

- plates of suitable strength. Toe guards shall be provided on walkways inside galleries on both sides of walkways.
- 4.2.4 Motor kW rating shall be suitable to restart the belt/chain under fully loaded condition. Motors shall be sized to be non-overloading over the entire capacity range.
- 4.2.5 All belting shall be of nylon-nylon fabric with cover grade suitable for the product handled. Top and bottom cover thicknesses shall be 3mm (minimum) each.
- 4.2.6 The idler rolls shall be made from ERW tubes of nominal 4.0 mm thickness, finished on the outside with edges rounded to prevent the damage of the belt.
- 4.2.7 The diameter of all carrying and return idlers shall be 127 mm.
- 4.2.8 Carrying idler frames shall be designed to prevent any accumulation of material, which shall hinder free rotation of the idlers. The frames shall not have any protruding parts liable to damage the belt.
- 4.2.9 All transition idlers shall be of three drop-in type, in-line identical and interchangeable rolls with fabricated bracket.
- 4.2.10 Impact idler rolls wherever provided shall consist of atleast six (6) numbers of closely spaced resilient natural rubber discs having thickness not less than 25mm and durometer hardness of 55 to 65 shore, scale "A".
- 4.2.11 Impact idlers shall be able to withstand the heavy impact of material loaded onto the belt conveyor. These idler sets shall be provided at all the loading points and the spacing shall not exceed 500mm.
- 4.2.12 All return idlers shall be of flat type.
- 4.2.13 The spacing of the return idlers shall be based on belt sag, which shall not exceed 2%. However, the maximum spacing shall not be more than 3000 mm in any case.
- 4.2.14 The training idler shall be pivot mounted on self aligning swiveling base having dust proof lubrication.
- 4.2.15 Two (2) Nos. guide rollers at each end shall be provided to maintain proper alignment of belt. These assemblies shall be provided at every 10 m spacing. Return training idlers shall be provided at every 30m spacing.
- 4.2.16 All drive pulleys shall be provided with 10mm diamond groove rubber lagging.
- 4.2.17 The minimum shaft diameter at bearing shall not be less than 50mm. Shafts shall not protrude from the pillow blocks where required and in such cases end cover shall be provided for the pillow block. The diameter of shaft at bearing shall be standardized to minimize the types of bearings. All bearings used in the conveyor pulleys shall be selected one size higher than the required size by calculation.
- 4.2.18 External belt cleaners comprising of primary & secondary scrapper shall be provided immediately after the discharge pulley on the return belt side.
- 4.2.19 One No. V-Type internal scraper shall be provided before the return side of the belt enters the lapping zone of the tail pulley.

4.2.20 The minimum slope of the chute shall be 55 deg with horizontal plane and all chutes shall be designed such that build-up of materials does not take place in the chute. Minimum valley angle of 50 deg shall be provided with respect to the horizontal plane. All head snub pulleys shall be taken inside the chutes.

4.2.21 All the chutes shall be made of 6mm Mild Steel.

4.2.22 The construction of chutes shall be in convenient sections with flanged joints so that the same can be erected and dismantled easily. All flange joints and bolt holes shall be properly sealed with suitable gasket of minimum 3mm to prevent leakage of dust and air.

4.2.23 Loading zones of all conveyors shall be provided with skirt boards. All skirt boards shall be made of 6mm thick MS plate.

4.2.24 Rubber curtain shall be provided at the end of the skirt board to minimize generation of dust.

4.2.25 Skirt boards shall be provided with bolted type cover plates of minimum 2.0mm thickness.

4.2.26 If gravity take up is provided, the take-up tower shall be fabricated from structural steel with necessary rope sheaves. The tower shall be provided with suitable safety cage for a height of 2.5 mtr form ground level made of expanded metal sheets. All the necessary maintenance platform, access Staircase from ground level etc. shall be provided. The bottom of the gravity take up tower shall be provided with a sand pit so that if the counterweight falls due to breakage of belt/rope, it shall transfer the impact to the sand cushion.

4.2.27 If required, the idler brackets at the concave/convex curve shall be provided with the required shims to ensure a smooth curve of the belt line.

4.2.28 All bearings shall be of antifriction type.

4.2.29 The drive assembly shall consist of the drive motor, Fluid or pin bush coupling (as applicable), reduction gear box, flexible coupling, as per requirement. The drive units shall be selected based on design conveyor capacity.

4.2.30 The gear reducer housing shall be of cast steel or welded steel construction, of modular design, totally enclosed, stress relieved and machined to form rigid, oil tight and dust proof enclosure for the gears and the bearings. The cover shall be split type at shaft center-line so that top half can be removed for inspection and repair without disturbing the bottom half.

4.2.31 The gear reducer shall have oil filling cap, breath vents, a visible oil level indicator, dipsticks and easily accessible drain plug.

4.2.32 The gear box assembly shall be designed for minimum operating L10 life of 50000 hours.

4.2.33 All the bearing installations shall have standard Plummer blocks. Plummer blocks shall be sourced from approved bearing manufacturer only.

4.2.34 All welded steel construction common base frame shall be provided for the complete drive assembly (i.e. motor, reducer and couplings).

4.4.1 Bucket Elevator shall conform to EIL Standard Specification for Bucket Elevator (Document No - 6-47-0003, Rev-4) attached with Tender Document.

BUCKET ELEVATOR

4.3.12 Necessary safety devices like zero speed switch shall be provided at the tail end apart from removable type guards for all rotating parts.

4.3.11 The drive unit shall comprise of motor, fluid coupling (in case of motor name plate rating greater than 30KW) or flexible coupling in the input side, reduction gearbox and gear coupling on the output side.

4.3.10 Inspection openings with protective mesh cover, of minimum size 250mm x 150mm, in the casing shall be provided at a spacing of not more than 3.0 m.

4.3.9 For the single chain conveyor the return chain support shall consist of manganese wear strip supported on cross members from the casing sides. For the double chain conveyor, the same shall be on flanged rollers mounted on shafts supported on bearings located external to the casing.

4.3.8 For the chain runners, manganese steel strip shall be used, welded to the bottom of the casing.

4.3.7 The casing shall be constructed from flat and pressed mild steel plates and rolled steel sections, having flange joints. The minimum thicknesses of bottom and side plates shall be 8mm. For top plates, the minimum thickness shall be 5mm. The side plates shall be provided with renewable wear or abrasion resistant liner plates.

4.3.6 The trailing drum or sprocket shall be similar to the driving sprocket and shall be provided with manually adjustable screw tension fittings.

4.3.5 The drive sprocket shall be keyed to a steel shaft supported in 'Cooper' split roller bearings or similar, in pedestal housings with good quality shaft seals, suitable for the duty.

4.3.4 The driving end shall be of fabricated construction made from minimum 8mm thick mild steel plates, suitably stiffened and fitted with end angle flanges for jointing with the casing.

4.3.3 All chains shall be of extra heavy duty wear resistant steel having breaking stress not less than ten times the maximum working load and with maximum speed 0.3 m/sec.

4.3.2 Chain conveyor shall be as per manufacturer's standard.

4.3.1 Drag chain conveyors shall be fully enclosed and gallery of 750mm minimum width shall be provided on one side of the conveyor.

CHAIN CONVEYORS

4.2.36 Fluid coupling shall be used as high speed coupling whenever the motor rating exceeds 30 kW. In case fluid coupling is used, selection of fluid coupling should be on the motor rating as per manufacturer's recommendation. Further service factor is not required to be considered.

4.2.35 All towers shall have one no. floor cleaning chute connecting all floors.

4.8	TRUCK LOADING SYSTEM
4.7.5	Modification of railway tracks / siding works, as required, for installation of wagon loading system shall be carried out by Contractor.
4.7.4	Maintenance walkways / access / inspection platforms shall be provided for wagon loader tower.
4.7.3	Movable telescopic spout shall be provided below each weigh hopper for filling the wagons. Each telescopic spout shall be able to move over half of wagon length and fill the wagon uniformly.
4.7.2	Wagon loading tower shall be provided with two (2) numbers Hopper of 65 MT each with motorized gates followed by two (2) numbers Weigh Hopper of 35 MT each (or $\pm 0.2\%$ accuracy) and motorized gate.
4.7.1	Automatic Wagon Loading System shall be provided for loading of wheat grains into Railway Wagons. Bogie covered hopper wagon for food grains type 'BCBFG' of Indian Railways shall be used. Number of wagons anticipated in each rakes shall be forty eighth (48) each having a capacity of 62 to 65 MT.
4.7	RAIL LOADING SYSTEM
4.6.4	Bulk weigher shall be provided after cleaning device for weighing of wheat grains before storing in Storage Silos.
4.6.3	2 Nos, 75 TPH flat sieve shall be provided by for removal of fines and dust from grains and bag filters shall be provided for proper disposal of dust.
4.6.2	2 Nos, 75 TPH each Rotary Drum sieve shall be provided for removal of large foreign particles from grains. Reject collection bin shall be provided with Rotary Drum.
4.6.1	Cleaning of wheat grains shall be provided in Process tower. Two stage cleaning of gains shall be provided, coarse cleaning followed by fines/dust cleaning.
4.6	CLEANING DEVICE
4.5.4	The flap gate shall be located in such a manner so as to have ease of maintenance and access for operating personnel.
4.5.3	The equipment shall be capable of being operated manually by means of a suitable chain-link mechanism, when the motor is under repair.
4.5.2	The flap gate shall have locking arrangements for two (2) extreme positions and shall be mounted with bolted connection for easy replacement.
4.5.1	Flap gates wherever required shall be of robust construction and actuated by means of a suitable geared motor. The geared motor shall be capable of providing the thrust required to operate the gate against the falling material load.
4.5	MOTORISED FLAP GATES
4.4.2	Suitable access along with material handling facilities shall be provided for all the Bucket Elevators.

