

All the peripherals shall conform to the following minimum requirement but the exact make & model shall be as approved by Owner during detailed engineering. The LAN to be provided under HMIPIS shall support TCP/IP protocol (Ethernet connectivity) with OPC RDI for interface with PLCs/other systems and shall have data communication speed of min. 100 MBPS. All network components of LAN and Servers/ Workstations shall be compatible to the LAN, without degrading its performance. The redundant LANs of all the units shall be connected through suitable network components. It shall be ensured that failure of this network component(s), shall in no way affect individual unit's operation monitoring & control in any way.

3.49.02 The Servers/Workstations/PCs/Laptop to be provided by the Bidder should be latest available in the market at the time of supply to prevent early obsolescence and shall be subject to Owner's approval. The software packages to be included with the server/OWS/PCs shall also be the latest version available at the time of supply.

3.49.03 However for Servers and Historians / Station LAN Server/ Programming station/NMS Server/operating work station/PC/Laptops, the hardware shall conform to the following minimum requirements:

SI No	Features	Servers/ Workstations for Information functions / Station LAN Server/ Programming station/NMS Server	Operator workstations/ Other workstations/ Documentation station (in case not part of prog. Stn.) and PC
1	Processor	Intel Xeon Six (6) Core 64 bit Processor capable 3.6 GHz with 16MB L3 cache memory per processor, Dual independent 1333 MHz system bus (2 way SMF) or better.	64 bit/32 bit - On board Intel - Xeon quad core, 3.46 GHz processor with 1066 MHz bus with Hyper threading or higher.
2	Memory	64GB ECC DDR - 3, 800 SDRAM.	8 GB DDR3 RAM
3	Drives	HDD - RAID 5 (1000 GB) Ultra 320 SCSI adaptors with internal storage capacity 3.6 TB DVD/CDROM - 24X CD- RW/DVD IDE combo USB - 4 ports DAT - 36 / 72 GB 2048 MB Graphic Accelerator	1 x 1000 GB IDE Hard Disc Drive of 7200 RPM or higher. 2048 MB Graphic Accelerator.
4	Monitor (colour)	LED based 24" sized Monitors. with non-interfaced refresh rate min. 75 Hz. Full HD resolution 1920 X 1080, 256 colours with MRPII compliant, viewing angle 178° vertical & Horizontal and fastest response	LED based 24" sized Monitors. with non-interfaced refresh rate min. 75 Hz. Full HD

		time.	resolution 1920 X 1080, 256 colours with MRPII ompliant, viewing angle 178° vertical & Horizontal and fastest response time.
5	RAID	SAS-channels, hardware RAID level 5 implemented	
6	Redundant hot swappable power-supply	2 nos.	
7	Removable bulk storage drive (DVD)	6GB (minimum)	
8	Removable Bulk Storage Media for above (with each server/work-station)	10 nos	
9	DVD R/W	16x or higher	16x or higher
10	Intelligent UPS (on line) with all accessories and software for remote monitoring for each workstation/server	1 no. each with 30 mins. Battery backup on machine load and 10% design margin at full load.	1 no. each with 30 mins. Battery backup on machine load and 10% design margin at full load.
11	Keyboard	ASCII	ASCII
12	Pointing Device	Optical Mouse	Optical Mouse
13	Accessories	Industrial grade furniture as approved during detailed engineering	Industrial grade furniture as approved during detailed engineering
14	Additional general purpose software (for using over network by servers/workstations/PCs)	Comprehensive disk maintenance utility for disk clean sweep/ crash guard/antivirus, etc. (like "Norton System Works Latest edition")	
15	Software	Windows 2008/2012/latest edition server version standard /Enterprise Edition or latest & proven version of Windows Operating system.	Windows XP/7 Professional or latest & proven version of

