	Two	[ ]
			Other_		
	b)# Input selection for display	Continuous	[ ]		
	thru' instrument keyboard		[ ]		

c)#	Display requirement	Bar graph	[ ]	Digital	[ ]
10	Indicating Controller		*Model No._____		
	a)* Architecture	Integral	[ ]	Split	[ ]
	b)# Output	4-20 mA dc	[ ]		
	c)* Number of I/O per instrument	Analog inputs_____	Analog outputs_____		
	d)# Scan time	250 ms	[ ]	Other_____	
	e)# Display requirement	Bar graph	[ ]	Digital	[ ]
	f)# Display selection	Continuous	[ ]		
	thru' instrument keyboard		[ ]		
	g)# Control mode selection	Required	[ ]		
	Auto/ cascade/ manual		[ ]		
	Local/ computer		[ ]		
	h)# Set point adjustment	Required	[ ]		
	i)# Manual loader	Required	[ ]		
	j)# Auto tracking of controller	Required	[ ]		
	k)# Other Specification:	As per controller and data-acquisition subsystem.			
11	Recorder **(NOT APPLICABLE)**		*Model No._____		
	a)** Chart	Strip	[X]	Size_____	
	b)* Recording type	_____			
	c)* Chart speed	25 mm/hr	[X]		
B)	HARDWIRED ANNUNCIATOR		*Model No._____		
	a)# Type	Audio	[X]	Visual	[X]
	b)# Sequence	As per ANSI/ISA-18.1 F3A / A2			
	c)# Mounting	Flush	[X]		
	d)# Power supply location	with logic	[X]		
	e)# Logic Unit	Integral	[X]	Separate	[ ]
	f)# Display type	Back lighted	[X]	Two lamp/alarm	[X]
		Clustered LED Type/Alarm	[X]		

	g)# *window size	_____			
	h)# Hooters	External to DCS	[X]	Solid state	[X]
	i)# Alarm Acknowledgement	Integral	[ ]	Separate	[X]
C)	HARDWIRED SWITCHES/ PUSHBUTTONS		*Make_____		
			*Model No._____		
	a)# Contact type	Silver alloy plated	[X]	Make before break	[X]
	b)# Sealed Contact housing	Required	[X]		
	c)# Contact rating	5 A @ 220 V ac	[X]	2 A @ 24 V dc	[X]
		5 A @ 110 V ac	[X]		
	d) Lamp type	Clustered LED Type/Alarm	[X]		
D)	RECEIVER SWITCHES (ALARM CARD) **(NOT APPLICABLE)**				
	*Make_____*Model No.				
	a)# Type of input	4-20 mA (2 wire)	[ ]	1-5 V dc	[ ]
	b)# Type of contact	SPDT	[ ]		
	c)# Contact rating	2 A @ 24 V dc	[ ]	Other_____	
	d)# Number of settings per module	One	[ ]	Two	[ ]
	e)# Power Supply	24 V dc	[ ]	Other_____	
	f)* Mounting	Rack	[ ]	Surface	[ ]
E)	TRIP AMPLIFIER **(NOT APPLICABLE)**		*Make_____		
			*Model No._____		
	a)# Type of input	Grounded thermocouple	[ ]	Type T/E/K	[ ]
		RTD Pt 100 DIN 43760			[ ]
	b)* Maximum source resistance		2000 Ω		
	c)# T/c burn-out Protection	Required	[ ]	Upscale	[X]
		Downscale	[ ]		
	d)# RTD open protection	Required	[ ]	Field Configurable	[ ]
	e)# Type of contact	SPDT	[ ]		
	f)# Contact rating	2 A @ 24 V dc	[ ]	Other_____	

