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1. INTRODUCTION

1.1. Scope

This document covers the specific requirements of the equipment and /or materials of I-TV system for "SHI LNG system test facilities" project.

This Specification will present supplier with minimum requirements and information. However, it is supplier's responsibility to develop the design in further detail and to satisfy the design conditions.

1.2. Language

All documents and drawings to be submitted shall be lettered in English or Korean.

2. SCOPE OF SUPPLY OF WORK

2.1. Item to be purchased

The following item shall be furnished in accordance with the requirements specified in this specification and other related documents.

ITEM	Q'TY	REMARK
I-TV System	1 lot	

All the related costs to be incurred by designing, documentation and tests & inspections at the Supplier's factory shall be included in the cost of the materials.

The Supplier shall include the supply of all materials, equipment and services for the complete installation within Supplier's scope of supply & work with the exception only of those details specifically stated herein as being supplied by others.

2.2. Scope of supply

The following table shows the minimum quantities of I-TV system. Supplier has a responsibility to provide all the necessary materials for complete system.

ITEM	Q'TY	UNIT	REMARK
I-TV camera with Junction Box	6	Sets	
- Explosion Proof Type	2	Sets	
- Weather Proof Type	4	Sets	

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ITEM	Q'TY	UNIT	REMARK
I-TV camera pole (Height : 3m)	6	Sets	3m : 2ea 4m : 4ea
I-TV system cabinet	1	Set	
Digital Video Recorder (DVR)	1	Set	
Monitor (24"LED) with keyboard & mouse	1	Set	
Monitor (50"LED) with wall mounting bracket	1	Set	
Interface cables between vendor equipment/device	1	Lot	
I-TV pole anchor bolt & nuts with steel plates	1	Lot	

2.3. Scope of work

- (1) All hardware with accessories and software for complete I-TV
- (2) Internal wiring inside local I-TV junction box and cabinet
- (3) Documentation
- (4) Supervision for installation
- (5) Commissioning
- (6) Training
- (7) Packing and Shipping
- (8) Inspection and test (FAT & SAT)
- (9) Performance guarantee
- (10) Information for Purchaser's foundation drawings
- (11) I-TV Pole structural calculation
- (12) Spare part list for 2 years operation

2.4. Out of Scope

- (1) Fiber Optic cables between CCR to local junction box
- (2) All civil foundation work

3. CODES AND STANDARD

The I-TV system covered by this specification shall be designed, inspected and tested in accordance with, but not limited to, the following listed codes, standards of latest edition in

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effect at time of placement.

- Korea Fire Safety Law and its Subsidiary Codes.
- Korean Industrial Standard (KS)
- American Petroleum Institute (API)
- American Society of Mechanical (ASME)
- International Electrotechnical Committee (IEC)
- National Fire Protection Association (NFPA)
- National Electric Manufacturers Association (NEMA)
- Other standards if required

In case of conflict between laws, codes and standards, it is imperative to notify the items by official announcement to the purchaser, who determine which codes or standards shall take precedence. The above codes and standards are representative. The intent of this paragraph is to cause the Supplier to comply to the applicable sections of these documents for the type of equipment and application specified. Any additional codes or standards which are determined to apply to the equipment as provided will be resolved by mutual agreement.

4. TECHNICAL SPECIFICATIONS

4.1. I-TV Camera

I-TV camera shall be provided with color camera, zoom lens, camera housing/wiper, pan/tilt in one body.

4.1.1. Color Camera

- | | |
|---------------------|---|
| 1) Sensor type | : 1/1.9" High sensitivity ultra low light CMOS sensor |
| 2) Effective pixels | : Full HD 2 mega pixels |
| 3) Angle of view | : Horizontal 60° (wide) ~ 2° (tele) |
| 4) Lens type | : Auto iris type |
| 5) Zoom | : Optical x30, Digital x12 |
| 6) Focal length | : f = 4.3 ~ 129 mm |

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4.1.2. Camera Housing & Pan/Tilt

- 1) Material : Die cast aluminum
- 2) Explosion type : Ex d, IIB, T3, IP65
- 3) Pan angle & speed : 360° continuous rotation, 6° /sec
- 4) Tilt angle & speed : 90°, 3° /sec
- 5) Power supply : AC 220V, 60Hz
- 6) Including Wiper

4.1.3. Local Junction Box

Local Junction Box (JB) shall be provided with Fiber Distribution Frame(FDF), FO hub switch, Video/Control/Power surge protector with complete assembly. The video/control/power cables between I-TV camera and JB shall be supplied by vendor. The junction box shall be die cast aluminum with explosion proof type (Exd, IIB, T3, IP65) and mounted on the I-TV pole.