4.12.1.1 ~~CI. No. 1.4 of Standard Specification for Centrifugal Pumps (Water Service) (Document No-641-0003) stands deleted and shall be read as "Vendor/Contractor to ensure that the offered model shall not be prototype. Vendor shall quote as per enlistment with EIL."~~

4.12.1 ~~CENTRIFUGAL PUMPS (WATER SERVICE)~~

4.12 ~~PUMPS~~

4.11.2 ~~CI. No. 1.5 of Standard Specification for Diesel Engine and DG Set (Document No-643-0040) stands deleted and shall be read as "Vendor/Contractor to ensure that the offered model shall not be prototype. Vendor shall quote as per enlistment with EIL."~~

4.11.1 ~~Refer EIL Standard Specification for Diesel Engine and DG Set (Document No-643-0040)~~

4.11 ~~DG SET~~

4.10 ~~SPLIT AIR-CONDITIONER~~

Split AC shall have wall/floor mounted indoor unit and remotely located air cooled condenser (outdoor unit) with insulated refrigerant piping, concealed (in conduit) condensate piping from indoor unit to outside the building, Controls and line accessories, Initial charge of refrigerant, oil and lubricants, Electrical and civil works (e.g. civil work related to concealing of refrigerant piping, condensate piping, cabling in AC space and outside up to the outdoor unit, cut-out in walls for Refrigerant piping) as required including the structural steel framework, pedestal to mount the indoor/outdoor units, supports for indoor/outdoor units, supports & clamps for refrigerant piping/cables, stabilizer, hold down nuts & bolts.

4.9 ~~HANDLING FACILITIES~~

There shall be adequate number of pendant operated electric hoists / CP Block (considering minimum pulling effort) as necessary for handling and maintenance of all equipment shall be provided. The hoists shall be suitable for operation from the respective platforms. The hoist capacity shall be adequate to lift and move the heaviest part of the concerned equipment during maintenance. Electric Hoists shall conform to Standard Specification for electric wire rope hoist (Doc no. 6-61-0014) and Chain Pulley Blocks shall conform to Standard specification for chain pulley block (Doc no. 6-61-0015) attached with the bid package.

4.8.1 The Truck Loading System shall comprise of a structural steel tower having one (1) no. Truck loading silo of live capacity 100 MT, for loading onto trucks.

4.8.2 Loading Silo shall be provided with ultrasonic level indicators at the top which shall continuously indicate the material levels inside the bunkers based on which the feeding system shall start/stop. The Silo bottom shall be provided with electrically operated isolation gate & manual gate with suitable telescopic chute mechanism for loading onto trucks.

4.8.3 Loading silo shall also be provided with suitable inspection openings and maintenance platforms, access ladders with handrail etc. Location of Truck loading station/ operator panel shall be in vicinity of the truck loading Silo.



Refer Centrifugal Pumps (Water Service) data sheet for details.

~~4.12.2 Submersible Pump with Motor for Tube Wells shall be as per Vendor Standard.~~

5.0 INSPECTION AND TESTING

5.1 Owner/EIL or his representative shall have access for stage wise and final inspection to their parts or areas of the plant (including sub-vendors plants) where work or attesting of the equipment is being performed. This is in addition to manufacturer's own inspection. The inspection procedure shall include checking the major dimension and verification of materials of construction (through mill test reports etc. which shall be made available by the vendor or all major components). Vendor shall furnish (with the equipment) material certification for major components. Minimum requirement shall be as per ITP attached with the bid package.

5.2 After assembly of each unit, it shall be subjected to tests as per the manufacturer's standard test procedure. This should include a functional test of the smooth running of the equipment. The functional test may be witnessed by Owner/EIL at Vendor's shop. Contractor shall furnish necessary notice for witnessing shop tests to Owner/EIL in due course. If dismantling is required for improvement of performance in the tests, the initial test shall not be acceptable and the final test must be done after corrections are made.

5.3 Acceptance of shop tests shall not constitute a waiver of requirements to meet the field performance under the specific operating conditions nor shall inspection by purchaser or his representative relieve the Contractor of his responsibilities in any way.

5.4 Generally Tests shall be conducted as per relevant standards as applicable for each and every equipment/item.

5.5 Contractor shall submit Quality Assurance (QA) procedure before commencement of fabrication for review. Approved QA procedure shall form the basis for equipment inspection

5.6 Contractor to also comply with the Inspection and testing as per clauses mentioned in the Standard Specification for equipment attached with the bid package.

6.0 PERFORMANCE GUARANTEE

6.1 Contractor shall be fully responsible for design and manufacturing work as well as the smooth functioning of the equipment covered under this specification as a minimum.

6.2 The system shall be performance tested at site after commissioning. The guaranteed parameters shall be checked during the performance test. The performance testing procedures shall be mutually decided after finalization of order.

6.3 Necessary Instruments for performance testing shall be arranged by the contractor, and calibrated before undertaking the performance test.

6.4 All equipment and component parts shall be guaranteed by the Contractor against faulty design, defective material or poor workmanship for a period stipulated in the bid package.

6.5 If any equipment or component(s) fail to perform the stipulated duty or malfunction, contractor shall, rectify, modify, replace or make good the defective

- Scope of Supply/Work
- Job specification and Datasheet
- EIL Standard Specification

In case of any conflict among various documents, following order of precedence shall govern:

10.0 ORDER OF PRECEDENCE

Surface preparation and painting for all other items shall be as per Specification attached with the bid package.

9.0 PROTECTION AND PAINTING

Special Tools and Tackles shall be supplied by Contractor along with the main equipment as recommended by OEM (Original Equipment Manufacturer).

8.4 SPECIAL TOOLS AND TACKLES

Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment is facilitated. Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.

Contractor shall provide the list of spare parts for first two years of operation and maintenance of the equipment as recommended by OEM (Original Equipment Manufacturer) with recommended quantities and itemised prices.

8.3 SPARES FOR TWO YEARS OF NORMAL OPERATION

Contractor shall supply commissioning spares sufficient for trouble free commissioning of the system at site. Any commissioning spares required during commissioning, over and above, the commissioning spares supplied, shall be made available by the contractor without any cost and time implication to purchaser. If for any reason, during commissioning, contractor needs to utilize spares from 2 years' operational spares, the same shall be replenished by contractor within a reasonable time without any cost implication to purchaser. Any unused commissioning spares shall be handed over to Owner.

8.2 COMMISSIONING SPARES

Refer document Mandatory Spare Parts (Equipment Division), doc. no. A951-000-80-43-MS-4500 attached with the bid package.

8.1 MANDATORY SPARES

Commissioning spares, Mandatory Spares and Special tools and tackles shall be separately packed with separate packing list. Packing case shall be clearly marked as Commissioning spares / Mandatory Spares / Special tools and tackles.

8.0 SPARES AND SPECIAL TOOLS & TACKLES

However all conflicts / discrepancies in the above mentioned documents shall be submitted to EIL for approval and EIL/Owner decision shall be final without any commercial implication to owner/EIL.

- Other Codes & Standard

GIC FLAT BOTTOM SILO		
Silo Dimension		
Type	Flat Bottom	
Silo Diameter	m	
Silo Total Height	m	
Silo Shell Height	m	
Silo Roof Height	m	
Roof Peak Load Capacity	Kgs	
Product Details		
Grain	Wheat	
Bulk Density	750	Kg/CUM
Angle of Repose	27	Deg
Moisture	12%	
Compaction Factor	5%	
Silo Capacities		
Silo Volume	CUM	
Capacity without compaction factor	MT	
Capacity with 5% compaction factor	MT	
Design Considerations		
Silo Design Standard	IS	
Seismic Zone	Zone IV	
Wind load	175	KMPH
Snow load Standard	75	Kgs/SqM
Silo Construction Details		
Nos of Sidewall Sheet Rings	Nos	
Nos of Sidewall Sheet per Rings	Nos	
Sidewall Sheet Material		
Roof Sheet material		
Tensile Stress	N/mm ²	
Yield Strength	N/mm ²	
Stiffeners		
Sheet Corrugation Standard Pitch x Depth		
Silo Roof Angle	30	Deg
Fastening Nuts and Bolts		
SILO STANDARD ACCESSORIES		

a. Storage Silo (12500 MT x 4 Nos)

