









NAME OF LSTK CONTRACT  
 CONTRACTOR  
 PROJECT

MONTH & YEAR  
 CLIENT  
 PMC : EIL  
 PROJECT OF 97

UNIT NAME / SUMMARY LEVEL \*

ANNEXURE - II (E.3)

**BULK MATERIAL STATUS (SUMMARY)**

(LOCAL (INDIAN) AND FOREIGN PROCUREMENT SEPARATELY)

STATUS AS OF :

S.NO.	ITEMWISE DESCRIPTION	UOM	TOTAL REQUIREMENT	QUANTITY			FORECAST FOR BALANCE DELIVERY					STATUS/PROBLEMS	
				ORDERED	RELEASED	RECEIVED AT SITE	1	2	3	4	5		
1	PIPES	M											
2	FITTINGS	No.											
3	FLANGES	No.											
4	VALVES	No.											
5	ELECTRICAL ITEMS (ALL)												
	ALL ITEMS												
6	INSTRUMENTATION ITEMS												
	ALL ITEMS												

**SAMPLE**

NOTE :

1. SEPARATE STATUS FOR EACH UNIT AND AT SUMMARY LEVEL
2. STATUS TO BE GIVEN SEPARATELY FOR LOCAL (INDIAN) AND IMPORTED PURCHASE.

FORMAT STANDS DELETED  
 REV 1









NAME OF LSTK CONTRACT  
 CONTRACTOR

PROJECT

MONTH & YEAR  
 CLIENT  
 PMC : EIL  
~~PROJECT OFFICE~~

QUANTITATIVE MONTHLY CONSTRUCTION PROGRESS STATUS  
 ( UNITWISE/DISCIPLINEWISE)

ANNEXURE :II(G.2)

WORK ITEM DESCRIPTION	UNIT OF MEASUREMENT	TOTAL QUANTITY				PROGRAM FOR NEXT MONTH
		REMENT	WORKLOAD	FRONT	COMPLETED	
EXCAVATION	CM					
BACK FILLING	CM					
RCC WORKS	CM					
BRICK WORK	CM					
AG PPG - FAB	ID					
AG PPG - ERN	IM					
U/G PPG - FAB	ID					
U/G PPG - ERN	IM					
INSTRUMENTATION						
- LOOPCHECKING	NOS					

**SAMPLE**

PERCENTAGE PROGRAMMED DURING THE MONTH :  
 PERCENTAGE ACHIEVED DURING THE MONTH :  
 PERCENTAGE PROGRAMMED FOR NEXT MONTH :

CUM. PERCENTAGE PROGRESS SCHEDULE :  
 FRONT :  
 ACTUAL :



NAME OF LSTK CONTRACT  
CONTRACTOR

MONTH & YEAR

CLIENT

PMC : EIL

PAGE 20 OF 27

PROJECT

UNIT : \_\_\_\_\_

ANNEXURE : II (J)

**SYSTEM HANDING OVER STATUS (UNITWISE)**

S.NO.	SYSTEM DESCRIPTION	FORMAT I ISSUE DATE				FORMAT II ISSUE DATE				FORMAT III ISSUE DATE				FORMAT IV ISSUE DATE				FORMAT V ISSUE DATE			
		TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE	TARGET DATE	ACTUAL DATE		
A.	SYSTEM I	TARGET DATE																			
		ACTUAL DATE																			
		TARGET DATE																			
B.	SYSTEM II	TARGET DATE																			
		ACTUAL DATE																			
		TARGET DATE																			
C.	SYSTEM III	TARGET DATE																			
		ACTUAL DATE																			
		TARGET DATE																			
GRAND TOTAL		TARGET (NOs.)																			
		ACTUAL (NOs.)																			

**SAMPLE**

**LEGEND :**  
 FORMAT I : INFORMATION REGARDING SYSTEM COMPLETION  
 FORMAT II : CHECKLIST  
 FORMAT III : READY FOR PRE-COMMISSIONING \ MECH COMPLETION CERTIFICATE  
 FORMAT IV : READY FOR COMMISSIONING CERTIFICATE  
 FORMAT V : COMPLETION OF COMMISSIONING CERTIFICATE

**NOTE :**  
 1. TO BE FURNISHED SEPARATELY FOR EACH UNIT  
 2. REPORTING SHALL START AFTER PREPARATION OF SYSTEMWISE COMPLETION SCHEDULE







NAME OF LISTK CONTRACTOR  
CONTRACTOR

PROJECT

MONTH & YEAR  
CLIENT  
PMC: EIL  
PROJ: 59-01-97

**ANALYSIS**

**DELAY ANALYSIS**

ANNEXURE : II(P-1)

SR. NO	DISCIPLINE	WTD VALUE %	DURING THE MONTH %		CUMULATIVE PROGRESS %		DEVIATION	REMARKS
			SCH	ACT	SCH	ACT		
1	HMTD							
2	GENERAL CIVIL							
3	ARCHITECTURE							
4	STRUCTURAL							
5	PIPING							
6	PRESSURE VESSELS							
7	ROT.EQUIPMENT							
8	MECH.EQUIPMENT							
9	ELECTRICAL							
10	INSTRUMENTATION							
	TOTAL	100.0						

245

NAME OF LSTK CONTRACT  
 CONTRACTOR  
 PROJECT

MONTH & YEAR  
 CLIENT  
 PMC : EIL  
 ANNEXURE - II(P-II)

**DELAY ANALYSIS**

SR. NO	DISCIPLINE	CUMULATIVE PROGRESS %		DEVIATION	ACTIVITY/ ITEM	DRG NO/ MIR NO	REMARKS
		SCH	ACT				
1	HMTD						
2	GEN. CIVIL						
3	ARCHITECTURE						
4	STRUCTURAL						
5	PIPING						
6	ROTATING EQPT						
7	MECHANICAL						
8	ELECTRICAL						
9	INSTRUMENTATION						



NOTE: COLOUR PHOTOGRAPHS SHOWING KEY PROJECT ACTIVITIES e.g. MANUFACTURING OF CRITICAL EQUIPMENT, TRANSPORTATION OF ODC ITEMS, CONSTRUCTION/ERECTION OF MAIN AREAS / EQUIPMENT SHALL BE INCLUDED EVERY MONTH.