4.1.4. I-TV Pole

Supplier shall supply I-TV Pole (3m, Carbon steel) to monitor the wide range of plant area. I-TV pole shall be equipped with Pole safe guard, anchor bolt and steel plate.

4.1.5. System Cabinet

I-TV system Cabinet shall have suitable Fiber Distribution Frame(FDF), FO hub switch, Video/Control/Power surge protector and Power control Unit (PDU) considering the number of I-TV camera in the field.

All components inside cabinet shall be wired by supplier and the cables between cabinet and Digital Video Recorder(DVR) and Remote monitor shall be supplied by vendor.

Cabinet shall have front and rear access door and preferred dimensions are 2100(H) including plinth x 800(W) x 800(D) and the cable entry shall be bottom entry.

4.1.6. Digital Video Recorder (DVR)

For the purposes of recording and retrieval of images, a digital video recorder(DVR)

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shall be provided. DVR shall be installed inside I-TV cabinet. The storage unit shall be capable of storing the images for a minimum period of 2 weeks.

DVR shall record continuously while playing back and be capable to be networked to remote installation to enable the retrieval and storage of video footage.

The DVR shall provide a minimum functions as the following.

- No. of channel : 8 CH (min.)
- Interface : RS-485 or Ethernet
- RAM : 4 GB
- CPU : Intel Core i7
- H.D.D : 2 TB

4.1.7. Remote Monitor

24" LED monitor with keyboard and mouse shall be provided to enable operator access to the I-TV camera system. Minimum functions of keyboard shall be on/off, wiper on/off, pan & tilt, zoom and focus.

50" LED monitor shall be provided to enable operator access to the I-TV camera system.

The monitor shall provide as the following.

- Manufacturer : SAMSUNG
- Model No. : UN55NU7050FXKR
- Accessories : Adjustable wall mounting bracket, DVI-HDMI cable with 20m

5. GENERAL REQUIREMENTS

5.1. Design Services

Design services furnished by Supplier shall include all functions necessary to provide completely engineered system, drawings, data books, operating manuals and maintenance manuals, etc.

- (1) Drawing and data submittal
- (2) Coordination with sub-Supplier

5.2. Supervision Service

The Supplier shall furnish competent experienced service representatives who will provide

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technical direction and perform duties as required to assure a successful operation of the system.

Testing and start-up service shall include inspection of equipments as delivered to jobsite, adjusting, testing and placing into all the complete I-TV system.

Supplier shall provide all special tools, equipment and consumables necessary for installation and initial start-up of the complete I-TV system. Service representative costs related to correcting design and manufacturing deficiencies in Supplier furnished equipment shall not be chargeable to the purchaser.

5.3. Kick-off meeting

The kick-off meeting shall be held between the both of parties to facilitate communication on technical matters. Supplier shall dispatch a sufficient number of qualified personnel who attend the kick-off meeting at the purchaser's office.

5.4. Training for Owner trainee at site

Training courses shall be available for Owner's operator.

6. SUPPLIER DATA REQUIREMENT

6.1. General

- (1) All documentation and drawings including information, calculations, schedules, etc. shall be submitted within the specified due date, as indicated in Section 6.2. Supplier shall be responsible for submitting all documentation in accordance with a program to be prepared by the Supplier's own allowing all participants sufficient time to check, access, comment, and eventually approve the documents.
- (2) The quality of the submitted documents must be in accordance with acceptable international practice and allow a speedy checking procedure. Documents not fulfilling these requirements will be returned to Supplier without comments for Supplier's improvement and resubmission. It is solely at the discretion of Purchaser to decide whether or not documents are acceptable.
- (3) All Supplier documentation shall employ Korean or English language.
- (4) Supplier's subcontractor list shall be approved by Purchaser prior to order to subcontractor.