1. STORAGE & SHIPPING SILOS

		Approach Ladder & Platform Package
Unit Each	m	Outside Ladder with Cage Length
Unit Each	m	Inside Ladder with Cage Length
Unit Each	m x m	Resting Platforms
Unit Each	m	Roof Ladder
Unit Each	m	Eve Railing with Platform
		Wind Rings
Unit Each	mm	Wind Ring with Connectors
unit each	mm x mm	Central Electric Slide Gate with Actuator
KW		Actuator Motor Rating
Unit Each	mm x mm	Manual Slide Gate with Ratchet and Pinion
Unit Each	mm x mm	Level Measuring Devices
Unit Each	High Level	Tuning Fork Type Level Probe
TPH	60	Sweep Auger
		Sweep Auger Dia
Mtrs		Sweep Auger Length
RPM		Sweep Auger
KW		Sweep Auger
		Sweep Auger Tractor Motor Rating
		Temperature Monitoring System
Unit Each		Temperature Sensing Cables with Temperature Sensors at every 2 meters
		Temperature Indication console with Cards, Cables and Cable Holding Brackets
		Silo Aeration System
		Flush Floor Perforated Aeration grid, Modular and Duly Supported Area of Perforations
Set	SqFt	Aeration Fans
Unit Each	HP	Aeration Fan KW
Unit Each	KW	Roof Ventilation Fans with motor
Unit Each	mm x mm	Vents with Bird Mesh
Unit Each		Closed Loop Fumigation System
Unit Each	CFM	Fumigation Fan
Unit Each		PVC Ducting, Valves, Pipe Fittings etc.
		SILO CATWALK
		Heavy Duty Hot Dip Galvanised Catwalk with Open Mesh Floor
		Catwalk Width
m		Catwalk Length
m		Galvanising Standard

b. Shipping Silo (4000 MT x 1 Nos)

Silo Dimension		Silo Diameter	
Silo Dimension		Silo Diameter	
Type		Flat Bottom	
Silo Total Height		m	
Silo Shell Height		m	
Silo Roof Height		m	
Roof Peak Load Capacity		Kgs	
Product Details		Grain	
Bulk Density		Kg/Cum	
Angle of Repose		Deg	
Moisture		%	
Compaction Factor		%	
Silo Capacities		Silo Volume	
Capacity without compaction factor		MT	
Capacity with 5% compaction factor		MT	
Design Considerations		Silo Design Standard	
Seismic Zone		Zone IV	
Wind load		KMPH	
Snow load Standard		Kgs/Sqm	
Silo Construction Details		Nos of Sidewall Sheet Rings	
Nos of Sidewall Sheet Rings		Nos	
Nos of Sidewall Sheet per Rings		Nos	
Sidewall Sheet Material		Roof Sheet material	
Tensile Stress		N/mm ²	
Yield Strength		N/mm ²	
Stiffeners		Sheet Corrugation Standard Pitch x Depth	
Silo Roof Angle		Deg	
Fastening Nuts and Bolts		Silo STANDARD ACCESSORIES	
Approach Ladder & Platform Package			

Unit Each	m	Outside Ladder with Cage Length
Unit Each	m	Inside Ladder with Cage Length
Unit Each	m x m	Resting Platforms
Unit Each	m	Roof Ladder
Unit Each	m	Eve Railing with Platform
Wind Rings		
Unit Each	mm	Wind Ring with Connectors
unit each	mm x mm	Central Electric Slide Gate with Actuator
KW		Actuator Motor Rating
Unit Each	mm x mm	Manual Slide Gate with Ratchet and Pinion
Level Measuring Devices		
Unit Each	High Level	Tuning Fork Type Level Probe
Unit Each	700	Sweep Auger
		Sweep Auger Dia
		Sweep Auger Length
Mtrs		Sweep Auger
RPM		Sweep Auger
KW		Sweep Auger
Temperature Monitoring System		
Unit Each		Temperature Sensing Cables with Temperature Sensors at every 2 meters
		Temperature indication console with Cards, Cables and Cable Holding Brackets
Silo Aeration System		
		Flush Floor Perforated Aeration grid, Modular and Dully Supported Area of Perforations
Set	SqFt	Aeration Fans
Unit Each	CFM	Aeration Fan KW
Unit Each	HP	Roof Ventilation Fans with motor
Unit Each	KW	Vents with Bird Mesh
Unit Each	mm x mm	Closed Loop Fumigation System
Unit Each	CFM	Fumigation Fan
Unit Each		PVC Ducting, Valves, Pipe Fittings etc.
SILO CATWALK		
		Heavy Duty Hot Dip Galvanised Catwalk with Open Mesh Floor
		Catwalk Width
m		Catwalk Length
m		Galvanising Standard

Unit Each	m	Inside Ladder with Cage Length
Unit Each	m x m	Resting Platforms
Unit Each	m	Roof Ladder
Unit Each	m	Eve Railing with Platform
Unit Each		Wind Rings
Unit Each	mm	Wind Ring with Connectors
Unit Each	mm	Manual Slide Gate with Ratchet and Pinion
Unit Each	mm x mm	Level Measuring Devices
Unit Each	High Level	Tuning Fork Type Level Probe
SILO CATWALK		
		Heavy Duty Hot Dip Galvanised Catwalk with Open Mesh Floor
		Catwalk Width
m		Catwalk Length
gsm min		Galvanising Standard

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Silo Dimension	
Type	Hopper Bottom
Silo Diameter	m
Silo Total Height	m
Silo Shell Height	m
Silo Roof Height	m
Roof Peak Load Capacity	Kgs
Product Details	
Grain	Wheat
Bulk Density	750 Kg/CUM
Angle of Repose	27 Deg
Moisture	12%
Compaction Factor	5%
Silo Capacities	
Silo Volume	CUM
Capacity without compaction factor	MT
Capacity with 5% compaction factor	MT
Design Considerations	
Silo Design Standard	IS
Seismic Zone	Zone IV
Wind load	175 KMPH
Snow load Standard	75 Kgs/SqM
Silo Construction Details	
Nos of Sidewall Sheet Rings	Nos
Nos of Sidewall Sheet per Rings	Nos
Sidewall Sheet Material	
Roof Sheet material	
Tensile Stress	N/mm ²
Yield Strength	N/mm ²
Stiffeners	
Sheet Corrugation Standard Pitch x Depth	
Silo Roof Angle	30 Deg
Fastening Nuts and Bolts	
SILO STANDARD ACCESSORIES	
Approach Ladder & Platform Package	
Outside Ladder with Cage Length	m
Unit Each	

d. Truck Loading Silo Pre (100 MT x 1 Nos)



DATASHEET FOR FOOD GRAIN STORAGE SILO PROJECT

Unit Each	m	Inside Ladder with Cage Length
Unit Each	m x m	Resting Platforms
Unit Each	m	Roof Ladder
Unit Each	m	Eve Railing with Platform
		Wind Rings
Unit Each	mm	Wind Ring with Connectors
Unit Each	mm	Manual Slide Gate with Ratchet and Pinion
Unit Each	mm x mm	Level Measuring Devices
		Tuning Fork Type Level Probe
Unit Each	High Level	SILCO CATWALK
		Heavy Duty Hot Dip Galvanised Catwalk with Open Mesh Floor
		Catwalk Width
		Catwalk Length
		Galvanising Standard
		gsm min

GIC HOPPER BOTTOM SILO		
Silo Dimension		
Type	Hopper Bottom	
Silo Diameter	m	
Silo Total Height	m	
Silo Shell Height	m	
Silo Roof Height	m	
Roof Peak Load Capacity	Kgs	
Product Details		
Grain	Wheat	
Bulk Density	Kg/Cum	
Angle of Repose	Deg	
Moisture	12%	
Compaction Factor	5%	
Silo Capacities		
Silo Volume	Cum	
Capacity without compaction factor	MT	
Capacity with 5% compaction factor	MT	
Design Considerations		
Silo Design Standard	IS	
Seismic Zone	Zone IV	
Wind load	KMPH	
Snow load Standard	Kgs/Sqm	
Silo Construction Details		
Nos of Sidewall Sheet Rings	Nos	
Nos of Sidewall Sheet per Rings	Nos	
Sidewall Sheet Material		
Roof Sheet material		
Tensile Stress	N/mm ²	
Yield Strength	N/mm ²	
Stiffeners		
Sheet Corrugation Standard Pitch x Depth		
Silo Roof Angle	30 Deg	
Fastening Nuts and Bolts		
SILO STANDARD ACCESSORIES		
Approach Ladder & Platform Package		
Outside Ladder with Cage Length	m	
Unit Each		

e. Bagging Silo (30 MT x 2 Nos)

Unit Each	m	Inside Ladder with Cage Length
Unit Each	m x m	Resting Platforms
Unit Each	m	Roof Ladder
Unit Each	m	Eve Railing with Platform
Unit Each	m	Wind Rings
Unit Each	mm	Wind Ring with Connectors
Unit Each	mm	Manual Slide Gate with Ratchet and Pinion
Unit Each	mm x mm	Level Measuring Devices
Unit Each	High Level	Tuning Fork Type Level Probe
SILO CATWALK		
		Heavy Duty Hot Dip Galvanised Catwalk with Open Mesh Floor
		Catwalk Width
m		Catwalk Length
gsm min		Galvanising Standard