PROJECT PHOTOGRAPHS

ANNEXURE: II (C)

NAME OF LSTK CONTRACTOR  
PROJECT

MONTH & YEAR  
CLIENT  
PMC: EIL  
Page 37 of 39

1.0 SCOPE OF SUPPLY / WORK

1.1 SCOPE OF SUPPLY

Contractor's scope of supply shall pertain to the following mechanical equipment / facilities, complete in all respects, but not be limited to the following:

SI. No.	ITEM	TAG NO.	QTY.
---------	------	---------	------

WHEAT HANDLING AND STORAGE SYSTEM			
1.0	Underground Trough Belt conveyors with hood cover inside tunnel below grade level, drive arrangement, pulley arrangement, idlers, take-up arrangement etc for conveying of wheat grains of design capacity <ul style="list-style-type: none"> <li>Belt Conveyor BC-1: 150 TPH</li> <li>Belt Conveyor BC-2: 60 TPH</li> <li>Belt Conveyor BC-3 &amp; BC-4 : 350 TPH</li> </ul> Underground tunnels shall be equipped with drainage slopes, sump pits and sump pumps and ventilation system. Fully enclosed Chain conveyor with cover, gallery, drive arrangement, etc may also be considered in lieu of the underground Belt Conveyors, subject to approval of the same from Owner / EIL during detailed engineering stage, without any commercial implications.	BC-1, BC-2, BC-3, BC-4	4 Nos.
2.0	Fully enclosed Chain conveyor with cover, gallery, drive arrangement, etc for conveying of wheat grains of design capacity: <ul style="list-style-type: none"> <li>Chain Conveyor CC-1, CC-2, CC-3, CC-4, CC-5, CC-6 &amp; CC-7</li> <li>Chain Conveyor CC-6 &amp; CC-7 : 60 TPH</li> <li>Chain Conveyor CC-5: 150 TPH</li> <li>Chain Conveyor CC-4, CC-3, CC-2, CC-1, CC-2, CC-3, CC-4, CC-5: 150 TPH</li> </ul> Bucket Elevators with drive arrangement for lifting of wheat grains of design capacity: <ul style="list-style-type: none"> <li>Bucket Elevator BE-1, BE-2, BE-3 : 150 TPH</li> <li>Bucket Elevator BE-4 : 60 TPH</li> <li>Bucket Elevator BE-5 &amp; BE-6 : 350 TPH</li> </ul> Flat bottom Storage Silos each of storage live capacity 12,500 MT along with Silo aeration system, closed loop fumigation system, Silo temperature & Humidity monitoring and pest detection system. Flat bottom silos shall be provided with motorized and manual bottom discharge gates at center & manual slide gates at other discharge points and sweep auger. Access step Ladder in spiral pattern (2 ft Min.), platforms & Approach step ladder. One number portable fumigant unit shall be provided by Contractor.	CC-1, CC-2, CC-3, CC-4, CC-5, CC-6 & CC-7	7 Nos.
3.0	Bucket Elevators with drive arrangement for lifting of wheat grains of design capacity: <ul style="list-style-type: none"> <li>Bucket Elevator BE-1, BE-2, BE-3 : 150 TPH</li> <li>Bucket Elevator BE-4 : 60 TPH</li> <li>Bucket Elevator BE-5 &amp; BE-6 : 350 TPH</li> </ul> Flat bottom Storage Silos each of storage live capacity 12,500 MT along with Silo aeration system, closed loop fumigation system, Silo temperature & Humidity monitoring and pest detection system. Flat bottom silos shall be provided with motorized and manual bottom discharge gates at center & manual slide gates at other discharge points and sweep auger. Access step Ladder in spiral pattern (2 ft Min.), platforms & Approach step ladder. One number portable fumigant unit shall be provided by Contractor.	BE-1, BE-2, BE-3, BE-4, BE-5 & BE-6	6 Nos.
4.0	Flat bottom Storage Silos each of storage live capacity 12,500 MT along with Silo aeration system, closed loop fumigation system, Silo temperature & Humidity monitoring and pest detection system. Flat bottom silos shall be provided with motorized and manual bottom discharge gates at center & manual slide gates at other discharge points and sweep auger. Access step Ladder in spiral pattern (2 ft Min.), platforms & Approach step ladder. One number portable fumigant unit shall be provided by Contractor.	S-1, S-2, S-3 & S-4	4 Nos.

1

Sl. No.	ITEM	TAG NO.	QTY.
5.0	Conical bottom Pre-storage Silos each of 250 MT live storage capacity with motorized and manual bottom discharge gates. Access step Ladder in spiral pattern (2 ft Min.), platforms & Approach step ladder.	PS-1 & PS-2	2 Nos.
6.0	Flat bottom Shipping Silo of 4000 MT storage live capacity with Silo aeration system, closed loop fumigation system, Silo temperature & Humidity monitoring and pest detection system. Flat bottom silos shall be provided with motorized and manual bottom discharge gates at center & manual slide gates at other discharge points and sweep auger. Access step Ladder in spiral pattern (2 ft Min.), platforms & Approach step ladder.	SS	1 No.
7.0	Truck unloading facility consisting of 6 Nos. unloading stations (1 Tippler + 5 Normal bays), each with an underground hopper of live capacity 25 MT, grating/grizzly, motorized and manual slide gates, etc. Dust extraction system with blowers and bag filters shall be provided at truck unloading bunkers. Shed over unloading area to be provided.	-	6 Bays.
8.0	Process tower with wheat grain cleaning device of 150 MT capacity consisting of 2 Nos x 75 TPH rotary drum sieve, 2 Nos x 75 TPH flat sieve for fines/dust separation system along with dust extraction system with blowers and bag filters. Online bulk weigher downstream of cleaning device shall be provided. Separate bins shall be provided for bye-products & for foreign material.	-	-
9.0	Electrically operated two-way flap gates, motorized slide gates below unloading hoppers, other automatic and manual gates.	-	Lot
10.0	Rapid Wagon Loading system with 2 Nos hopper each of 65 MT capacity, 2 Nos weigh hopper each of 35 MT capacity with motorized gate and movable telescopic spout below each hopper for loading onto wagons of BCBFG type of Indian Railways, dust extraction system.	-	Lot
11.0	Laying Work / Siding for new railway track / modification of existing railway track including all civil work / Electrical work / lighting / signaling / paving etc. and obtaining other related statutory approvals through Railway approved sub-contractor.	-	Lot
12.0	Refer Structural/ EWS part of the tender (for Railway siding work). Truck Loading System with one (1) Truck Loading Hopper Bottom Silo (TS) of 100 MT	TS	Lot

SI. No.	ITEM	TAG NO.	QTY.
13.0	live capacity, telescopic chute and auxiliaries.		
14.0	2 Nos. 30 MT each bagging Hopper bottom Silos with 2 Nos bagging machines of 30 TPH capacity and weigh hoppers below each Bagging Silos. The bagging system shall consist of a transfer bag conveyor, Bagging surge bins, Bag machines and Bag stacking conveyor. Bagging machines shall fill 50 kg jute bags and shall have double head switching machine and conveyor.	BS-1 & BS-2	Lot
15.0	Electronic Road Weigh Bridges (pit type pitless type) with local operator room of 60 MT capacity each for weighing trucks.		2 Nos.
16.0	Forced ventilation of all underground tunnels with 1W+1S centrifugal fan maintaining 20 ACPH.		Lot
17.0	DG Set of 400 KVA Prime rating		1 No.
18.0	Fire water Electric Driven Jockey Pump with motor	26-PA-101	1 Set
19.0	Fire water Diesel Driven Fire water main pump with diver	26-PA-103 / 104	2 Nos.
20.0	Drinking water Pumps (1W+1S)		2 Nos
21.0	Submersible Pump with motor for Tube wells		2 Nos
22.0	Complete Electrical / Instrumentation / Civil / Structural / Architecture / piping works of the above package.		Lot.
23.0	Wheat Handling and Storage Control Station and other E&I Rooms as per Electrical / Instrumentation / Civil / Structural / Architecture requirements.		Lot
24.0	Air Conditioning system for buildings as marked in Architectural drawing.		Lot
25.0	Mandatory Spares as per list attached.		Lot
26.0	Commissioning Spares		Lot
27.0	Quotation for two year Recommended spares of normal operation.		Lot
28.0	First Fill of lubricants, chemicals, refrigerant and other consumables.		Lot
29.0	Reference: 1. Job Specification (Equipment Division): Doc. No - A951-000-80-43-SP-4500. 2. Flow Diagram of Wheat Handling & Storage System (Drg No - A951-000-80-43-3001). 3. Layout of Wheat Handling System (Drg No - A951-000-80-43-1001).		Lot
30.0	Material handling facilities viz. electric wire rope hoist, chain pulley blocks, etc. (Refer Note-1 below)		Lot
	Foundation and civil / structural works for all the above mentioned packages.		Lot
	Civil, Structural, Electrical and Instrumentation		Lot