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- (5) Technical documentation of Supplier's subcontractor shall be reviewed and cross-checked and approved by Supplier prior to submission to Purchaser for approval.
- (6) Supplier's drawings (for layout, outline, assembly or subassembly, arrangement) shall include basically the followings:
 - Coordinates and North direction arrow mark
 - Descriptions of elevation base
 - Parts list
 - Revision mark and revised description
 - Project title block with full descriptions
- (7) Supplier's drawings shall be prepared on ISO standard sized sheets of A1, A3 and A4.
- (8) The numbering system for equipment, piping, instrumentation, correspondences, drawings and documentation for this project will be informed to the Supplier after contract and shall be followed by the Supplier.
- (9) When submitting revised Supplier documents, Supplier shall clearly indicate all revised points with cloud mark and/or revision marks. This is mandatory requirement. Supplier shall be responsible for all possible results caused by omitting revision mark. Any document omitting the revision marks may be returned without comment.
- (10) Purchaser's acceptance, with or without comments, of Supplier's documents does not relieve Supplier from complying with all terms, conditions, codes, standards, requirements of the order and this specifications. Purchaser reserves the right to review and comment on documents that have previously accepted with or without comments, and Supplier shall incorporate those comments without any cost and delivery impact.
- (11) Purchaser's comments on submitted documents are not to be considered as authorization to change the scope of purchase order, unless commented as scope change. Changes of scope shall only be effected via letter or fax.
- (12) Formal clarification, exception and deviation ("deviation" hereinafter) list shall be submitted in Supplier's proposal. If deviations are specified on some part of proposal, not in formal deviation list, then the deviation shall be not accepted at all. All requirements in this specification shall be deemed accepted by Supplier if not specified in deviation list. Any deviation shown on Supplier document after contract award shall not be accepted by Purchaser even though Purchaser overlooks it.



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6.2. Engineering Document Requirement

Document	When bid No. of copies	For Approval		Final		Remark
		No. of copies	Due date	No. of copies	Due date	
GENERAL DOCUMENTS						
1) Supplier print index/ schedule		*1	4w	*2	+3w	Note 6
2) Engineering, fabrication, test & delivery schedule by item		*1	4w	*2	+3w	
3) Monthly progress report			Monthly			
4) Clarification, exception and deviation list against this specification	PDF					
5) Sub-Supplier list		*1	12w	*2	+3w	
6) Spare parts list for installation & site tests with itemized price	PDF	*1	12w	*2	+3w	Note 3
7) Recommended spare parts list for 2-years operation with itemized price	PDF	*1	12w	*2	+3w	Note 3
8) Special tool list	PDF	*1	12w	*2	+3w	Note 3
9) Training program and schedule		*1	24w	*2	+3w	
10) Installation, operation and maintenance manual				*2	30w	
11) Packing specification				*2	-4w	
12) Shipping schedule & packing list				*2	-4w	
13) Technical data requested by Purchaser (Including Foundation information, ITV pole weight etc.)	PDF					
INSTRUMENTATION DOCUMENTS						
1) Equipment List	PDF	*1	12w	*2 *4	+3w +++2w	
2) Specification & Data Sheet	PDF	*1	12w	*2 *4	+3w +++2w	
3) System Configuration with description	PDF	*1	12w	*2 *4	+3w +++2w	
4) System cabinet arrangement		*1	12w	*2 *4	+3w +++2w	
5) Dimensional drawing		*1	12w	*2 *4	+3w +++2w	
6) Equipment catalogues	PDF	*1	12w	*2	+3w	