2. BELT CONVEYOR DATA

Sl. No.	Parameters		
1.	Rated Capacity, TPH	150	150
2.	Design capacity, TPH	60	350
3.	Belt Width, mm (minimum)	650	800
4.	Trough Angle, degree	35	
5.	Carrying idlers diameter (mm); 3-roll	toughed type	
6.	Return idlers type/diameter (mm)		
7.	Conveyor length, m		
8.	Approx conveyor lift, m		
9.	Approx belt speed, m/sec	2.5	3.0
10.	Belt Type	NN	
11.	Cover Grade		
12.	Top/Bottom cover Thickness, mm (min)	3 / 3	
13.	Take up arrangement	Screw	Screw
14.	Motor KW rating, KW		

MANUFACTURER'S DATA

a) Belting for all conveyors

- Belt make :
- Belt width (mm) :
- Belt type :
- Belt speed (m/sec.) :
- No. of plies :
- Allowable working tension :
- Belt rating :
- Top and bottom cover thickness, mm :
- Cover Grade :
- Belt factor of safety :
- Total Belt length :
- Type of Belt splicing :
- Total Belt weight :

b) Idler data for all conveyors

Make	Trough angle	No. of Rolls	Roll dia (mm)	Roll material and nom. thickness	Type of Bearing
Impact	35 deg.				
Toughed	10 deg. And 20 deg				
Transition	Flat				
Return					
Training					

Max Spacing	Max 500mm	Max 1000mm	Max 3000mm
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c) Pulleys for all conveyors

Diameter (mm)	Drive	Snub	Tail	Take up	Bend
Face width (mm)					
Shaft material	C-40 or superior				
Shell thickness & material					
Bearing type and size					
Bearing centres (mm)					
Plummer Block type					

d) Conveyor Details

e) Drive Details of Belt Conveyors:

- i) Motor
 - Make
 - KW & RPM
- ii) Reducer
 - Make
 - Type
 - Nominal ratio
 - Holdback
- iii) High Speed coupling
 - Make
 - Type
- iv) Low Speed coupling
 - Make
 - Type
- v) Brakes
 - Location
 - Type
 - Make
 - Braking torque

- 3) BUCKET ELEVATOR
- a. DESIGN AND CONSTRUCTION
- Equipment No. :
 - Rated Capacity (TPH) :
 - Design capacity (TPH) :
 - Material Conveyed : Wheat Grains
 - Feed Size :
 - Lump Size, Max :
 - Feed from :
 - Discharge to :
- b. BELT/CHAIN
- Make :
 - Type (Belt/Chain) :
 - Speed :
 - Length, Centre to Centre: :
 - Bucket Size :
 - Type of Bucket Attachment:
- c. HEAD PULLEY ASSEMBLY/HEAD SPROCKET
- Head Pulley Assembly:
 - Type :
 - Material :
 - Head Sprocket Type :
 - Material :
- d. DRIVE
- Motor, KW :
 - Reducer :
 - Make :
 - S.F. :
- e. HOLD BACK
- Type :
- f. DISCHARGE CHUTE
- Material :
 - Thickness :
 - Liner Material :
 - Liner Thickness :
- g. OVERALL DIMENSIONS
- Overall Height :
 - Empty Weight of Equipment :

4) WAGON LOADING SYSTEM

5) TRUCK LOADING SYSTEM

6) WEIGH BRIDGE (ROAD)

General

Make :

Type of loading :

Rate of discharge of loading :

Capacit of each gates, TPH :

Rate of loading, TPH :

Quantity, No. of Silos : One

Dimension of bunkers, mm :

Storage capacity, MT : 100 MT

Type of liners provided :

Mouth opening dimensions, mm :

Type :

Capacity : 60 MT

Quantity : Two (2)

Accuracy : $\pm 0.025\%$

Overload Capacity : At least 25% of rated capacity

No. and Size of Weigh Cabin :

Type/Make/Model no :

Platform size :

Minimum division :

Maximum speed of vehicle passing :

MOC :

Weighing console :

Make/Model of weighing console :

Operation & Control details :

Microprocessor based with suitable memory

Fit Pitless type electronic road weigh bridge



10) ELECTRIC HOIST

OPERATING PARAMETERS		
1	Capacity: Lift:	
2	Location: Lift speed, M/min.:	
3	Lift creep speed, M/Min.: Traverse speed, M/Min.:	
4	Beam size: Length of travel:	
5	Operating Floor level: Elevation of Bottom of monorail where Hoist to be mounted :	
6	Area Classification: Duty Class: M 2	
7	CONSTRUCTION FEATURES	
8	Make: Model:	
9	Overall size: Overall weight:	
10	MATERIAL OF CONSTRUCTION	
11	Drum: Wheels:	
12	Trolley: Hook:	
13	Sheave: Rope:	
14	Rope size: No of falls:	
15	Min. breaking load, Kg: Factor of safety:	
16	Drum size: Type of hook:	
17	Safety latch in hook: Type of bearing:	
18	Hoist motor, KW: Travel motor, KW:	
19	Hoist brake type: Travel brake type:	
20	Hoisting: Lowering:	
21	Traverse: Limit switches:	
22	Control voltage: Service factor:	
23	Flexible power cable details: Pendant Wt.:	
24	Pendant push button station details: Length of pendant cable:	
25	Gear ratios: Weight of hoist, kgs:	

VENDOR DATA REQUIREMENTS

The following drawings/documents marked "✓" shall be furnished by the bidder.

S. N.	DESCRIPTION	WITH BID	POST ORDER			REMARKS
			FOR REVIEW	FOR RECORD	WITH DATA BOOK (FINAL)	
1.	Filled in Technical Compliance Format	✓				
2.	Document Control Index	✓				
3.	Flow Diagram & Plant Layout	✓			✓	
4.	Filled-in Mechanical Data Sheets (alongwith performance curves for pumps)	✓			✓	
5.	List of Mandatory Spares	✓			✓	
6.	List of commissioning spares			✓	✓	
7.	List of recommended spare parts for 2 (two) years normal operation and maintenance (with itemized price)			✓	✓	
8.	List of Special Tools & Tackles, if any			✓	✓	
9.	List of bought out items with details such as make, type, size, rating etc.	✓			✓	
10.	Utility Consumption figures			✓	✓	
11.	GA drawing and cross-section drg. of individual MOC & equipment load data			✓	✓	
12.	Sizing/Selection and Power Calculation	✓			✓	
13.	Curve for pump power-shaft speed v/s torque			✓	✓	
14.	Manufacturer's catalogues for the offered models			✓	✓	
15.	Inspection & Test Procedures & Certificates/ reports	✓			✓	@
16.	Installation, operation & maintenance manuals containing all certified drawings & documents			✓	✓	
17.	Performance Guarantee Test Procedure as applicable	✓			✓	
18.	As Built Drawings				✓	

Notes :

1. "TICK" denotes applicability.
2. Post order, drawing / document review shall commence only after approval of Document Control Index (DCI).
3. All post order documents shall be submitted / approved through EIL eDMS portal.
4. Final documentation shall be submitted in hard copy (Six prints) and soft (two CDs/DVDs) in addition to

- submission through EIL eDMS.
5. Refer - 6-78-0001: Specification for quality management system from Bidders.
 6. Refer - 6-78-0002: Specification for documentation requirements from Contractors.
 7. Refer - 6-78-0003: Specification for documentation requirement from Suppliers.
 8. All drawings & documents shall be submitted in A4 or A3 paper sizes. Documents in higher paper size shall be submitted in exceptional circumstances or as indicated in the MR/Tender.
 9. Post order- The schedule of drawing / data submission shall be mutually agreed between EIL & the bidder / contractor / supplier during finalization of Document Control Index (DCI).
 10. "@" indicates submission of documents to Inspection Agency.
 11. Bill of Material shall form part of the respective drawing.

This specification outlines the minimum requirements under which the manufacturer shall design, manufacture, test and supply the Dust Collection System: Bag filter type, complete with all accessories.