	g)# Number of settings per module	One	[ ]	Two	[ ]
	h)# Power supply	110 V ac, 50 Hz	[ ]	Other_____	
	i)* Mounting	Rack	[ ]	Surface	[ ]
F)	MV/I CONVERTER **(NOT APPLICABLE)**			*Make	_
	*Model No._____				
	a)# Type of input	Grounded thermocouple	[ ]	Type T/E/K	[ ]
	b)* Maximum source resistance		2000 Ω		
	c)# Thermocouple burn-out protection	Required	[ ]		
	d)# Cold junction compensation	Required	[ ]		
	e)# Signal linearisation			Required	[ ]
	f)* Input isolation	Available	[ ]	Not available	[ ]
	g)# Output	4-20 mA	[ ]		
	h)# Maximum load resistance	600 Ω @ 24 V dc	[ ]		
	i)# Power supply	110 V ac, 50 Hz	[ ]	Other_____	
	j)* Mounting	Rack	[ ]	Surface	[ ]
G)	SIGNAL ISOLATOR			*Make_____	
				*Model No._____	
	a)# Input			4-20 mA dc (2 wire)	[X]
	b)# Output			4-20 mA dc	[X]
	c)# Isolation			Required	[X]
	d)# Number of outputs			Two	[X]
	e)# Power Supply	110 V ac, 50 Hz	[ ]	24 V dc	[ ]
				Other _____	
	f)# Mounting	Rack	[ ]	Surface	[ ]

15. INTRINSIC SAFETY BARRIERS

1	Function	To limit the transfer of energy to hazardous area.			
2	Hazardous area Classification	NEC Division 1 Gr.B, C & D			
3	Location	Control room	[X]	Safe Area	[X]
4	Specifications				

4.1#	Type	MTL 5000 series or equivalent				[X]
		Single	[X]	Dual		[ ]
		Non Isolating	[ ]	Isolating		[X]
		Three Port	[X]			
		Voltage Level – 250 V**				[X]

Note ** :In case isolation voltage level is less than 250 V, vendor to ensure

(a) Any voltage more than permitted isolation voltage of barriers shall not enter the barrier cabinet.

(b) Barrier cabinet shall be provided with redundant power feeders each with over volt protection for the supplied isolation voltage of barriers.

4.2*	External Power Supply	Required	[ ]	Not Required		[ ]
	110 V, 50 Hz	[ ]		24 V dc		[ ]
		Others_____				
4.3*	Barrier specification					
4.3.1	Transfer accuracy	Temperature 0.05%	[X]	Analog 0.075%		[X]
4.3.2	Response time	Analog 250 µsec	[X]	Digital 10 msec		[X]
4.3.3	Status indication	Required	[X]			
4.3.4	Cold Junction Error	1ºC	[X]			
4.3.5	Cable Parameters	As per enclosed table				
4.4#	Maximum fault voltage	250 V rms.	[X]			
4.5*	Grounding	Individual thru' bus bar	[ ]			
5#	Certification	Approval Certificate from recognized statutory body				

Notes: 5)# Vendor to ensure that the Barriers are suitable for the following cable parameters.

SIGNAL TYPE	CABLE TYPE	R(Ω/km)	L(Mh/km)	L/R(H/Ω)	C(pF/m)
4-20 mA & CONTACTS	12p X 0.5 mm² Shielded (16 strand each of dia 0.2 mm)	39.7	-	25	400

6)# The type and Model No. of transmitters and I/P converters shall be intimated after the placement of order.

7)# In case of bulk Power Supply, dual channel Barriers must be used whenever non-isolating barriers are to be used.

16. CONSOLES, CONTROL PANEL, CABINET AND ACCESSORIES

*Model No._____

1*	Installation Location					
	a) Location	Indoor	[X]			
	b) Flooring	False	[X]	Concrete		[X]