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Document	When bid No. of copies	For Approval		Final		Remark
		No. of copies	Due date	No. of copies	Due date	
GENERAL DOCUMENTS						
Q.A DOCUMENTS						
1) Quality assurance manual	PDF	*1	14w	*2	+3w	
2) Inspection and test plan including 3rd party	PDF	*1	14w	*2	+3w	
3) Inspection and test procedure		*1	14w	*2	+3w	
4) Shop inspection & test report, certificates				*2	-4w	
5) Site acceptance test plan & procedure		*1	24w	*2	+3w	
6) Site test report				*2	+3w	
7) KOSHA, KTL or KGS certificate for explosion-proof type electric equipment and instruments	PDF			*2	-2w	
DATA BOOK PACKAGE						
1) Data book package		*3	-2w	*4	++2w	

Legend : *1 : 9C + PDF files *2 : 13C + PDF files *3 : 6C + 2 USB *4 : 18C + 7 USB

OR : Original C : Hard Copy(by air mail) PDF : PDF file(by e-mail) USB : USB memory stick

+ : after receiving comment - : before shipment ++ : after shipment +++ : after site tests

- 1) Quotation must include cost of above data.
- 2) Revised drawing and documents shall be submitted within 3 weeks after Purchaser's comment issue unless otherwise specified in this section.
- 3) Documents required for proposal as specified in "When bid" column shall be included in the proposal. Omission of any document may cause rejection of the proposal at the discretion of Purchaser.
- 4) Any document submission schedule that Supplier cannot follow shall be clearly suggested in Bidder's deviation list in proposal. Supplier shall have the obligation to keep the submission schedule specified in this section unless otherwise agreed.
- 5) Supplier document list containing all anticipated drawings and data shall be submitted prior to first issue of Supplier documents as soon as possible. This list shall be updated and submitted to Purchaser with each issue of Supplier documents.
- 6) Specified instrumentation documents shall be updated by Supplier incorporating all field changes, if any, that may happen during installation and site tests.

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7. SUPPLIER DATA REQUIREMENT

7.1. General

- (1) As the inspection and presence required, Supplier shall submit the plan of production test to Purchaser.
- (2) Supplier shall execute inspection and test at the Supplier's factory or at the site in the presence of Supplier, based on various test plans and inspection procedures approved. If any defect is found through the inspection and test, it must be replaced or repaired at Supplier's expense.

1) Intermediate inspection of manufacture

As necessary to check the materials used and the manufacturing process, the intermediate inspections will need to be executed.

2) Inspection of completion

The test report should be submitted before the inspection and presence of Purchaser, the duplicated items can be substituted.

7.2. Tests

- (1) The tests are comprised of the inspections of appearance, structure and quantity, and the operational test.
- (2) Supplier shall keep the test equipments(vernier calipers, circuit tester, basic tools) ready and available during the test.

8. PACKING, SHIPPING AND STORAGE

- 8.1. The system equipment shall be cleaned, prior to packing for shipment to remove all accumulated dust and manufacturing debris. All interconnecting cable connectors shall be protected and identified properly. Cable shall be packaged individually and identified clearly on the outside of the package.
- 8.2. The equipment shall be crated to allow movement by forklift, rollers, crane slings and/or skidding. The packing and boxing procedures shall be designed to provide proper equipment protection, with consideration given for site environment conditions, at the time of the year, when the shipment is made. All crates shall be clearly marked with purchase order number and item numbers.



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- 8.3. The boxes shall be marked to indicate the balance point. The weight of each box shall be marked on at least two sides in painted numerals at least three(3) inches in height.
- 8.4. Final shipping instructions will be delivered to the Supplier as required prior to shipment.
- 8.5. Prior to delivery Supplier shall identify to purchaser in writing all special storage and preventive maintenance requirements to be applied after receipt of equipment at the construction site.
- 8.6. All the devices are not allowed to be shipped without the approval of the person in charge of Purchaser.



KOGAS-Tech
KOREA GAS TECHNOLOGY CORPORATION

Comment Resolution Sheet



SAMSUNG HEAVY INDUSTRIES

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Document Status			Comment Status		
Code 1		Approved	Required to revise Document	O	
Code 2		Approved with Comments	Number of Open Comments		
Code 3		Not Approved			
Code 4	O	Noted			
No.	Company Comments		Contractor's Response		Status (Open / Close)
1	50" Monitor 1Set 추가 (제어실 벽면 고정용)		반영완료		Close