2.0 CODES AND STANDARDS

2.1 Latest editions of the following codes and standards shall govern:

- IS-2494 (Part-1) : V-Belts – Endless V-Belts for Industrial Purposes (General Purpose-Specification)
- IS: 2494 (Part 2) : V-Belts – Endless V-Belts for Industrial Purposes (Fire Resistant and Antistatic V-Belts-Specification)
- IS-3142 : Pulleys-V-Grooved Pulleys for Endless V-Belts Sections Z,A, B, C, D and E and Endless Wedge Belts Sections SPZ, SPA, SPB and SPC-Specification
- ACGIH : Industrial Ventilation (A manual of recommended practice)
- ASME B 16.5 : Pipe flanges and pipe fittings
- NFPA 68 : Explosion Venting
- EIL Std. 6-33-0005 : Standard Specification for Rotary Valve/ Feeder
- EIL Std. 6-47-0002 : Standard Specification for Screw conveyor
- EIL Std. 6-42-0002 : Standard Specification for Centrifugal Fans
- EIL Std. 6-76-0103 : Instruction to Vendor for site Performance Guarantee Requirement for Package Unit

3.0 TECHNICAL REQUIREMENT

- 3.1 Duty
- 3.1.1 Dust collection system shall be suitable for 24 hours/day continuous operation. The system shall be suitable for maintaining clean and dust-free environment around the dust generating areas.
- 3.1.2 The dust collection system shall be provided with PLC based control to interlock and monitor different control parameters, when specified.
- 3.1.3 Design of dust collection system shall be as per ACGIH norms.
- 3.1.4 Balancing dampers shall be provided in each branch for balancing purpose.
- 2.2 Other international standards may also be acceptable subject to their being equivalent or superior to those listed above, with prior approval of Purchaser.
- 2.3 For provisions not covered by the above codes & standards, applicable good engineering practices and norms of the industry shall be applicable.
- 2.4 National Laws and statutory provisions together with any local bylaws for the state wherein package is required to be installed shall be complied with.

- 3.2 Dust Filter
- 3.2.1 The dust filter shall be induced draft, self-cleaning, bag type equipment. Bags shall be cleaned by means of automatic reverse pulse jet system with instrument air or nitrogen, as indicated in data sheet.
- 3.2.2 Reverse pulse jet cleaning system shall be complete with manifold, solenoid valves, electronic timer or pressure switch, blow tubes and individual venturi for each filter element. The housing shall be air tight and shall be provided with explosion vent as per NFPA 68, if handling explosive dust. The slope of bottom cone of dust hopper shall be at least 60° with horizontal. The hopper shall be provided with inspection/cleaning port.
- 3.2.4 The bag filter shall be insulated or provided with electric space heater, if specified in the data sheet.
- 3.2.5 All flanges may be made from plate drilled to ASME B 16.5.
- 3.2.6 The filter shall be of vertical configuration with the bags vertically suspended on a tube sheet from the top of the casing. The bags shall be easily removable type. An external ladder and service platform shall be provided by vendor for bag changing and servicing automatic blowback system.
- 3.2.7 Bag cages shall be made from minimum 4 mm thick wire and shall be hot dip galvanized. Cages longer than 3 m shall be of collapsible/ split type for ease of handling.
- 3.2.8 Filtration velocity shall not exceed 2 cm/sec. Filters shall be designed for an outlet dust emission of maximum 10 mg/Nm³ or as specified in the data sheets or as per Pollution Control Board requirement, whichever is most stringent.
- 3.2.9 Bag material shall be polyester with minimum density of 550 gm/m² or as specified in data sheet.
- 3.2.10 For dusts generating static electricity, bag material shall be static conducting type.
- 3.2.11 A manometer shall be provided at a location of easy visibility for indicating pressure drop across the filter. A differential pressure transmitter and alarm shall be provided when specified in the data sheet.
- 3.2.12 An internal grid to serve as bag catcher shall be provided which shall be strong enough to sustain the impact of accidental fall of personnel.
- 3.3 Suction Blowers
- The blowers shall conform to EIL Standard specification No. 6-42-0002 for centrifugal fans. Noise level shall not exceed 85 dB (A) at 1m distance.
- 3.4 Rotary Valves
- The Rotary valves shall conform to EIL Standard specification No. 6-33-0005 for Rotary Valve/ Feeder.
- 3.5 Screw conveyors
- The Screw conveyors shall conform to EIL Standard specification No. 6-47-0002 for Screw conveyors.
- 3.6 Carbon Steel Ducts
- Ducting shall generally be as given below unless otherwise specified in job specification.
- 3.6.1 Sizing of ducts shall be done based on velocity of 20-25 m/sec unless otherwise specified in the data sheet.
- 3.6.2 Duct flanges shall be of minimum 6 mm thick plate conforming to IS:2062. Flange dimensions shall be as per ASME B 16.5. Gasket shall be minimum 3 mm thick non asbestos type.

STANDARD SPECIFICATION
FOR
DUST COLLECTION SYSTEM:
BAG FILTER TYPE

- 3.6.4 Minimum thickness of carbon steel ducts shall be 3 mm. They shall be made from CS sheets conforming to IS:1079. Dust collection hoods shall be suitably stiffened.
- 3.6.5 Air tight access openings or clean-outs shall be provided at regular intervals to suit layout.
- 3.6.6 All duct work shall be complete with supports. Support spacing shall be selected according to the duct diameter.
- 3.6.7 Smooth pipe bends of radius not less than 5 times the diameter shall be provided. Miter bends are acceptable for duct diameter of 250 mm and above. Miter bends shall be made of minimum 5 sections.
- 3.6.8 All branches shall enter the main duct at an angle of preferably 22½°, but in any case not exceeding 45°.
- 3.6.9 Exhaust stack shall be provided with the bird protection screen and suitable rain protection cowl. Stack shall be self-supporting type unless otherwise specified.
- 3.6.10 Height of stack shall be 3 meters (minimum) above highest elevation of plant building and shall conform to local statutory requirement.
- 3.6.11 Suction hoods at various collection points and dampers shall be provided along with the duct.
- 3.6.12 Pressure tapings shall be provided in the duct at suitable locations.

4.0 INSPECTION AND TESTING

- 4.1 Equipment shall be subjected to stagewise expediting, inspection and testing at vendor's sub-vendor's works by Purchaser/its authorised inspection agency. Vendor shall submit Quality Assurance (QA) plans before commencement of fabrication. Approved QA plans shall form basis for equipment inspection.

4.2 Testing at Works

- 4.2.1 Vendor shall perform tests and inspection necessary to ensure that the material and workmanship conform to the requirement of this specification.
- 4.2.2 Vendor shall furnish test certificates to show that the equipment meets the performance requirements. Manufacturer's test certificates shall be furnished for all bought out items
- 4.2.3 Fittings, valves, instruments and other accessories like filters etc. shall be duly tested and manufacturer's test certificates shall be produced. Hydrostatic/pneumatic testing for valve body strength, tightness of seat and tightness of back sealing shall also be carried.
- 4.2.4 All Positive Displacement Blowers and Centrifugal Blowers shall be performance tested at manufacturer's shop in accordance with applicable codes and standards.

- 4.2.5 Any or all the tests, at Purchaser's option, shall be witnessed by Purchaser/its authorised inspection agency. However, such inspection shall be regarded as check-up and shall in no way absolve the vendor of his responsibility.
- 4.3 Any or all the tests, at Purchaser's option, shall be witnessed by Purchaser/ its authorised inspection agency. However, such inspection shall be regarded as check-up and shall in no way absolve the vendor of his responsibility.

4.4 Performance Testing and Guarantees

- 4.4.1 A field performance test shall be conducted by the vendor to demonstrate the guaranteed performance after commissioning in accordance with test procedure and report to be prepared as per EIL Std. No. 7-76-0103.

- 4.4.2 The following shall be guaranteed and demonstrated during the performance testing:
The procedure of performance testing shall be submitted for Purchaser's review and shall be mutually agreed between the Purchaser and the vendor.

- 4.4.3 Necessary instruments for the performance testing shall be arranged by the vendor, and shall be tested and calibrated before undertaking the performance test.
- 5.0 PROTECTION AND PAINTING
- 5.1 Surface preparation and painting shall be done as per Project specific painting Specification.
- 5.2 Stainless steel surfaces, both inside and outside, shall be pickled and passivated.
- 5.3 Machined and bearing surfaces shall be protected with varnish or thick coat of grease.
- 6.0 PACKAGING AND IDENTIFICATION
- 6.1 All packaging shall be done in such a manner as to reduce the volume. The equipment may be dismantled into major components, suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly match marked for site erection.
- 6.2 Attachments, spare parts of the equipment and small items shall be packed separately in wooden-cases. Each item shall be appropriately tagged with identification of main equipment, item denomination and reference number of the respective assembly drawing.
- 6.3 Detailed packing list in water-proof envelope shall be inserted in the package together with equipment.
- 6.4 Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number, name of manufacturer etc.
- 6.5 Vendor shall furnish procedure for prolonged storage of supplied equipment/material at site.
- 7.0 SPARE PARTS
- 7.1 Vendor shall submit list of spare parts with recommended quantities and itemised prices for first two years of operation of the equipment. Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment is facilitated.
- 7.2 Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.
- 7.3 Vendor shall also submit a list of commissioning spares with quantities. The commissioning spares shall be sufficient for trouble free commissioning of the system at site. Any commissioning spares required during commissioning, over and above, the commissioning spares supplied, shall be made available by the vendor without any cost and time implication to Purchaser. If for any reason, during commissioning, vendor needs to utilise spares from 2 years' operational spares, the same shall be replenished by vendor within a reasonable time without any cost implication to Purchaser. Any unused commissioning spares shall be handed over to owner.

1.0 GENERAL

1.1 This specification outlines the minimum requirements under which the manufacturer shall design, manufacture, test and supply the Electronic Weigh-Bridge (Road), complete with all accessories.