1

1

1

**1.2 SCOPE OF WORK**

- 1.2.1 Contractor's scope of work shall include all design, engineering, procurement, manufacture, painting (primer + finish coat), shop inspection & testing, supply, transportation, site storage, installation, site painting, site testing, commissioning and performance guarantee of equipment as described in this Specification, its attachments and documents/drawings referred therein forming a part of the Bid Package.
- 1.2.2 The Contractor shall supply commissioning spares as required during commissioning of equipment. Contractor shall procure spares from the original equipment manufacturers (as per their recommendation) and shall make them available at Site well before the start of commissioning activities. Any additional spares required during commissioning shall not be taken from the two years operating spares; instead such spares shall be supplied by the contractor free of cost.
- 1.2.3 Contractor shall supply special tools and tackles required for normal operation and maintenance. Contractor shall supply these special tools and tackles as recommended by OEM, along with the equipment.
- 1.2.4 Contractor shall supply Mandatory spares as per List attached in the Bid package.
- 1.2.5 Supply of spares required for two years normal operation as recommended by the OEM (Original Equipment Manufacturer) shall be listed by the Contractor and quoted separately with item wise price list as specified in commercial part of tender document. Ordering of the same shall be Client's discretion.
- 1.2.6 M/s CWC / EIL may provide their comments on critical vendor documents. Contractor shall be obliged to incorporate Owner / EIL's comment(s) without any delivery & commercial implication to Owner. Also design of some critical equipment like Storage Silos, Shipping Silo and Pre-storage Silos shall be vetted by Institute listed elsewhere in Bid Package.
- 1.2.7 Insulation, first fill of lubricants, hydraulic oils, refrigerant and other consumables required for equipment during erection and commissioning shall be supplied by the Contractor.
- 1.2.8 Contractor shall submit drawings, documents, specifications, inspection & test reports, performance test procedures etc. as defined in document no. A951-000-80-43-VDR-4500 attached with the Bid Package.
- 1.2.9 Painting shall be done as per painting specification attached elsewhere in the Bid Package.
- 1.2.10 Contractor to consider and include site visit (s), as required, to make themselves fully aware of the space available for entire system and ensure complete feasibility of the scheme before submission of technical offer as no price implication whatsoever shall be entertained after award of Contract. Attached layout / scheme is preliminary in nature and for guidance purpose only, Contractor shall develop layout

Sl. No.	ITEM	TAG NO.	QTY.
	works shall be as per Civil/Structural, Electrical and Instrumentation Specification attached elsewhere with the Tender Document.		
	<b>Note-1:</b> Type, quantity and capacity shall be decided during detailed engineering based on Material handling facilities study that shall be carried out by Contractor during detailed engineering stage based on the selected equipment size & weight and it shall be approved by CWC/EIL.		
	<b>Note-2:</b> Before award of job "Contractor" implies "Bidder".		

- 1.2.11 All the items / packages / facilities shall comply with applicable national and international codes & standards as well as any statutory regulation in existence particularly for that items/package/facility.
- 1.2.12 All statutory clearances and permits from local, statutory and other bodies such as Indian Boiler Regulations, Static and mobile pressure vessel rules, Chief controller of explosives, Factory inspector, Labor Inspector, Electrical inspector, pollution control board, Indian Railways etc., as applicable, shall be obtained by Contractor.
- 1.2.13 Contractor shall procure equipment from Master Vendor List (attached with the bid package) within the range specified as per approved enlistment with EIL. Any additional Vendor List, the makes/sub vendor of same shall have sufficient Proven Track Record (PTR) and shall be subject to Client / EIL approval during detail engineering without any time and price implication to Owner. Any additional vendors if proposed by Bidder shall have sufficient Proven Track Record (PTR). Decision of Client / EIL for approval of additional vendors shall be final and binding on Contractor without any Commercial implication.
- 1.2.14 Any item / component / facility not specifically mentioned but required as per good engineering practice within package battery scope limit for safe, continuous, trouble free operation of the plant is deemed to have been specified and shall be included in the scope of Contractor, without any commercial implication to Owner.

/ scheme considering all facilities required making the system complete and operational.



**1.0 TECHNICAL COMPLIANCE FORMAT**

- 1.1 Bidder shall indicate his reply in the space provided in the following format. In case space provided is not adequate, the reply may be furnished separately under suitably numbered annexes / attachments duly referred against the comment / query.
- 1.2 The Compliance Statements / Queries are required to be categorically confirmed / answered by the Bidder and the completely filled in Technical Compliance Format shall be submitted together with the Bid.

Sl. No.	Compliance Statement / Query	Bidder's Confirmation / Answer (Yes/No)
1.	Confirm that the scope of work and battery scope limits shall be in compliance with the tender document. All other equipment, materials and work not explicitly mentioned but nevertheless required to fulfill the system and functional requirements shall be deemed to have been included in the scope of Bidder with no additional price and time implication to the Owner.	
2.	Bidder to note that this is a "Zero deviation" bid. Hence any deviation, what so ever, to the tender specification is not acceptable. Confirm compliance.	
3.	Confirm that bidder has duly filled in and signed this technical compliance format and submitted this document with their offer, which will form the basis of technical evaluation.	
4.	Bidder is informed that the detailed offers from the equipment manufacturer for all equipment is not required to be furnished in the Bidder's proposal at this stage. If the Bidder in their proposal furnishes any such details, these shall not be reviewed or taken cognisance of at this stage. These details shall be treated as preliminary and for reference and record purpose only and shall not be contractually binding. Review of these details will be done after award of contract. Bidder shall comply with the bid requirements without any post order price and time implication to the owner.	
5.	Confirm that the Performance Guarantee requirements as specified in the tender Specifications shall be complied.	
6.	Confirm that all Inspection & Tests as required as per specification and Codes attached and referred to have been included by the Bidder in the scope.	
7.	Confirm that wherever the materials of construction of Equipment components / parts have been specified in the tender specification, the same or superior MOC shall be considered.	