		General MS Windows latest, MS-Office Professional, Adobe Acrobat, anti-virus software with IPS, etc. Application engineering & HMI software - to suit project Specific requirement.	Windows OS with Multimedia. Third party operating system, graphical users interface and software, if required. General MS Windows latest, MS-Office Professional, Adobe-Acrobat, anti-virus software with IPS, AutoCAD etc. Application engineering & HMI software - to suit project Specific requirement.
16	Misc. Requirements	i. 1 Parallel port ii. 4 nos. USB 3.0/2.0 ports. (2 nos. on front side). iii. 4 – 10/100/1000 MB/1GB network ports iv. Two non-boards and two added v. External SCSI port vi. Dual hot plug power supplies vii. Dual Hot plug fans viii. 2 PCI Express slots (1x4 lane and 1x8 lane) ix. 2 PCI X slots (64bit/100MHz) x. 2 PCI slots (one 32bit/33MHz, 5V & one 64bit/66Mz) xi. Hot Redundant Server shall be provided, wherever required. xii. Backup & Disaster Recovery software.	System chipset: Intel Express. 2 x RS – 232 ports. 1 x parallel port. 4 nos. USB 3.0/2.0 ports. (2 nos. on front side). 1 x 16 X or better DVD R/W Drive. 2 x Ethernet (10 / 100 / 1000MB) cards (Industrial Grade). 2 nos. graphic output cards minimum. Sound card & Internal speakers. Wireless internet & Blue tooth Interface. Redundant power supply (In built).

The supervisory function of HMIPIS like log, calculations, shall be implemented in redundant Server/Information workstation, so that no functions are lost due to a

signal failure.

The mouse/keyboard/monitor shall have extra length of cable depending on the location of CPU rack (normally placed behind LVS panel).

Individual Monitors shall be supplied for all stations (except LVS OWS) Bidder to ensure that the aspect ratio of these monitors is same as that of the LVS being supplied.

3.49.04 Specification for Lap-Top (Note-Book) PC

All the Laptop will also be used as pluggable temporary programmer's station and operator station functionalities of the programming stations mentioned in the specifications shall be provided (including requisite license).

The LapTop shall meet following minimum requirements:

- Intel Centrino™ Mobile Technology.
- Intel Core – i7 Processor with 3.46 GHz, 4 MB L2 cache, 1066MHz
- FSB.
- 15" WXGA LED Screen with wide angle viewing.
- 1000 GB 7200 rpm HDD with shock absorber.
- 4 GB 800 MHz DDR3 SDRAM (slot for 1no. additional RAM slot should be provided)
- 1024 MB Graphic Accelerator
- 1 x windows XP/7 Professional or latest & proven version of Windows OS with Multimedia
- Slim type DVD-RW/DVD ROM combo drive.
- Internal 10/100/1000Mbps Ethernet card
- IEEE 802.11B connectivity port
- IR port
- Optical mouse
- 2Nos. USB 3.0/2.0 ports & Wireless INTERNET & blue tooth interface
- External mouse connectivity and optical mouse
- Minimum 8 hrs battery backup.
- Recovery software tools.
- Sound cards
- Internal speakers
- General MS Windows latest, MS-Office Professional, Microsoft Visual Studio, Adobe Acrobat, anti-virus McAfee or equivalent, etc.
- Application engineering & HMI software - to suit project specific requirement.
- Carry Bag.

3.49.05 Large Video Screen (LVS)

Large video screens, complete with projectors, screens, control units (graphical generators), Master controller, Matrix switcher & associated accessories shall be supplied as per the following specifications.

1. Size (diagonal) 65 inch – 70 inch
2. Type LED illuminated Digital Light Processing (DLP) technology with rear projection configuration.
3. Resolution of each screen Minimum 1400 x 1050 pixels and should offer 16.7 million colors.
(Bidder to ensure that the aspect



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ratio of OWS monitor is same as that of LVS being supplied.) The brightness uniformity should not be less than 95 % ANSI 9.