2.0 CODES AND STANDARDS

2.1 Latest editions of the following codes and standards shall govern:

- IS - 9281 (Part I) : Specification for Electronic Weighing System-Terms and Definition
- IS - 9281 (Part II) : Specification for Electronic Weighing System-Method of Measurements
- IS - 9281 (Part III) : Specification for Electronic Weighing System-Requirements
- IS - 9281 (Part 4) : Specification for Electronic Weighing System-Code of Practice for Use and Installation
- EIL Std.-6-44-0004 : Standard Specification for Shop and Field Painting
- EIL Std.-7-76-0103 : Instructions to Vendor for Site Performance Guarantee Requirements for Package Units

2.2 Other international standards may also be acceptable subject to their being equivalent or superior to the above, with prior approval of purchaser.

2.3 For provisions not covered by the above codes & standards, applicable good engineering practices and norms shall govern.

3.0 TECHNICAL REQUIREMENT

- 3.1 The weighbridge shall be electronic type using load cells for weight measurement.
- 3.2 The weighbridge shall be pit type/pitless type as indicated in data sheet.
- 3.3 The weighbridge shall have overload capacity of atleast 25% of rated capacity.
- 3.4 The weighing accuracy shall be $\pm 0.025\%$ of the weight over complete capacity range.
- 3.5 Load cell shall have IP-68 protection and shall be suitable for maximum ambient temperature and classified area as specified in data sheet.
- 3.6 Weigh bridge platform top shall be anti skid type.
- 3.7 Platform shall be supported on adequate numbers of longitudinal joists/channels to provide strength to the weighbridge. The platform shall be rigid enough to resist deflection and deformation in all directions.
- 3.8 Constraints shall be provided in weighbridge for both directions to restrict any movement due to movement of truck/lorry.
- 3.9 All material used for fabrication of weigh bridge structure shall be of tested quality IS: 2062 carbon steel.
- 3.10 Weight measurement shall be independent of the location of weight on the weighbridge platform.

- 3.11 Design of Weigh Bridge shall incorporate suitable access for maintenance of load cells and other components.
- 3.12 Weighing Console
- 3.12.1 The weighing console shall be microprocessor based suitable to operate under maximum ambient dry bulb temperature and maximum ambient humidity conditions specified in the job specification. Alpha-numeric keyboard shall be included for data entry to printout comprehensive weight ticket.
- 3.12.2 The weighing console shall have built-in non-volatile memory to store the configurational and application data.
- 3.12.3 The weighing console shall be provided with either a built in printer for weigh ticket printing or an external dot-matrix printer to print out weigh-tickets and any other data required.
- 3.12.4 The weighing console shall have built-in calendar clock. It shall be possible to change the time under password protection.
- 3.12.5 The weighing console electronics shall have suitable memory to retrieve data for the last 500 weighments against customer, product and vehicle information.
- 3.12.6 The weighing console shall operate at 240V, 50 Hz AC. The system shall operate satisfactorily in case of voltage variation of $\pm 10\%$ and frequency variation of $\pm 5\%$.
- 3.12.7 The weighing console shall be supplied complete with all hardware and software meeting specified requirements.
- 3.12.8 Weighing Console Interface
- a) Weighing console shall be connected with a personal computer to be supplied by vendor. The computer shall be used to generate inventory report, loading report etc. in the user defined formats.
- b) Weighing console shall be provided with minimum 2 numbers RS-232C/422/485 synchronous/asynchronous serial communication ports and a published communication protocol preferably MODBUS.
- c) Weighing Console shall be suitable for interface with Purchaser's DCS, if specified in Job Specification/data sheet. All hardware/software for connecting weighing controller console to purchaser's DCS through RS 422/485 serial link with MODBUS RTU protocol along-with details such as address mapping list etc. Shall be supplied by vendor. Necessary converters and serial link cable shall also be supplied by vendor. Distance of Serial cable between weighing console and purchaser's DCS shall as specified in Job Specification/data sheet.
- 3.13 When weighbridge is located in classified hazardous area, suitable zimmer barrier shall be provided between control room and weighbridge. All electrical items and instruments in the field shall be suitable for the specified area classification.
- 3.14 All installation materials, Electrical and instrumentation junction boxes, cables and cable glands, fittings, termination of cables at field and control room shall be provided and these shall be suitable for the electrical area classification of operating zone. The cable with necessary conduits between load cells and weighing console shall be by vendor. All such cables shall be shielded and armoured type.
- 3.15 Weighbridge shall be supplied with the test weights of total weight equivalent to 10% of the rated capacity of the weighbridge in denominations of 10 nos. of 10 kg, 5 nos. of 20 kg and balance of 50 kg.

4.0 INSPECTION AND TESTING

4.1 Equipment shall be subjected to stage-wise expediting, inspection and testing at vendor's/sub-vendor's works by purchaser/its authorised inspection agency. Vendor shall submit Quality Assurance (QA) plan before commencement of fabrication. Approved QA plan shall form the basis for equipment inspection.

4.2 Testing at Works
 Vendor shall perform tests and inspection necessary to ensure that the material and workmanship conform to the requirement of this specification. As a minimum following tests shall be conducted.

- i) Dimensional check up and visual inspection.
- ii) Checking of all material test certificates.
- iii) Review of test certificate of all bought out components.
- iv) Load cell test for rated and overload weight.

4.3 Any or all the tests, at purchaser's option, shall be witnessed by Purchaser/its authorised inspection agency. However, such inspection shall be regarded as check-up and shall in no way absolve the vendor of his responsibility.

4.4 Performance Testing and Guarantees

4.4.1 A field performance test shall be conducted by the vendor to demonstrate the guaranteed performance after commissioning in accordance with test procedure to be prepared as per EIL Sid. No. 7-76-0103.

The procedure of performance testing shall be submitted for Purchaser's review and shall be mutually agreed between the purchaser and the vendor.

4.4.2 The following shall be guaranteed and demonstrated during the performance testing:

- a) Full load test and over load verification test.
- b) Accuracy test.

4.4.3 Necessary instruments for the performance testing shall be arranged by the vendor, and shall be tested and calibrated before undertaking the performance test.

4.5 Statutory Approval

Vendor shall provide assistance to owner for obtaining certification of applicable Weights & Measure Authority. The requisite fee for certification shall be reimbursed by owner.

5.0 PROTECTION AND PAINTING

5.1 Surface preparation and painting shall be done as per Standard Specification for Shop and Field painting (Specification No. 6-44-0004).

5.2 Stainless steel surfaces, both inside and outside, shall be pickled and passivated.

5.3 Machined and bearing surfaces shall be protected with varnish or thick coat of grease.

6.0 PACKAGING AND IDENTIFICATION

6.1 All packaging shall be done in such a manner as to reduce the volume. The equipment may be dismantled into major components, suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly marked marked for site erection.

6.2 Attachments, spare parts of the equipment and small items shall be packed separately in wooden-cases. Each item shall be appropriately tagged with identification of main equipment, item denomination and reference number of the respective assembly drawing.

6.3 Detailed packing list in water-proof envelope shall be inserted in the package together with equipment.

6.4 Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number, name of manufacturer etc.

6.5 Vendor shall furnish procedure for prolonged storage of supplied equipment/material at site.

7.0 SPARE PARTS

7.1 Vendor shall submit list of spare parts with recommended quantities and itemised prices for first two years of operation of the equipment. Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment is facilitated.

7.2 Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.

7.3 Vendor shall also submit a list of commissioning spares with quantities. The commissioning spares shall be sufficient for trouble free commissioning of the system at site. Any commissioning spares required during commissioning, over and above, the commissioning spares supplied, shall be made available by the vendor without any cost and time implication to purchaser. If for any reason, during commissioning, vendor needs to utilise spares from 2 years' operational spares, the same shall be replenished by vendor within a reasonable time without any cost implication to purchaser. Any unused commissioning spares shall be handed over to owner.

1.0 GENERAL

This specification outlines the minimum requirements for the design, engineer, manufacturer, test and supply of the Belt Conveyors suitable for bulk material handling and its accessories.

2.0 CODES AND STANDARDS

2.1 This standard is based on following Indian/International Standards, and the standards referred therein, which shall be deemed to be part of this standard:

- IS 1891 : Specification for Rubber Conveyor and Elevator Textile Belting.
- IS 4776 : Specification for Troughed Conveyors.
- IS 7155 : Code of Recommended Practice for Conveyor Safety.
- IS 8531 : Specification for Pulleys for Belt Conveyors.
- IS-8597 : Specification for Flat Belt Conveyors.
- IS 8598 : Specification for Idlers and Idler Sets.
- IS 8730 : Classification and Codification of Bulk Material Handled by Continuous Material Handling Equipment.
- IS-9295 : Steel Tubes for Idlers for Belt Conveyors.
- IS-11592 : Selection and Design of Belt Conveyors-Code of Practice.
- ISO-15236 (Pt 1 to 4) : Steel Chord Conveyor Belts.
- EIL Std. 7-76-0103 : Instructions to Vendor for Site Performance Guarantee Requirement for Package Units.

Latest revision of the above-mentioned standards as on the date of enquiry shall be applicable.