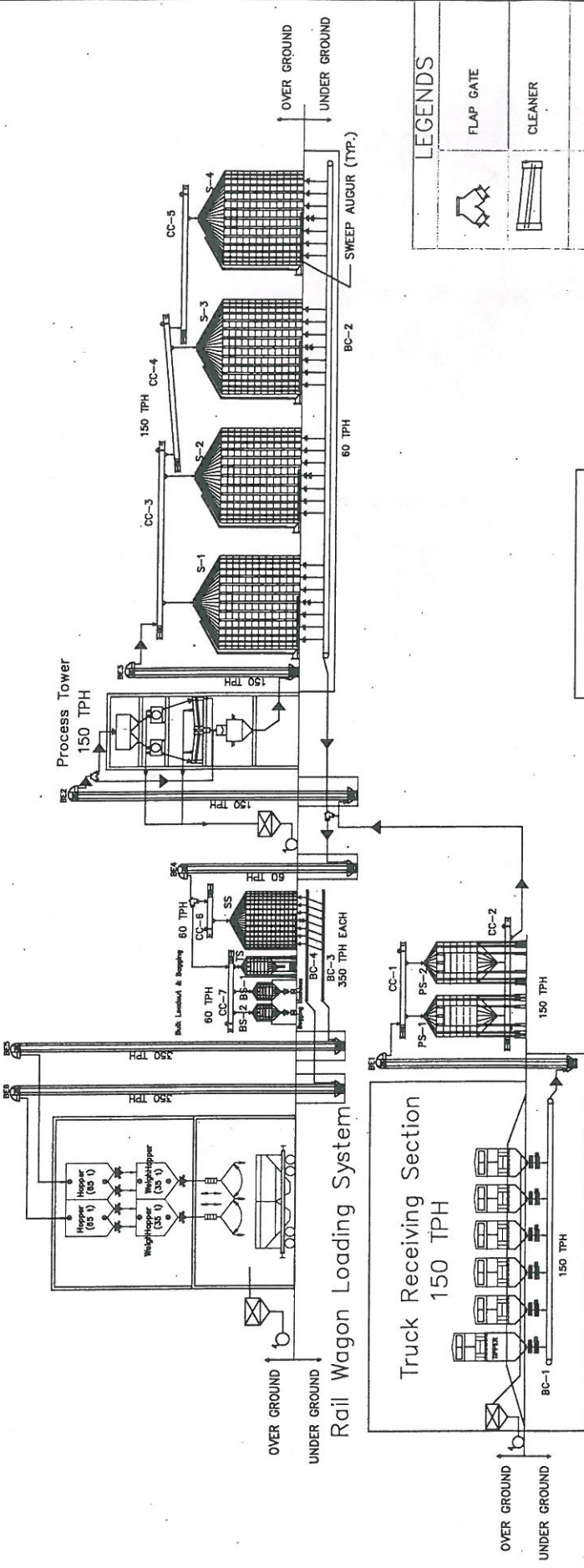
Sl. No.	Compliance Statement / Query	Bidder's Confirmation / Answer (Yes/No)
8.	Confirm that makes of all bought-outs shall be as per the Consolidated Vendor List enclosed in the Bid Package. Bidder to source the materials from Vendors indicated in the "Master Vendor List" as per the range specified therein. Any additional vendors if proposed by Bidder for any item(s) where no list is provided in the Master Vendor List, the makes/sub vendor of same shall have sufficient Proven Track Record (PTR) and shall be subject to Client / EIL approval during detail engineering without any time and price implication to Owner. Any additional vendors if proposed by Bidder shall have sufficient Proven Track Record (PTR). Decision of Client / EIL for approval of additional vendors shall be final and binding on Contractor without any Commercial implication.	
9.	Confirm that itemised list for Two year recommended spares for normal operation and maintenance shall be provided for all Packages.	
10.	Bidder to confirm categorically that following have been included by them in their offer. • Commissioning spares as required • Mandatory spares as specified in tender document • Special tools and Tackles, if any, required for maintenance purpose. • Consumables, chemicals, lubricants, etc, for trial run and commissioning.	

Place: \_\_\_\_\_ Date: \_\_\_\_\_  
 [Signature of Authorized Signatory of Bidder]  
 Name: and Designation \_\_\_\_\_  
 Seal: \_\_\_\_\_



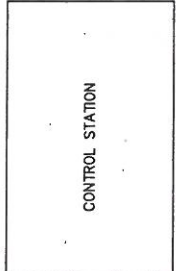


The drawing, design and details given on this format are the property of ENGINEERS INDIA LIMITED. They are merely loaned on the borrower's express agreement that they will not be reproduced, copied, exhibited or used, except in the limited way permitted by a written consent given by the lender to the borrower for the intended use.

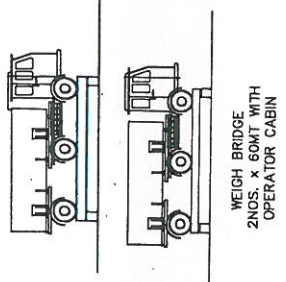


**NOMENCLATURE**

PRE STORAGE SILO PS-1	Ø7.12 X 5.42H CAP.= 250 MT
PRE STORAGE SILO PS-2	Ø7.12 X 5.42H CAP.= 250 MT
STORAGE SILO S-1	Ø32 X 17.16H CAP.= 12500 MT
STORAGE SILO S-2	Ø32 X 17.16H CAP.= 12500 MT
STORAGE SILO S-3	Ø32 X 17.16H CAP.= 12500 MT
STORAGE SILO S-4	Ø32 X 17.16H CAP.= 12500 MT
SHIPPING SILO SS	Ø21.32 X 12.58H CAP.= 4000 MT
TRUCK LOADING SILO TS	Ø5.32 X 5.42H CAP.= 100 MT
BAGGING SILO BS-1	Ø4.64 X 2H CAP.= 30 MT
BAGGING SILO BS-2	Ø4.64 X 2H CAP.= 30 MT



FOR TENDER PURPOSE ONLY



**LEGENDS**

	FLAP GATE
	CLEANER
	DRUM SEIVE
	BELT CONVEYOR (BC)
	BUCKET ELEVATOR (BE)
	CHAIN CONVEYOR (CC)
	INTAKE HOPPER

<b>ENGINEERS INDIA LIMITED</b> NEW DELHI		<b>DRAWING NO.</b> AS1-000-04-3001		<b>REV.</b> 0
REV. DATE		BY		APPROVED
0	12/12/2016	REVISOR	ISSUED WITH TENDER	SMPPB
B	27/10/2016	REVISOR	REVISOR	SMPPB
A	20/06/2016	REVISOR	ISSUED FOR COMMENT	SMPPB
REV.	DATE	BY	CHK	APPROVED
FLOW DIAGRAM OF WHEAT HANDLING AND STORAGE SYSTEM				
T: 011-5553 REV:0 A3-426287				

1.1 Specific requirements and guidelines pertaining to individual equipment and system are listed in subsequent sections. However, the following general considerations have to be kept in view for all items while formulating their specifications and procurement engineering activities:

1.1.1 Reliability in service (assessed from Contractors' relevant track record and improved by incorporating certain minimum design features or requirements in the specifications).

1.1.2 All equipment shall be sourced from the attached Company/Consultant approved vendor list. All equipment shall be of proven design. Prototypes, new designs, or extensive modifications of standard designs are unacceptable.

1.1.3 Compliance with applicable national or international codes and standards as well as any statutory regulation in existence for a specific item.

1.1.4 Ease of operation and maintenance including any necessary measures for ensuring safety of personnel and equipment as well as a conducive working environment.

1.1.5 Standardization of components, wherever feasible.

1.1.6 Adherence to any limitations of space available for the equipment and its operation / maintenance.

1.1.7 The size and weight of equipment / package shall preferably be kept minimum.

1.1.8 Facility for any known future expansion of plant capacity with a minimum of modifications or shutdown.

1.1.9 Equipment shall be designed for the given site condition.

1.1.10 Piping, Electrical, Instrumentation and controls wherever applicable for the equipment and packages shall be engineered as per the respective sections, described in the Bid package.