	c) Floor Loading Limits		No	[ ]	1200 kg/m^2	[ ]
	d) Vibration		No	[X]	Yes	[ ]
	e) Air Conditioning		Yes	[X]	No	[ ]
2	General Details					
	a)# Type		Self Supported	[X]	Free Standing	[X]
	b)# Panel		Enclosed Cubicle	[X]		
	c) Graphic requirements		Non-Graphic	[X]	Semi-Graphic	[ ]
	d)# Lighting Requirement		No	[ ]	Yes	[X]
		For Inside Panel/Cabinet		[X]	Door Switch	[X]
		Power supply 230 V ac, 50 HZ		[X]	Other_____	
	e)* Ventilation		Yes	[X]	No	[ ]
			With louvers	[ ]	With Fan	[ ]
	f)# Fan Failure Alarm		Required	[X]		
		On Operator Console		[X]		
	g)# Doors		Yes	[X]	No	[ ]
			Rear	[X]	Side	[ ]
	h)# Door Width		Double Door	[ ]		
		Each max of 300 mm (for system cabinets)		[X]		
		Each max. of 600mm (for panels)		[X]		
	i)# Special Features		Vibration-proof	[X]	Explosion-proof	[ ]
			Drip proof	[ ]	Pressurized	[ ]
	j)# Cable entry		Bottom	[X]	Top	[ ]
			Glands	[X]		
	k)# Receptacles	For 110 V/240 V ac		[X]	For Telephone Set	[X]

3 a) Size and Quantity:

Note: Height for all cabinets shall be 2200 mm Max., including channel base of 100 mm.

DESCRIPTION	MAKE	DIMENSIONS IN mm			QTY.	WEIGHT WHEN FULLY LOADED
		WIDTH	HEIGHT	DEPTH		

CONTROL PANEL						
DCS SYSTEM CABINET						
AS POWER DISTRIBUTION CABINET						
DC POWER DISTRIBUTION CABINET						
TRIP AMPLIFIER/ AUXILLARY CABINET						
PLC I/O CABINET						
PLC PROCESSOR CABINET						
PLC CONSOLE						
OPERATOR CONSOLE						
ENGINEER CONSOLE						
HARDWIRED CONSOLE						

b) Channel Base — 100 X 50 X 6 mm [X] — MS [X]

4# Painting Colour:

a) External — Opaline Green (IS 275) [ ]

Light Admiralty Grey (IS 697) [ ]

b) Internal — Pale Cream(IS 352) [X]

Beige (IS 388) [ ]

c) Channel Base — Black [X]

d) Panel Finish — Non Glossy High Satin [X]

5 Constructional details:

a) Control Panel

b)* Front Plate — CRCA 3.2 mm thick steel [X]

HRCA 5 mm thick steel [X] — Welded to Frame [X]

c)# Side and Top Plates — CRCA 2 mm Thick steel [ ] — Welded to frame [ ]

d)# System Cabinets Front, Sides & Top — CRCA 2 mm Thick steel [X]

Welded to frame [X]

e)# Door Panel	CRCA 1.6 mm Thick steel	[X] Single Side hinge	[ ]
	Both Side hinge	[ ] Concealed Hinges	[X]
	Flush Pull Handle	[X] Lever type Handle	[ ]
f)* Anchor Bolt Size	_____		
g)# Frame angle size	50 X 50 X 4mm	[X]	
h)** Lifting Eye Bolt	Required	[X] Size_____	
i) Card Rack Size	19" Rack	[X]	
j)* Card Rack Type	Swing out pivoted	[ ] Fixed	[ ]

6. Wiring:

a)# Type	General Purpose	[X]	
	Intrinsic Safe	[X]	For Barrier Racks & other Intrinsically safe equipment.
b) Wiring details	As per notes attached	[X]	
c)# 110 V ac, 50 Hz UPS Wiring			
External to Cabinet/Panel	min. 3 x 2.5 mm² Copper conductor PVC insulated and armoured.		
Inside the Cabinet/Panel	min. 19 strands, 16 AWG Copper conductor PVC insulated.		
d)# 230 V ac Wiring	1.5 mm² Copper Conductor PVC Insulated Armoured.		
Low voltage int. to cabinet/panel	min. 19 strands, 16 AWG Copper Conductor PVC insulated.		
e)# Signal Wiring / 24 V dc Wiring			
External to cabinet/ panel	1.5 mm² twin twisted, individual shielded, overall shielded with overall drain, PVC insulated and armoured.		
Inside the Cabinet Panel	Stranded min. 7 x 20 AWG Copper conductor PVC insulated, twin twisted and shielded.		
f)# Terminal Type	Screw clamp type with Pressure Plate.		
g)# Terminal size for Signal	Suitable for min. 2.5 mm² size Conductor		
h) For Power Distribution	Suitable for min. 4 mm² size Conductor		
i)# Terminal Block	Clip-on Channel Mounted stack Type		
j) Wiring Colour Code			
i)# Power supply (110 V, 240 V ac)	Hot	Red	[X]