2.2 Other international standards may also be acceptable subject to their being equivalent or superior with prior approval of purchaser.
 2.3 For provisions not covered by the above codes & standards, applicable good engineering practices and norms shall govern.
 2.4 National Laws and statutory provisions together with any local bylaws for the state wherein package is required to be installed shall be complied with.

3.0 TECHNICAL REQUIREMENT

Technical requirements of Belt Conveyor shall be as per Codes and Standards referred in clause 2.1 above, subject to the following additions, deletions and modifications:

3.1 Addition / Deletion / Modification to IS 11592 : 2000 (Reaffirmed 2010)
 i) Clause no. 8.6.1 (Addition): Textile belting shall be in accordance with IS - 1891 while steel cord Belting shall meet the technical requirements as specified in ISO - 15236.
 Nylon/Nylon & polyester belt shall be of cut edge type construction while textile & steel cord belt shall be of moulded type construction. Cover of belt used for highly

abrasive material shall be provided with breaker reinforcement. Cotton textile belting shall not be used.

Belt rating and cover thickness shall be selected such that factor of safety on belt tension as recommended by belt manufacturer is maintained and cross-checked from load support and troughability considerations.

All Belting shall have hot vulcanized joints.

ii) Clause no. 8.7 (Addition): For pulley shaft diameter calculation, ANS/CEMA B105.1 (Specifications for Welded Steel Conveyor Pulleys) shall be followed.

Pulley diameter shall be as per belt manufacturer's recommendations. However, minimum diameter of various pulleys shall not be lower than as indicated below:

Type of Pulleys	Min. diameter, mm
Drive Pulley	500
Tail & take up Pulleys	400
Bend and Snub Pulleys	315

All Pulleys shall be of welded steel construction and stress relieved.

All Pulley bearings shall be of anti-friction type with self-aligning double row spherical roller bearings, enclosed in a dust and moisture-proof housing which shall be of cast iron or cast steel construction and shall be of split type. Provision for proper lubrication of the bearings shall be provided on all the plummer blocks. The bearing seals shall be double labyrinth type. Bearing shall be selected for L_{10} life of minimum 50000 hrs.

iii) Clause no. 8.7.3 (Modification): Drive pulleys shall be lagged with diamond groove. Tail and take up pulleys shall be plain lagged.

iv) Clause no. 8.8.4.6 e (Addition): At each loading point, rubber disc impact idlers shall be provided with minimum five number idlers at a maximum spacing of 500 mm. For heavy duty applications, impact pad/slider bed shall be provided, if specified in the Job Specification. For power calculation and belt selection, additional friction due to impact pad/slider bed shall be considered.

v) Clause no. 8.8.4.7 a (Addition): While selecting idler spacing, resultant load on idlers (sum of belt load, material load and the radial resultant of the belt tensions) shall also be checked, so that it does not exceed the allowable load capacity of the idlers.

vi) Clause no. 8.10.3.1 (Addition): Motor rating shall be suitable to restart the conveyor under fully loaded condition. Fluid coupling shall be used for all motor ratings exceeding 30 kW.

vii) Clause no. 8.11.2.1 (Modification): Hold back shall be provided on all inclined conveyors whose inclination exceeds 6 degrees and shall be integral with the gear box.

viii) Clause no. 8.11.2.1 (Addition): Brakes shall be of DC Electromagnetic type. Electro hydraulic thrustor type shall be used for downhill conveyors.

ix) Clause no. 8.12.2.2 a (Modification): Screw type take up shall be used upto a conveyor length of 30 m.

x) Clause no. 8.12.2.3 (Addition): Gravity take-up type tensioning arrangement, wherever required, shall be supplied complete with take up pulley, frame, guides, necessary number of cast iron or concrete counter weights, hangers of supports for counterweights, inspection platform, sand pit and safety guard. In case of horizontal

take up, sheaves shall be provided with life lubricated antifriction bearings. Adjustable carrying/return idler frames shall be provided for horizontal gravity take up.

x) Clause no. 8.12.4 (Addition): Adjustable components of take up weights shall be easy to handle and each piece shall not weigh more than 20 kg.

xii) Clause no. 8.13.2 (Addition): Chute fabricated from carbon steel shall have 10 mm minimum thickness. Product contact surfaces on loading, transfer and discharge chutes shall be provided with liner as specified in job specifications. Chutes shall be provided with sufficient number of inspection doors at locations deemed necessary.

xiii) Clause 8.13.2.2 (Modification): Skirt board shall of adequate length which shall allow for the material turbulence at the loading zone to settle down, but in no case the length of skirt board shall be less than 3 meter.

xiv) Clause 8.13.2.2 (Addition): Wear resistance of skirt board rubber shall be less than belt cover rubber. It shall give tight seals, and have low coefficient of friction. Skirt rubber shall be suitably clamped to the skirt plates.

xv) Clause no. 8.14.1 (Addition): Belt conveyor support structure shall consist of stringer channels with short supports (stand/post), the angles and bracings of rigid construction with expansion joints to ensure accurate conveyor alignment.

xvi) Clause no. 8.14.8 (Addition): The head and tail frames shall be constructed with structural rolled sections of adequate strength. Frame shall be of welded construction and shall have provision for supporting the pulleys, chute and scrapers.

xvii) Clause no. 8.14.1b (Modification): For single conveyor, walkway of 1000 mm on one side and 750 mm on other side shall be provided. For double conveyors, central walkway of 1000 mm along with side walkways of 750 mm on both sides shall be provided. Walkways inclined more than 10 degrees shall be provided with suitable anti-skid bar for preventing slippage.

Minimum head room clearance shall be 2.20 meter for all walkways, stairs, landings etc.

xviii) Clause no. 8.14.4 h (Addition): Sufficient number of louvers and windows shall be provided in the conveyor gallery to give adequate lighting and ventilation. Adequate numbers of translucent sheets shall also be provided for natural lighting.

xix) Clause no. 9.1 (Addition): Seal plates shall be provided at bottom of the gallery at all road/trail crossings and movement areas. Seal plates shall be 3.15 thick as a minimum unless otherwise specified.

xx) Clause no. 9.1 j (Addition): Deck plates shall be provided between conveying and return side of belt at all feed points and discharge end of minimum 4 meter length at each point. Deck plates shall be 3.15 mm thick as a minimum.

xxi) Clause 9.3.4 (Modification): Worm gear reducers and open chain/sprocket reducers shall not be used.

xxii) Clause 9.3.6 (Modification): Service factor of minimum 1.5 shall be considered, irrespective of duration of service.

xxiii) Clause no. 9.3.6 (Addition): Mechanical rating of gear box shall be minimum 1.25 times of the selected motor power or 1.5 times of BKW drive pulley whichever is higher. Thermal rating of gear box shall not be less than selected motor power (KW).

xxiv) Clause no. 9.4 (Modification): Couplings shall adequately provide for lateral and angular misalignment and longitudinal displacement of shafts. For high speed coupling, pin bush/tyre coupling at motor output shaft shall be used for motor rating

upto 30 kW and fluid coupling above 30 kW motor rating. For low speed coupling, geared coupling shall always be used.

xxv) Clause no. 9.9.4.2 (Modification): Two stage spring loaded primary and secondary external scrapers with suitable adjusting mechanism shall be provided.

xxvi) Clause no. 10 (Addition): Emergency pull cord switches shall be provided on both sides of conveyor along walkways at a maximum spacing of 25 meters. Minimum one number on each side shall be provided.

Belt way switches shall be provided on both sides of conveyor at a maximum spacing of 30 meters.

Zero speed switch shall be provided at either tail or bendpulley.

Protective guards of wire mesh type shall be provided for all exposed rotating components. Guards shall be readily removable and replaceable.

3.2 Addition / Deletion / Modification to IS 8531 : 1986 (Reaffirmed 2008)

i) Clause no. 4.0 (Modification): Cast Iron is not acceptable and thus IS210 - Specification for gray cast iron castings is not applicable.

ii) Clause no. 4.0 (Addition): Shaft material shall be 40C8 (old designation C40) as per IS 1570 (Part 2/Sec1) or superior, unless otherwise specified.

3.3 Addition / Deletion / Modification to IS 8598 : 1987 (Reaffirmed 2008)

i) Clause no. 4.6 (Modification): Idlers shall be provided with bearings grease packed for life. The bearing shall be seize resistant type. The L_{10} life of idler bearings shall be minimum 30000 hours.

3.4 Addition / Deletion / Modification to IS 9295: 1983 (along with Amendment no.1, January 1996 and Amendment no. 2, March 1999)(Reaffirmed 2009)

i) Clause no. 9.1 (Addition): The thickness of steel tube shall be selected based on design requirement, however in no case the thickness of steel tube shall be less than 4.5 mm.

3.5 Additional Requirements for Conveyor Calculation

i) Conveyor power and tension calculation shall be done as per IS 11592, unless otherwise specified in job specifications.

ii) Artificial coefficient of friction for horizontal and uphill conveyor = 0.03

Artificial coefficient of friction for downhill conveyor = 0.012

iii) Resistance due to impact pad /slider bed, if applicable, shall be calculated according to latest edition of "Belt Conveyors for Bulk Materials" published by CEMA.

iv) Pressure between belt cleaner and belt = 65000 N/m^2 (minimum)

4.0 INSPECTION AND TESTING

4.1 Equipment shall be subjected to stage-wise expediting, inspection and testing at vendor's/sub-vendor's works by purchaser/its authorised inspection agency. Approved Quality Assurance (QA) plan shall form the basis for equipment inspection.