1.2 Specifications forming a part of the Bid Document indicate a minimum standard of quality for materials, fabrication and/or erection of the proposed equipment. Responsibility for complete compliance to these specifications shall rest with the Contractor. It will be Contractor's responsibility to obtain clarification from Owner's representative, wherever necessary, which in all cases shall be final and binding.

1.3 All equipment and materials supplied or installed under these specifications shall be installed in accordance with sound engineering principles and good fabrication and construction practice (No omission from these specifications shall relieve the Contractor from his responsibility).

1.4 All equipment and materials fabricated and installed under these specifications shall conform to the latest editions of the applicable codes and standards cited in the bid documents. No omission in the project instructions shall be construed as relieving the Contractor of his responsibility to ascertain these requirements, to perform work and furnish material in accordance with the codes specified.

**1.0 GENERAL CONSIDERATION**

1.5 Contractor shall develop technical specification of equipment taking into consideration the requirements defined in specifications, data sheets and the requirements attached with bid package.

1.6 Equipment shall be complete in all respects and any item or feature not covered in the specification but essential for proper operation shall be included by the Contractor. Also the plant shall conform in all respects to high standards of engineering design, state of art technology, and reliability in continuous operation.

### 1.7 MATERIAL OF CONSTRUCTION AND METALLURGY

1.7.1 All materials and equipment shall be new and unused.

1.7.2 All materials supplied under these specifications shall be adequate for the proposed service. Proper consideration shall be given to their function with regard to corrosion, chemical attack, and other process hazards, and precautions to avoid these hazards shall be taken. Such precautions shall include but not be limited to the following:

1.7.2.1 Suitable treatment of materials to minimize corrosion and for strength considerations as per applicable codes.

1.7.2.2 Protective coating: Suitable as required to preserve the utility, efficiency, and appearance of the equipment under operating conditions as highly corrosive.

1.7.2.3 Corrosion allowance and safety factor shall be within good engineering practice subject to the minimum as stated in the relevant Specifications/Data Sheets.

1.7.3 Particular attention shall be given to the metallurgy and arrangement of equipment in contact with fluid and which is likely to be exposed internally and externally to corrosive media. All phases of the process and mechanical design of the facility must be thoroughly checked to assure that unsatisfactory conditions such as plugging, and/or undesirable chemical reactions will not occur.

1.7.4 Selection of material for each component of equipment shall be based on the design pressure, temperature and other conditions of operation and in no case shall be inferior to the material indicated in the bid package.

### 1.8 LAYOUT AND OPERABILITY

1.8.1 Layout shall be prepared taking into consideration various factors like requirement of operability, approach, safety, withdrawal space requirement, maintenance, foundation requirements etc. for convenient operation.

1.8.2 The facility shall be laid out and constructed for convenience and safety of operation and maintenance. Similar equipment shall be grouped together as much as possible so as to best conform to good engineering practice and fulfill accepted standards of process simplicity, safety, and economy. All equipment shall be oriented to permit servicing in such a way as to require a minimum of dismantling. In the case, conservation of space shall also be taken into account.

1.8.3 Contractor shall provide adequate design measures to handle all predictable occurrences resulting from weather, process upsets, or operational failures, or interruption of utilities. All such features shall be provided unless exceptions are brought to Owner's attention and a specific agreement is reached to forego such measures.

1.8.4	The skid shall be designed and built to ensure that all the equipment along with accessories, panel and piping are mounted suitably for convenient operation.
1.8.5	Electrical equipment and material shall be in accordance with the attached electrical specification.
1.9	<b>SAFETY</b>
1.9.1	It is the intent of the Owner that operational hazards be reduced to a minimum. Contractor shall use sound engineering judgment to complete an installation that will perform the required function without compromising this aim.
1.9.2	All electrical devices shall meet the requirements for the area classification in which they are installed.
1.9.3	All controls shall operate in a fail-safe mode.
1.9.4	Piping shall be arranged in a manner so as to avoid tripping or headroom problems. Piping or tubing of insufficient mechanical strength for standing or hanging shall be protected from personnel traffic.
1.9.5	Stairs, ladders, handrails and walkways shall be provided as per operation, maintenance & safety requirements.
1.9.6	Noise limits and vibration limits shall be minimized and shall be as per specification attached with the bid package.
1.10	The selection and installation of instrumentation and controls shall meet the minimum requirements defined in the attached instrumentation specifications.
1.11	Painting shall comply to the requirement as per specification attached with the bid package.
2.0	<b>CODES AND STANDARDS</b>
2.1	The main codes and standards applicable for equipment or system are indicated in the respective standard specification.
2.2	The list of applicable EIL standard specifications is as given below. Contractor shall refer the applicable standard specifications and codes (latest version) referred therein for the item or system and make part of respective equipment specification in compliance with all such standards

**3.0 SYSTEM DESCRIPTION FOR WHEAT HANDLING AND STORAGE SYSTEM**

Brief description of system requirements are specified below. However, Contractor to note that system described below is minimum requirement and not limited to the following. Any items required for proper and safe operation of the Plant, but not specifically mentioned, are deemed to be included in Contractor's scope of supply and work. The following drawings shall be referred:

- a) Flow Diagram of Wheat Handling and Storage System (Drg No : A951-000-80-43-3001)
- b) Layout of Wheat Handling System (Drg No : A951-000-80-43-1001)

The layout drawing is for general guidance only. Contractor shall prepare a workable layout considering operation and maintenance requirement, without any commercial implication.

**3.1 Truck Unloading Facility:**

3.1.1 Truck unloading facility shall consist of 6 unloading stations (1 Tippler + 5 Normal days), each with an underground hopper of capacity 25 MT each.

3.1.2 1 Tippler shall be provided at one unloading station.

3.1.3 Grating / grizzly of suitable opening shall be provided on the top of each unloading hopper and manual and motorized slide gate shall be provided at the bottom of each hopper. Baffles, as required, inside the hopper shall be provided.

3.1.4 Unloading area shall be provided with weather protection shed.

3.1.5 2 Nos. pit type weigh bridges of 60 MT capacity each shall be provided for weight recording along with AC operator room for suitable instrumentation (assumed digital display, PC, printer, etc.).

3.1.6 Dust extraction system with blowers and bag filters shall be provided inside Truck unloading station.

3.1.7 Suitable sample collecting system along with laboratory shall be provided.

3.2 The unloading hoppers shall discharge to an underground receiving belt conveyor (BC-1) of 150 TPH capacity. Underground tunnel shall be provided for housing conveyor located below grade level running beneath the unloading area. Tunnel shall be equipped with lighting, drainage slopes, sump pits and sump pumps and ventilation system.

3.3 Receiving conveyor BC-1 shall discharge to a Bucket Elevator (BE-1) of capacity 150 TPH which lift the material and feed in to two (2) numbers conical bottom Pre-



storage / Receiving Silos (PS-1 & PS-2) each of live capacity 250 MT through a Chain Conveyor (CC-1) of capacity 150 TPH.