4. Configuration of LVS Single tier with Screens seamlessly combined with provision of expansion of one screen on each side.
5. Control Unit Same as operator work station without the LED monitor. Facility of projecting a particular display on a selectable area of the screen upon activation of a predefined event shall be provided.
6. Input signal interface Interfacing with Video signals, to receive & project pictures from CCTV, Owner's Live camera, VCP, Flame Camera
This Video signal shall be connected to video wall through Master controller.
Signal types : PAL, NTSC or SECAM in S-VHS/VHS, Composite, Component , S-Video DVI,VGA, SCADA Each cube should be capable of taking two inputs.
Matrix Switcher (for Unit Control room LVS) A matrix switcher shall be provided used for connecting the control unit to the video wall.
No of Inputs: 6
No. of Outputs: 6
Remote unit/video switcher for switching between video signal & HMI signal, selecting the video signal channel (live minimum 16 camera nos./location typically) shall be provided.
7. Illumination level Minimum 170 cd/sq.mtr.
8. Degree of viewing Minimum Horizontal +/- 33 deg and Vertical +/- 27 deg
9. The LVS and its accessories shall be designed in such a way that the brightness in the centre of the screen and the edges of the screen is uniform and there is no perceivable difference in the quality of the picture on the centre and on the edges of the screen. If any extra hardware has to be provided for achieving the above feature, same shall be provided by the bidder at no extra cost. The screens should have low inter screen gap of ≤ 0.2 mm for seamless viewing.
10. Auto brightness & colour adjustment between each screen. White point should be 3200k- 9600 K Custom.
11. The hardware/software of the control unit shall be such that the command execution time of any control command from the LVS shall be same or better than the execution time from the OWS as stipulated under 'Functional Guarantee, Vol II, chapter 8 of specifications. If during any stage of the contract, the command response times as stated in specifications are not achieved, the bidder shall upgrade the hardware/software of the control unit in order to achieve the same at no extra cost to the Owner.
12. Master controller unit shall be provided for controlling the entire video wall in Unit Control Room LVS. It shall be capable of projecting HMI



displays over a part of screen to multiple screens. Any configuration of windows shall be possible. Facility for overlays shall be provided. Specification of Master controller unit shall be same as specified for server.

13. Complete LVS analysis & diagnostic software shall be provided.
14. LVS annunciation functionalities shall be provided with salient features of the conventional hardware annunciations, while presenting more flexibility.
15. The projectors, screens, control units (graphical generators), Master controller and associated wall management software should be of same manufacture. OEM should have a manufacturing setup in India for Video Walls.
16. As no hardwired backup has been envisaged, the LVS should ensure operation of the plant in case of total failure of all operator stations. Hence Complete DDCMIS/PLC HMI & operation software shall also be loaded on respective display controller.
17. LVS shall be designed for continuous viewing (24 hours in a day) under normal room ambient lighting without any need to darken the room. Suitable darkening of the projection screen for light absorption shall be provided for this purpose.
18. The system should be configured such that any of the operators sitting on the same network should be able to work on the Large Video Screen sitting at his own position with his local keyboard & mouse.

3.49.06 Graphical Interface Unit

Minimum specifications of Graphical Interface unit shall be as follows:-

SI no.	Features	Description
1.	Power supply (Redundant)	230 V AC from UPS/24 V DC as per requirements.
2.	Display Size	10.4-15" minimum. Actual size as per owner's approval.
3	Display Type	Coloured, TFT high resolution screens
4.	Protection class	IP-65 for extremely dust prone area, otherwise IP-55. Enclosure shall be IP 65 for extremely dust prone area, otherwise IP-55
5	Keys	Function keys and numeric keys
6	Interfacing requirements	Interface with respective DDCMIS
7	Functional requirements	Ability to do programming. Graphics display including alarms and

		operator guidance messages.
8.	Enclosures	Required as per site/process requirements.
9.	Other requirements	Industrial Grade, GIU shall be ruggedly designed to withstand hard environments like high temperature, shock and vibration.