		Neutral	Black	[X]
		Earth	Green	[X]
	ii)# PLC dc Wiring (24 V dc)	Positive	Red	[X]
		Negative	Black	[X]
	iii)# Alarm System		White	[X]
	iv)# Control & Shutdown		Yellow	[X]
	v)# Analog Signals (Intrinsically safe)	Light Blue	[X]	

7**# Power Distribution Box

a) Location	Inside console/ panel/ cabinet	[X]
b) Power supply Isolation	Required for each instrument with fuse and switch where short circuit protection is required, else MCB shall be used.	
c) Fuse Type/Rating	HRC	[X]
d) Switch Type/Rating	DPST / 5 A @ 230 V ac	[X]

17. NOTES ON WIRING

1# All wiring shall conform to API RP 550 Part-I, Sections 7 and 12. Different signal level cables shall be routed under false flooring with separation distances as recommended by API RP 550 Section 7.

2# All wiring inside racks, cabinets, and back of the panels shall be housed in covered, non-flammable plastic raceways arranged to permit easy accessibility to various instruments for maintenance, adjustments, repair and removal.

All wiring in the raceways shall be properly clamped. All incoming cable shall be terminated by vendor at marshalling rack with cable glanding including supply of cable glands. Total wiring cross-sectional area shall not exceed 50 % of the raceway cross sectional area. Rubber Plastic grommets shall be used for wire entry into individual instrument and entry/ exit of wires through raceways.

3# Separate wiring raceways shall be used for power supply wiring, dc and low level signal wiring, and intrinsically safe wiring. Parallel runs of ac and dc wiring closer than 300 mm shall be avoided.

4# Vendor can alternately offer pre-fabricated cables for interconnection between different cabinets and panels.

5# Wire termination shall be done using self insulating crimping lugs.

6# More than two wires shall not be terminated on one side of single terminal. The use of shorting links for looping shall be avoided.

7# Terminal housing shall be strictly sized with considerations for accessibility and maintenance. Following points should be considered:

a)# Distance between terminal strip and side of the cabinet parallel to the strip, up to 50 terminals, shall be minimum 50 mm.

b)# Distance between terminal strip and, top and bottom of the cabinet shall be minimum 75 mm.

c)# Distance between two adjacent terminal strips shall be minimum 100 mm.

d)# Additional distance for each additional 25 terminals shall be minimum 25 mm.

e)# Distance between cable gland plate and the bottom of the strip shall be minimum 300 mm.

8# All terminal strips shall be mounted on suitable anodised metallic or plastic stand-off.

9# No splicing is allowed in between wire/ cable straight run.

10# Terminal strips shall be arranged group-wise for incoming and outgoing cables separately. 20% spare terminals shall be provided as a minimum.

11# Cabinet and rack layout shall be made considering proper accessibility and maintenance. 15% spare accessories like relays, switches, lamps, fuses etc., shall be provided as a minimum.

12# Terminal blocks for intrinsically safe wiring shall be separate.

NOTE: The distances given in point no. 7 are excluding the width of the race-way.