3.4 Each of conical bottom Pre-storage silo shall discharge from bottom through motorized & manual slide gates to a Chain Conveyor (CC-2) of capacity 150 TPH. Chain conveyor CC-2 shall discharge to Bucket Elevator (BE-2) for lifting wheat grains to top of Process Tower for cleaning.

3.5 Cleaning device housed inside Process Tower shall be able to separate large foreign particles and fine dusts from wheat grains. 2 Nos Coarse screen / Rotary Drum Sieve of 75 TPH each capacity shall be provided for separating large foreign particles. Dust cleaning of grains shall also be carried out by 2 Nos x 75 TPH each flat sieve. Proper disposal of dust from machine shall be provided. Air Blowers with bag filters shall be provided for carrying and disposal of dust. Online Bulk weigher shall also be provided inside process tower downstream of cleaning device for measuring through-put and total flow over time. Provision shall also be provided for bypass of grain flow to cleaning device. Separate bins shall be provided for by-products and for foreign material comprising small rocks and other objects obtained after cleaning of Foodgrains prior to moving them into the Silos. Containers shall be provided for discharging chaff and grain dust obtained from the final cleaning process prior to dispatch of Foodgrains.

3.6 From cleaning device the grains shall be further routed to Storage Silos through Bucket Elevator (BE-3) of capacity 150 TPH. Grains shall be stored in four (4) numbers flat bottom silos of each 12,500 MT capacity. A set of Chain Conveyors (CC-3, CC-4 & CC-5) shall be used for feeding of material into Storage Silos. CC-3 shall take feed from BE-3 and shall be able to feed S-1 & S-2, as well as downstream chain conveyor CC-4. CC-4 shall feed material into Silo S-3 & downstream chain conveyor CC-5, which in turn shall feed S-4. Motorised slide gates shall be provided at each discharge point of chain conveyors to Storage Silos.

3.7 Storage Facilities: Flat Bottom Storage Silos

3.7.1 Total 50,000 MT wheat grains shall be stored in 4 Nos flat bottom Storage Silos (S-1, S-2, S-3 & S-4) of live capacity 12,500 MT each.

3.7.2 Silo specifications shall be as specified in cl. No. 4.1 of this document.

3.7.3 Each silo shall have several flow openings at the bottom. Sweep auger shall be provided at the center of each silo for extracting the material completely.

3.8 Underground Belt conveyor (BC-2) of 60 TPH capacity shall be provided below bottom of silo along openings for extracting grains from Silos. Underground tunnels shall be provided for this conveyor located below grade level running beneath the Storage silos. Tunnels shall be equipped with drainage slopes, sump pits and sump pumps, lighting and ventilation system.

3.9 Belt conveyor BC-2 shall discharge through a Flap gate to either Bucket Elevator (BE-4) of capacity 60 TPH for further dispatch of grains or to Bucket Elevator (BE-2) for recirculation of grains inside Storage Silos. Provision for bypassing of Cleaning device shall also be provided.

3.10 Bucket Elevator BE-4 shall discharge through a Flap Gate to either Chain Conveyor (CC-6) of capacity 60 TPH for further conveying to Shipping Silo or to Chain Conveyor (CC-7) of capacity 60 TPH for dispatch through truck or bags.

This specification covers general requirement for the design, engineering, materials, fabrication, workmanship, inspection, testing, supply, and supervision of erection at site of Silos in accordance with this specification & Codes listed in the bid document.

SCOPE

4.1.1

MAIN STORAGE SILOS AND OTHER SILOS

4.1

TECHNICAL REQUIREMENT

4.0

The Plant Control System shall be installed for operating the equipment in sequence, in accordance with the operational requirements of the Storage Facility. Equipment shall be interlocked through the Plant Control System so that the failure of one piece of equipment shall stop all other equipment upstream and also close all feed gates. It shall comprise, inter alia, the operation and control system, Foodgrain inventory control system, quality and preservation control system, Vehicle identification and movement control system and disaster/hazard management system.

3.16

All the Buildings / Towers shall be provided with Electric Hoists / Manual Hoist for maintenance purpose. Electrically operated Hoist with trolley will generally be provided for handling equipment / component weighing 5 MT or above and / or lift more than 5m or where frequency of maintenance/operation is relatively high. Floor sweeping chutes shall be provided at various locations where grain may accommodate.

3.15

Two numbers Automatic Bagging system of 30 TPH capacity each with bagging & switching (double head) machine shall be provided below each Bagging silos (BS-1 & BS-2) for loading of wheat grains in 50 kg bags. Each Bagging Silos of live capacity 30 MT shall be provided with a weigh hopper to store material of each bag. The bagging system shall consist of a transfer bag conveyor, Bagging surge bins, Bag machines and Bag stacking conveyor. The bagging warehouse shall have covered capacity of at least 200 MT and a storage capacity of at least 500 MT of wheat grains. Wheat grain will be stored in bags in warehouse. Floor area of at least 100 Sqm will be provided in warehouse for storage of bags prior to dispatch.

3.14

Chain Conveyor CC-7 shall discharge to either conical bottom Truck loading Silo (TS) of 100 MT live capacity or Bagging Silos (BS-1 & BS-2) of 30 MT live capacity each. Mechanized truck loading system having telescopic chute along with manual & motorized slide gate shall be provided. Local operating panel shall be provided.

3.13

Conveyors BC-3 & BC-4 shall direct material to Wagon loading station through a set of Bucket Elevators (BE-5 & BE-6) of capacity 350 TPH each. Wagon loading station shall be provided with 2 Nos Hoppers of 65 MT live capacity each, followed by two numbers weigh hopper of 35 MT live capacity each. Provision shall be provided for fling of both hoppers of 65 MT capacity by both Bucket Elevators (BE-5 & BE-6). At the bottom of each weigh hopper motorized gate with movable telescopic spouts are fitted for simultaneous loading of a wagon. Wagon loading operation shall be fully automatic. Total wagon loading time shall not exceed 4.5 hours per rake. Bogie covered hopper wagon for food grains of BCBFG type of Indian Railways shall be used for loading. Wagon loading system shall be suitable for the same. Local operator cabin housing operator panel shall be provided in wagon loading area.

3.12

Chain Conveyor CC-6 shall discharge to flat bottom Shipping Silo (SS) of 4000 MT live storage capacity. Shipping Silo shall discharge to a set of underground belt conveyors (BC-3 & BC-4) of capacity 350 TPH each.

3.11



EN-1997: Geotechnical Design\*

EN-1992: Design of Concrete Structures\*

Part II: Grain Handling Equipment and Accessories

Part I: Constructional requirements

IS - 5503: General requirements for Silos for Grain Storage

4.1.2.2 Construction Specifications:

SS EN 1993-4-1:2011: Design of Steel Structures-Silos

IS - 875 for wind loads

IS - 1893 for seismic loads

IS - 9215 : Specifications for outdoor Steel Bins for Foodgrain Storage

factor of about 5% (five per cent)).