3.49.07 Printers

Sr no.	Features	Colour Laser Printer	Colour Laser Printer	Line Impact Dot Matrix Printer
1	Paper Size	A3	A4	132 column continuous fan fold type
2	Printing speed (min) in normal mode for A4 size	6 ppm (colour) 24 ppm (B&W)	4 ppm (colour) 16 ppm (B&W)	1000 LPM
3	Type	Heavy duty, at least 50000 pages/month	Heavy duty, at least 30000 pages/month	Heavy duty, at least 50000 pages/month
4	Resolution (black) (min.)	600 dpi	600 dpi	—
5	First page out time (with full graphic display)	=<1 min for colour, <45 sec for BW	=<1 min for colour, <45 sec for BW	
6	Paper input capacity (min.)	500 sheets	500 sheets	Continuous paper feed
7	Additional features	Automatic Duplex Printing		With printer Stand & sound proof enclosure (<60 dB)
8	Paper sheets (1 ream = 500 sheets) with each printer	20 reams (A3) 20 reams (A4)	20 reams (A4)	20 reams (132 column fan-fold)
9	Additional Cartridge/toner/ ribbon of each type as used in printer with each printer	1	1	10
10.	<u>Two sets of print cartridges and Five ream of papers shall also be provided with each printer provided anywhere in the plant by bidder with each control system and any other system specified elsewhere in specification.</u>			

3.49.08 TECHNICAL SPECIFICATION OF THE A0 SIZE SCANNER CUM PLOTTER

S.NO.		
1	PRINT	
	Media Size supported	Up-to 40" width or more
	Line drawings	28 sec per A1 Drawing
	Print resolution	2400 x 1200 dpi or more
	Technology	Thermal Inkjet
	Ink cartridge colors	6 colours or more (Cyan, grey, magenta, matte black, photo black, yellow)
		Dedicated Grey colour ink
	Ink types Dye-based (C, M, Y, G , pK)	pigment-based (mK)
	Line accuracy	+/- 0.1%
	Scan	
	Scanning Width (Media)	40 inch or more
	Scan speed Color	minimum 3.81 cm/sec (1.5 in/sec) or higher
	Grayscale	min 11.43 cm/sec (4.5 in/sec) or higher
	Scan/copy resolution	minimum 600 dpi or higher
	Maximum scan thickness	0.8 mm (0.03 in) or higher
	Scanning Technology	CCD
	Copy	
	Reduction/enlargement	25 to 400%
	Maximum copies	minimum 99 copies or higher
	Copier settings	Copy quality, copy color, roll, content type, original paper type, background removal, contrast, de-skew
	Media Handling	
	Printer	sheet feed, two automatic roll feeds, automatic roll-switching, automatic cutter
	Scanner	straight-through scan paper path for sheet and cardboard originals
	Media Types Printer	bond and coated paper, technical paper, film, photographic paper, backlit, self-adhesive
	Media Types Scanner	non-abrasive paper, vellum, translucent, Mylar, recycled, blueprints, cardboard (No plywood, stone plates, metal plates or abrasive, dirty, rough, sharp-edged, metal clamped, or

		burned surfaces or transparencies)
	Memory	32 GB (virtual), 160 GB hard disk minimum.
	Connectivity Interfaces	(standard) Gigabit Ethernet (1000Base-T), Hi-Speed USB 2.0/3.0 certified, E IO Jetdirect accessory slot and Direct USB Printing
	Print languages	TIFF, JPEG , HP GL /2, HP RTL , CAL S G 4, PCL 3 G UI
	PostScript	Adobe® PostScript® 3™, Adobe PDF 1.7, T IFF, JPEG , GL /2, RTL ,CAL S G 4, PCL 3 G UI
	Drivers Included	PostScript® Windows, Linux, and Mac drivers

3.50.00

Switches :

Layer-2/3 switches shall have the following features:

- i. High Performance Industrial grade
- ii. In built diagnostic features
- iii. 20% spare ports
- iv. Inbuilt redundant 24 V DC power supply.
- v. 48 X Gigabit Ethernet Port
- vi. 24 or 48 x 10/100/1000 Base TX ports (STP)
- vii. SNMP, RMON, VOIP, VLAN, Multi link Trunk support
- viii. Broadcast/multicast storm control, Supervisor Engine redundancy capability, Redundant Power Supply, Integrated Security features (IPS, ACL, Firewall), 10 GB module support for future upgradeability
- ix. Expandability/stackability through a dedicated high speed expansion port. Routable, remotely manageable, configurable.
- x. Intelligent SNMP manageable mini-UPS for 30 minutes backup shall be provided with all accessories and software.