18. TRAINING KIT

*Model No._____

1#	Number of Training Consoles	One	[X]		
2#	Number of CRT's	One	[X]	Other TFT	
3#	Type of Consoles electronics	Individual	[ ]	Other_____	
4**#	Type of keyboards				
	Engineering Keyboard	Required	[X]	One	[X]
	Operator Keyboard	Required	[X]	One	[X]
	Maintenance Keyboard	Required	[ ]	One	[ ]
5#	Number of printers	One	[X]		
6	System requirements:				

a)** System modules:

DEVICE NAME	MODEL No.	MODULE TYPE INSTALLED (list out all installed cards in sub-system)	MODULES OFFERED
CONTROLLER & DATA ACQUISITION SUB-SYSTEM			
ENGINEER INTERFACE SUB-			

SYSTEM			
OPERATOR INTERFACE SUB-SYSTEM			
ANY OTHER (please specify)			

b)# Signal simulator/ generator Required [X]

c)# Application software to meet all functional requirements of system. Required [X]

7# Facilities and capabilities — Stand alone system for the following functions:

- Training of plant operators [X]
- Training of maintenance staff [X]
- Checking of system hardware and electronics modules [X]

8# Software Packages

- Distillation column [ ]
- Boiler [ ]
- Reactor [ ]
- Any other_____

9# Minimum I/O requirement

Analog Inputs for control:	24	[ ]
Analog Inputs for Data-Acquisition:	36	[ ]
Analog Outputs:	24	[ ]
Digital Inputs:	12	[ ]

Note: Training Kit must include all component hardware including all functionally distributed database, storage hardware/software, engineering console (if separately necessary for the system).

19. SEQUENCE OF EVENT RECORDER (SER)

*Model No._____

A. Offered System Details

1# a) Dedicated Sequence of Event Recorder [ ]

b) Combined with PLC [X]

2* Total no. of cabinets offered _____

a)* SER Cabinets _____

b)* Alarm Card Cabinets _____

3*	MTBF		_____hours			
4*.	MTTR		_____hours			
B.	SPECIFICATIONS					
1#	Type		µP Based	[X]	Configurable	[X]
		CPU Type	_____			
2#	Type of Enclosure		General Purpose	[X]		
3#	Configuration		Single	[X]	Duplex	[ ]
			Switch Over Time (if Duplex)	_____sec		
4#	Scan time		_____ msec			
5#	Processor cycle time		_____ msec			
6#	Resolution Required		1 msec	[ ]	100 msec	[ ]
			10 msec	[ ]	50 msec	[ ]
			Any Other	PLC Scan Time		

7* INPUT DETAILS

a) Input Isolation — Required [ ]

b) Type of Input Modules

Type of Module	Model No.	No. of Inputs per module
4-20 mA DC 2 wire (HART) [ ]		
0-20 mA DC (2 wire) [ ]		
1-5 V DC [ ]		
0.25-1.25 V DC [ ]		
Potential Free Contact [X]		
RS 232 C [ ]		

c) Max. No. of Input / Module

Analog	8	[ ]	16	[ ]
	32	[ ]		
Contacts	16	[ ]	32	[ ]

d) A/D Converter Resolution — 1500 steps [X] Actual _____

e) Load riving Capability — 750 Ω [X] Actual _____

8*	SER Capability					
	Analog Resolution		_____msec			
	Contact Input Resolution		_____msec			
9*	SER PC		Required	[X]	Not Required	[ ]
	Function of PC:					
		SER Configuration		[X]		
		Alarm Display		[X]		
		Diagnostics		[X]		
		Any Other		_____		
	Alarm Printer		Required	[X]		
	Type		Laser	[X]		
	Alarm Data Storage		Required	[X]		
	Storage Time		96 hours	[X]		
10*	Interfacing with: (INCLUDED IN PLC)					
		PLC	Yes	[ ]	No	[ ]
		DCS	Yes	[ ]	No	[ ]
		AIMS	Yes	[ ]	No	[ ]
11*	No. of Input Points		256 Nos.	[ ]		
			512 Nos.	[ ]		
			1024 Nos.	[ ]		
12*	Power Supply		110 V 50 Hz	[X]		