\* (Bulk density of wheat in the IS shall be read as 750 kg/ cubic meter with compaction

Part III : Bins Designed for Mass Flow and Funnel Flow

Part II : Design Criteria

Part I : General Requirements and Assessment of Loads

IS - 9178 : Criteria for design of Steel Bins for storage of Bulk Materials\*

4.1.2.1 Design Specifications:

The Indian & International Codes applicable to the design and construction of the Storage Facility Silos shall be as follows:

4.1.2 CODES FOR SILOS (as applicable):

Any other dimension of Silos may also be adopted by Contractor for the same capacity

S. NO.	TAG. NO.	SILO NOMENCLATURE	STORAGE CAPACITY PER SILO (MT)	NOS. OF SILOS	DIMENSION Dia x Ht (m X m)
1	PS-1 & PS-2	Pre Storage Silo	250	2	7.12 X 5.42
2	S1, S2, S3, S4	Storage Silo	12500	4	32.00 X 17.16
3	SS	Shipping Silo	4000	1	21.32 X 12.58
4	TS	Truck Loading Silo	100	1	5.32 X 5.42
5	BS-1 & BS-2	Bagging Silo	30	2	4.64 X 2.00
6	-	Unloading Hoppers	25	6	By Vendor

The Storage Facility consists following major Silos having tentative Dimensions as mentioned below (Silo Supplier to confirm the same):

The requirements outlined in this specification & its attachments are minimum and shall be carried out for quality assurance and for job records. However these shall not prohibit the Contractor from offering the best available technology & additional requirements based on his experience of supply of such equipment. This specification shall not be considered limiting & it shall be Contractor's responsibility to comply with all the requirements of the package on to which it is annexed.

\*(Applicable for foundations)

- In case of any conflict or inconsistency in the provisions of the applicable Indian Standards or codes and International Standards or codes, the Indian Standards or codes shall apply.
- In the absence of any specific provision in this Agreement, the following standards shall apply in order of priority:
  - (i) Bureau of Indian Standards (BIS)
  - (ii) Relevant Standards or codes as applicable in the United States of America or the European Union or Singapore such as
    - > AISC - American Institute of Steel Construction
    - > AISI - American Iron and Steel Institute
    - > ASABE - American Society of Agricultural & Biological Engineers
    - > ASCE - American Society of Civil Engineers
    - > ASTM - American Society for Testing and Materials
    - > ICC - International Code Council
    - > OSHA - Occupational Safety and Health Administration
  - (iii) Any other specifications/standards/codes proposed by the Concessionaire and reviewed by the Independent Expert.

- The latest version of the specified codes and standards which were notified/published at least 60 (sixty) days prior to the Bid Date in respect of this Agreement shall apply.
- In case of any inconsistency or conflict between the provisions of this Agreement and the applicable BIS Standards or Codes, the provisions of this Agreement shall apply.

- The Storage Facility, including its systems and equipment, shall conform to Applicable Laws, Applicable Permits, provisions of this Agreement and Good Industry Practice.

#### 4.1.3 DEVIATIONS

Deviations are not acceptable to Bid. However, deviation with intent to improve upon the equipment life or performance may be discussed and settled in pre-bid stage and it shall be CWC/EIL's prerogative to accept them or not. Post Bid deviation is not allowed.

For successful Contractor any deviation at the execution stage, which becomes unavoidable, shall be submitted for CWC/EIL approval and Contractor shall not proceed with such deviation till acceptance of deviation by CWC/EIL. Time taken/delay, if any, in processing of deviation permit or its rejection shall be solely to Contractor's account. CWC/EIL decision in this regard shall be firm and binding on the Contractor.

The Silos shall be constructed from boiled Galvanized Iron Corrugated (GIC) sheets. The galvanisation thickness, which is from hot dip process, should not be less than 350 grams/meter square or any other thickness better than this, capable of lasting for 30 (thirty) years. The galvanisation thickness, which is from hot dip process, should not be less than 350 grams/meter square or any other thickness better than this. Any other coating material which is superior like Zincalume sheet are also acceptable. Coating should be capable of lasting for 30 (thirty) years. Support structures shall be made of Galvanized steel to achieve longevity & should have proper interlock with floor screen to ensure firm support. Silos shall be provided with flashing of L shape such that it can hold anchor bolts to reduce the chance of water ingress from outside. The Silos shall



**MINIMUM THICKNESS & MATERIAL REQUIREMENT:**

4.1.5

During design of silo, worst combination of loads & effects shall be considered. Analysis of stress shall be carried out in erection, operation and testing conditions. Wind and seismic loads need not be considered acting simultaneously. Other loadings from direct & indirect sources shall be considered, which may be present & required to be considered for structural safety of the silo.

**COMBINATION OF LOADS:**

4.1.4.4

- a) Normal filling and emptying.
- b) Homogenization/Recirculation
- c) Arching of stored product
- d) Discharge devices such as Auger etc. & Load exerted by temperature Cables during emptying of grain.

Due consideration shall be given to the following while designing the silo for operating conditions:

**OPERATING LOADS**

4.1.4.3

- a. Dead load of silo, structure and any equipment mounted on it such as temperature cables etc.
- b. Superimposed loads due to material handling equipments (such as Auger), ladders and platforms etc.
- c. Horizontal load/pressure acting on the side walls, vertical load/pressure acting on cross sectional area & frictional load/pressure on the side walls at every point of shell and cone caused due to stored product during all conditions shall be calculated & considered for design.

**DEAD LOAD/SUPERIMPOSED LOADS**

4.1.4.2

Pressure exerted by the stored Grain on Silo walls shall be considered.

**PRESSURE LOADING**

4.1.4.1

The following loading conditions & effects shall be considered while designing the various components of a Silo & Silo walls, compression ring, curb angle stiffeners & bottom cone etc.

**DESIGN**

4.1.4

A temperature monitoring system shall be provided for each Storage Silo & Shipping Silo. Each system shall consist of temperature sensing cables suspended vertically from the Silo roof rafters and accessible from outside for maintenance. Temperature cables shall have nylon covering to minimize surface friction with grain. Number of cables should be adequate for temperature monitoring without leaving large area in silo unmonitored. Load exerted by each cable should not exceed 750 kg on the roof. Each Silo shall be equipped with a controllable scanner capable of interfacing with the

**4.1.6.3 Silo Temperature Monitoring System**

(i) Fixed plastic pipes to inject fumigants into the Silo aeration system  
 (ii) Ducting at the bottom of the Silo  
 (iii) Fixed plastic pipes for collecting exhausted fumigant from the top of the Silo for recirculation thereof.

Each Storage Silo & Shipping Silo shall be provided with a closed loop fumigation system with Aluminium Phosphide comprising of:

**4.1.6.2 Silo Fumigation System**

(i) Internal perforated ducts on concrete channels  
 (ii) External ducting  
 (iii) Fans  
 (iv) Dampers  
 (v) Roof vents as required  
 (vi) Instrumentation (temperature monitoring system)  
 (vii) Air volume.

To remove the hotspots developed inside the silos and to bring the inside grain atmosphere to uniform temperature, air will be circulated through the grain. Aeration system includes fans with aeration frames which are fixed in trenches on the floor of the Silo foundation. Transition connecting the fan to the silo should have a non-return flap. Aeration frames are covered by perforated sheets having holes for the air passage. Air requirement is 6 m<sup>3</sup>/hr/Ton. At least 4 Nos of Aeration fans shall be provided. Silo aeration system in Storage Silos & Shipping Silos shall include the following components:

**4.1.6.1 Silo Aeration System**

**4.1.6 SUPPORTING SYSTEMS REQUIRED WITH SILO:**

be water tight and shall be constructed in a manner that protects the Silos, conveyors and all other equipment from accumulation of ground water. The support slab of Silos shall be elevated so that all equipment is situated at a level above the once-in-50-years flood level at the Site. The Silos shall be capable of withstanding seismic activity in accordance with the guidelines issued by the National Disaster Management Authority. Silos roof shall be made water proof so that in any worst case rain water does not enter the Silo.