Secondary switches shall have the following features:

- i. 24 or 48 X 10/100/1000 Base TX ports (STP)
- ii. 2 or 4 X Gigabit Ethernet Port
- iii. SNMP, RMON, VOIP, VLAN, Multi link Trunk support. Support for stacking with high throughput Broadcast/multicast storm control.

3.51.00

The Firewall shall meet following minimum requirements:

Industrial grade Firewall appliance should facilitate multi-vendor, multi-application environment and should support third-party products on open alliance. It should support Active-Active configuration.

- i. The firewall should contain following features:
 - (a) Stateful inspection of packets.
 - (b) NAT functionality, including dynamic and static NAT translations



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- (c) Latest version of SNMP
- ii. The firewall must send log information to a separate log server via an encrypted connection. Firewall logging must not impact firewall performance.
- iii. Remote network access to the firewall should only be possible through the administration interface.
- iv. The firewall administration station must be capable of pushing firewall security policies and configurations to individual or multiple firewalls through a secure, encrypted connection to the firewall administration interfaces.
- v. Graphical User Interface (GUI) and a Command Line Interface (CLI) for making changes to the firewall rules set should be provided. (Access to the firewalls via the GUI or the CLI must be through a secure encrypted channel).
- vi. Any changes or commands issued by an authenticated user should be logged to a database configured on any of the machines in the LAN. The administration station must allow for a hierarchical architecture for rules set administration and viewing of firewall configurations Management.
- vii. The firewall must not support any unencrypted means of access to the firewall.
- viii. It should Monitor ALL network traffic-traffic at Firewalls (Internet and external networks), in the DMZ and detect known threat through deep packet inspection.
- ix. Detects unknown threats via anomaly scanning.
- x. Detect unknown threats via behavior pattern to protect from zero day attacks.
- xi. Keeps up-to-date on new threats and vulnerabilities.

3.51.01 Intrusion Detection System (IDS) & Intrusion Prevention System (IPS) Features:

In order to inspect all inbound and outbound network activity and identify suspicious patterns that may indicate a network or system attack from someone attempting to break into or compromise a system on the Station LAN Network, the recommended IDS/IPS should contain the following combined features. Any feature can be selected depending on whether it is to be configured as IPS or IDS.

- i. Able to analyze, detect and report on security related events.
- ii. Able to inspect traffic and to drop malicious traffic based on the configuration of security policy.
- iii. Able to inspect the content of network packets for unique sequences/signatures.
- iv. Able to detect and prevent known types of attacks such as worm or Trojan infections and hacks.
- v. Able to prevent denial of service (DOS) and Distributed Denial of Service attacks.
- vi. Able to prevent abnormal behaviors by monitoring and learning normal network behaviors.
- vii. Keeps up-to-date on new threats and vulnerabilities.
- viii. Should provide user friendly interface to queries and reports on threats and event data so that security administrators can gain a better understanding of their ability to protect their network.
- ix. Should provide detailed activity logs for auditing.
- x. Able to detect known threats via deep-packet inspection.



14.16.01 All technical manuals, reference manuals, user's guide etc., in English required for modification/editing/addition/deletion of features in the software of the PLC/Control system shall be furnished. The Bidder shall furnish a comprehensive list of all system/application software documentation after system finalization for Owner's review and approval.

14.16.02 All The software listings including source code for application software, All special - to-project data files etc. shall be submitted by the Bidder.

14.17.02 SOFTWARE LICENCES

The Bidder shall provide software license for all software being used in Bidder's System. The software licenses shall be provided for the project (e.g. organisation or site license) and shall not be hardware/machine-specific. That is, if any hardware/machine is upgraded or changed, the same license shall hold good and it shall not be necessary for Owner to seek a new license/renew license due to upgradation/change of hardware/machine in Bidder's System at site. All licenses shall be valid for the continuous service life of the plant.