Shell wall shall be strengthened by using splices, stiffeners of suitable size, thickness, ladder with cage. Supported with rafters of suitable size, manhole on the roof.

- 4.1.9 Each underground unloading hopper shall have an opening at the ground level with grate and baffles for unloading Foodgrains from Vehicles. The grade level at the top of unloading hoppers shall be at least 200 (two hundred) mm above ground level to prevent ground water ingress into the unloading hoppers. The top of each
- 4.1.8 Separate bins shall be provided for bye-products and for foreign material comprising small rocks and other objects obtained after cleaning of Foodgrains prior to moving them into the Silos. Containers shall be provided for discharging chaff and grain dust obtained from the final cleaning process prior to dispatch of Foodgrains.  
**Bins for disposal of foreign material**
- 4.1.7 **CALIBRATION OF SILOS**  
The Silos shall be calibrated and appropriately marked with at least 2 (two) sealed rulers to identify the aggregate volume of each Silo in fractions of 1/500th (one upon five hundredth) of such aggregate volume. The sealed ruler shall be indelibly imprinted and shall be in the form of concentric circles running on the inside wall of the Silo such that the volume of the Foodgrain stored in the Silos can be readily ascertained by reference to such sealed rulers. The Silo shall be designed with appropriate mechanisms to enable easy access to and reading of the sealed ruler for verification of the volume of Foodgrain stored in a Silo at any point of time.
- 4.1.6.7 **Manual Discharge Gate**  
Manually operated discharge gate will be provided at the bottom of silo for controlling the flow of the grain from the silo.
- 4.1.6.8 **Motorized Gate**  
Electrically operated discharge gate will be provided at the bottom and top of silo for controlling the flow of the grain.
- 4.1.6.6 **Sweep Auger**  
All Storage Silos & Shipping Silo shall be provided with one single pass sweep augur. This is required to remove the left out grain from the silo after gravity unloading. Made from structural steel MS, bolted in construction with pivot assembly, screw with trough assembly, traction end wheel. Flame proof geared motor of suitable HP for screw main drive and geared motor for traction wheel are provided.
- 4.1.6.5 **Pest detection system**  
All Storage Silos & Shipping Silo shall be provided with Pest detection system.
- 4.1.6.4 **Silo level Measuring Device**  
All Silos shall be provided with level measuring devices. Two numbers of vibrating fork type stationary level indicators will be provided for the silo, one at the top and one at the bottom to indicate whether the silo is empty or full.  
Plant Control System. Moisture shall be restricted to 12%.



a) Design Data  
b) Complete dimensions; size, location & orientation of Accessories & supports etc.

a minimum:

Mechanical engineering datasheets/fabrication drawings shall include the following as

**Mechanical Engineering Data sheets/Fabrication drawings**

- a) Master document index with schedule of submissions.
- b) Mechanical design calculations & FEA (if required).
- c) Mechanical engineering data sheets.
- d) Detailed drawings/documents.

Master document index with submission date must be submitted within 15 days after award of contract. Following order of submission of document must be adhered to:

Vendor to provide loading data for design of foundation and technological structure & calculation thereof.

Design calculations, stress analysis, FEA (if required) and mechanical engineering data sheets/fabrication drawings shall be submitted for CWC/EIL review. Contractor shall also furnish additionally generated data for detailed design and design formulas used along with references for review. Comments, if any, shall be compiled with Review of documents shall not relieve the Contractor/ Vendor of his responsibilities to supply equipment as per requisition.

**DOCUMENTATION**

4.1.11

- Approach step ladder system installed in spiral around silo (2 ft Min. width)
- A straight Step Roof Ladder covering all roof platforms (2 ft Min. width)
- Internal ladder Accessible from roof to enter in to Silo
- 3 full Platforms shall be provided on roof (starting of roof, mid of roof & peak of roof). A minimum 6 feet diameter platform shall be provided on peak platform.
- Platforms shall be provided with Handrails.
- Roof manhole, Shell Manhole on the first ring of silo
- Vents with flap gates
- Exhausts fans on roof with bird screen and flap gate. Air Displacement capacity of Exhaust fans = Aeration fan Capacity. Roof exhaust fans shall be provided with Louvers to ensure rain water ingress is prevented.
- Floor screen of silos shall be of flat design for easy clean out of grains.
- Roof panels to have corrugated profile so that the overlapping panels do not have any gap in between.

All Silos shall be provided with following accessories required for easy operation and maintenance

**Accessories required for operation & maintenance of Silos:**

4.1.10

unloading hopper shall be equipped with grating to prevent the ingress of birds into the unloading hoppers and to prevent humans from accidentally falling into the unloading hoppers. The underside of the baffle shall be equipped with a special baffle arrangement for dust abatement.

4.2.3 Walkway of minimum 750 mm on one side shall be provided for each conveyor. Covered gallery shall be provided all along the belt conveyors. All walkways shall be provided with chequered plates. All tower floors shall be provided with chequered

4.2.2 Trough belt conveyors with 35 trough angles shall be used. All belt conveyors shall be provided with hood cover. Belt conveyors shall be designed as per IS-11592.

4.2.1 Belt conveyors shall be designed as per standard EIL specification No. 6-47-0001. (However CEMA is also acceptable for Belt conveyor sizing and Power calculation). The list and brief parameters of the belt conveyors considered within the scope of this package shall be as per the Data sheets attached with the bid specification.

**BELT CONVEYORS**

Contractor shall guarantee that all the materials used in the equipment are new and have been submitted to regular acceptance procedure & are free from any defect regarding quality, form and appearance and compliance to various technical requirements of this specification.

Contractor shall guarantee the sizing, mechanical design, materials, workmanship, and performance of complete silos including all components, sub-assemblies, bought outs etc.

**GUARANTEES**

For the equipment stage wise & final inspection shall be by a reputed third party inspection agency. Inspection shall be carried out only after drawings are approved by EIL.

Contractor shall carry out various tests as per applicable codes/standards. Any or all test shall be witnessed by CWC/EIL.

Silos shall be subjected to inspection by CWC/EIL or third party who shall have access to inspect the equipment at any stage during manufacture. During inspection, material certificates, shop test data, certificates for bought out components and other relevant information shall be furnished and testing done as required so as to ascertain that the specifications and quality is complied with.

Inspection test plan shall comply with all requirements specified or enclosed herein. It must specify various stages of inspection. Any comments by CWC/EIL shall be complied with without time & cost implication.

Silo Roof & Shell shall be checked for water leak proof by Hydrant @ 5 kg/cm<sup>2</sup>.

**INSPECTION**

Silo Vendor documents must be reviewed & approved by Contractor before submission. Unchecked document without revision clearly marked shall not be reviewed. Successive review of the same document shall apply only with respect to comments on the previous submission. All documents shall be legible & of good quality. Illegible documents shall be returned without review & any delay in review of such documents shall be to Contractor's account.

(c) Material of construction of all components along with their sizes and thickness.

(d) Any specific feature, requirements relating to the equipment.