As a customer support, the Bidder shall periodically inform the designated officer of the Owner about the software upgrades/new releases that would be taking place after the system is commissioned so that if required, same can be procured & implemented at site.

14.18.00 (A) SPECIFICATIONS OF OWS

The minimum requirement for OWS shall be as per Vol. V, Part B, Chapter 3.

UPS : 1 no. on-line Interactive UPS with 30 mins. battery backup on machine load (for OWS & its printer) with all accessories and software for remote monitoring facility for main off site package except CHP's off site package.

Accessories : Required furniture for mounting of HMI peripherals shall be provided.

(B) GRAPHICAL INTERFACE UNIT

The minimum requirement of Graphical Interface Unit are as follows:

SI No.	Features	Description
1.	Power supply (Redundant)	24 V DC or 230 V AC from UPS as per requirements.

2.	Display Type	10.4" – 15" sized minimum Colour, high resolution TFT screens with keypad. Actual size as per owner approval.
3.	Humidity & Operating Temperature	5-95%, 0-50 deg C
4.	Protection class	IP-65 for extremely dust prone area, otherwise IP-55. Enclosure shall be provided to prevent ingress of dust.
5.	Keys	Function keys and numeric keys
6.	Interfacing requirements	Interface with respective PLC system
7.	Functional requirements	Ability to operate drives locally using function keys Graphics display including alarms and operator guidance messages.
8.	Enclosures	Required as per site/process requirements.
9.	Other requirements	Industrial Grade, GIU shall be ruggedly designed to withstand hard environments like high temperature, shock and vibration.

Note: Refer Appendix to Part-A and Annexure A to chapter 14, Vol. V FOR QTY of GIU.

14.19.00 PRINTER

14.19.01 Printers for Off-site packages shall be provided as indicated in Chapter 14, Annexure A as a part of the HMIS system. It shall print out all alarm/trip conditions and event changes in plant status along with date and time of occurrence.
The minimum requirement for printers & accessories shall be as per Vol. V, Part B, Chapter 3.

14.20.00 PLC Configuration:

The PLC configuration will have a hierarchy of industrial grade open system architecture for management information system (MIS) and closed system architecture for plant operation and control system.

The complete MIS system including hardware, software, cables etc, as required shall be provided. This shall acquire dynamic pre-configured points and mimics as required by Owner.



14.16.01 All technical manuals, reference manuals, user's guide etc., in English required for modification/editing/addition/deletion of features in the software of the PLC/Control system shall be furnished. The Bidder shall furnish a comprehensive list of all system/application software documentation after system finalization for Owner's review and approval.

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The minimum requirement for OWS shall be as per Vol. V, Part B, Chapter 3.

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Accessories : Required furniture for mounting of HMI peripherals shall be provided.

(B) GRAPHICAL INTERFACE UNIT

The minimum requirement of Graphical Interface Unit are as follows:

SI No.	Features	Description
1.	Power supply (Redundant)	24 V DC or 230 V AC from UPS as per requirements.

2.	Display Type	10.4" – 15" sized minimum Colour, high resolution TFT screens with keypad. Actual size as per owner approval.
3.	Humidity & Operating Temperature	5-95%, 0-50 deg C
4.	Protection class	IP-65 for extremely dust prone area, otherwise IP-55. Enclosure shall be provided to prevent ingress of dust.
5.	Keys	Function keys and numeric keys
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8.	Enclosures	Required as per site/process requirements.
9.	Other requirements	Industrial Grade, GIU shall be ruggedly designed to withstand hard environments like high temperature, shock and vibration.

Note: Refer Appendix to Part-A and Annexure A to chapter 14, Vol. V FOR QTY of GIU.

14.19.00 PRINTER

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14.20.00 PLC Configuration:

The PLC configuration will have a hierarchy of industrial grade open system architecture for management information system (MIS) and closed system architecture for plant operation and control system.

The complete MIS system including hardware, software, cables etc, as required shall be provided. This shall acquire dynamic pre-configured points and mimics as required by Owner.