4.2 Testing at Works

4.2.1 Vendor shall perform tests and inspection necessary to ensure that the material and workmanship conform to the requirement of this specification.

4.2.2 Inspection and Testing at vendor's/sub vendor's works and site shall include but not be limited to the following.

i) Dimensional check up.

ii) Checking of all material test certificates.
 iii) Stress relieving of pulleys
 iv) Static balancing of pulleys
 v) DP test for long weld of pulley shell, weld of end disc with shell and hub.
 vi) Ultrasonic test for forged shaft
 4.3 Any or all the tests, at purchaser's option, shall be witnessed by purchaser's authorised inspection agency. However, such inspection shall be regarded as check-up and shall in no way absolve the vendor of his responsibility.

4.4 **Performance Testing and Guarantees**
 4.4.1 A field performance test shall be conducted by the vendor to demonstrate the guaranteed performance after commissioning in accordance with test procedure to be prepared as per EIL Std. No. 7-76-0103.

4.4.2 Rated capacity shall be guaranteed and demonstrated during the performance testing.
 4.4.3 All parts of the conveyor shall operate satisfactorily without any undue friction, vibration, noise or display of any other unfavorable characteristics during the performance test.
 4.4.4 All equipment and component parts shall be guaranteed by the vendor against defective material and design for a period as specified in Purchaser's general purchase conditions.
 4.4.5 If any defect occurs during the guaranteed period the Vendor shall make all necessary alterations, repairs and replacement at their own cost.
 4.4.6 Necessary instruments for the performance testing shall be arranged by the vendor, and shall be tested and calibrated before undertaking the performance test.

5.0 **PROTECTION AND PAINTING**
 5.1 Painting shall be followed as specified in job specific painting specification.
 5.2 Stainless steel surfaces, both inside and outside, shall be pickled and passivated.
 5.3 Machined and bearing surfaces shall be protected with varnish or thick coat of grease.

6.0 **PACKAGING AND IDENTIFICATION**
 6.1 All packaging shall be done in such a manner as to reduce the volume. The equipment shall be dismantled into major components, suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly match marked for site erection.
 6.2 Attachments, spare parts of the equipment and small items shall be packed separately in wooden-cases. Each item shall be appropriately tagged with identification of main equipment, item denomination and reference number of the respective assembly drawing.
 6.3 Detailed packing list in water-proof envelope shall be inserted in the package together with equipment.

6.4 Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number, name of manufacturer etc.
 6.5 Vendor shall furnish procedure for prolonged storage of supplied equipment/ material at site.

7.0 **SPARE PARTS**
 7.1 Vendor shall submit list of spare parts with recommended quantities and itemised prices for first two years of operation of the equipment. Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment is facilitated.



- 7.2 Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.
- 7.3 Vendor shall also submit a list of commissioning spares with quantities. The commissioning spares shall be sufficient for trouble free commissioning of the system at site. Any commissioning spares required during commissioning, over and above, the commissioning spares supplied, shall be made available by the vendor without any cost and time implication to purchaser. If for any reason, during commissioning, vendor needs to utilize spares from 2 years' operation spares, the same shall be replenished by vendor within a reasonable time without any cost implication to purchaser.

1.0 GENERAL

This specification outlines the minimum requirements for the design, manufacture, test and supply of the Bucket Elevator and its accessories.

2.0 CODES AND STANDARDS

2.1 This standard is based on following Indian/International Standards, and the standards referred therein, which shall be deemed to be part of this standard:

- IS - 7167 : Code for selection and use of bucket elevators.
- IS - 6930 : Dimensions for fixing arrangements of buckets for bucket elevators
- IS - 6832 : Specification for Fixing screws and fixing washers for buckets for bucket elevators.
- IS - 6833 : Specification for Buckets for Bucket Elevators.
- IS - 7054 : Specification for Casing for bucket elevators.
- IS - 10131 : Link chain ends and chain bows for bucket elevators
- IS - 12961 : U-Links for chains for bucket elevator-Specification
- ISO - 7190 : Continuous Mechanical Handling Equipment - Bucket elevator - classification
- ISO - 5050 : Continuous Mechanical Handling Equipment - Vertical bucket elevators with calibrated round steel link chains - General characteristics
- ISO - 5051 : Continuous Mechanical Handling Equipment - Deep elevator bucket with flat real wall - Main dimensions.

EIL Std.-7-76-0103 : Instructions to Vendor for Site Performance Guarantee Requirements for Package Units

Latest revision of the above-mentioned standards shall be applicable.

2.2 Other international standards may also be acceptable subject to their being equivalent or superior with prior approval of purchaser.

2.3 For provisions not covered by the above codes & standards, applicable good engineering practices & norms shall govern.

3.0 TECHNICAL REQUIREMENT

Technical requirements of Bucket Elevator shall be as per Codes & Standards referred in clause 2.1 above, subject to the following additions, deletions and modifications:-

Addition / Deletion / Modifications to IS: 7167 - 1974 (Reaffirmed 2011)

i) Addition: The elevator shall be suitable for continuous duty at full load.

ii) Clause No. 7 (Addition):

a) Pulleys used for belt bucket elevator shall be of welded steel construction and stress relieved.

- b) Pulleys shall be with crown face for proper belt alignment.
 - c) Pulleys shall be statically balanced.
 - d) Cast iron sprockets shall not be used for chain bucket elevator. The sprockets shall be designed to give maximum chain life.
 - e) Shafts shall be of forged steel, sized to withstand shock loads.
 - f) Antifricition self-aligning bearings shall be used for the pulleys.
 - g) The bearings shall be enclosed in dust proof plummer blocks.
 - h) The plummer blocks shall have provision for greasing the bearings.
 - i) Bearing shall have L_{10} life of minimum 40000 hrs.
- iii) Clause No. 8 (Addition):
- a) The drive motor shall have high starting torque and shall be suitable for starting bucket elevator under fully loaded condition.
 - b) Service factor shall be minimum 1.5 for drive.
 - c) Inching drive shall be provided for inspection & maintenance of buckets, belt/chain and bucket fixing bolts.
 - d) Couplings shall be flexible type, provided with a safety cover.
 - e) Fluid coupling shall be used for motor rating above 30 kW.
- iv) Clause No. 9 (Addition):
- a) Safety guards shall be provided for all exposed rotating parts.
 - b) Service Platform shall be provided for bucket elevator to give access to the drive and head end for inspection, lubrication and servicing. They shall extend around three sides of the elevator and shall be complete with suitable hand rail all round.
 - c) Access ladder with safety cage in accordance with safety codes shall be provided for all platforms.

INSPECTION AND TESTING

- 4.0 Equipment shall be subjected to stage wise expediting, inspection and testing at vendor's/sub-vendor's works by purchaser's/its authorised inspection agency. Vendor shall submit Quality Assurance (QA) plan before commencement of fabrication. Approved QA plan shall form the basis for equipment inspection.
- 4.2 **Testing at Works**
 - 4.2.1 Vendor shall perform tests and inspection necessary to ensure that the material and workmanship conform to the requirement of this specification.
 - 4.2.2 Inspection and Testing at vendor's/sub vendor's works and site shall include but not be limited to the following.
 - i) Dimensional check up.
 - ii) Checking of all material test certificates.
 - iii) Review of non-Destructive Test Report.
 - iv) No Load test run of the bucket elevator.
- 4.3 Any or all the tests, at purchaser's option, shall be witnessed by purchaser's/its authorised inspection agency. However, such inspection shall be regarded as check-up and shall in no way absolve the vendor of his responsibility.

4.4 Performance Testing and Guarantees

4.4.1 A field performance test shall be conducted by the vendor to demonstrate the guaranteed performance after commissioning in accordance with test procedure to be prepared as per EIL Sd. No. 7-76-0103.

The procedure of performance testing shall be submitted for Purchaser's review and shall be mutually agreed between the purchaser and the vendor.

4.4.2 Guaranteed capacity shall be demonstrated during the field performance test.

4.4.3 All parts of the bucket elevator shall operate satisfactorily with no undue friction, vibration, noise or display of any other unfavourable characteristics during the performance test.

4.4.4 All equipment and component parts shall be guaranteed by the vendor against defective material and design for a period as specified in Purchaser's general purchase conditions.

4.4.5 If any defect occurs during the guaranteed period the Vendor shall make all necessary alterations, repairs and replacement at their own cost.

4.4.6 Necessary instruments for the performance testing shall be arranged by the vendor, and shall be tested and calibrated before undertaking the performance test.

5.0 PROTECTION AND PAINTING

5.1 Surface preparation and painting shall be done as per vendor's standard suitable for highly corrosive industrial environment, unless otherwise specified elsewhere in the Material/Purchase Requisition.

5.2 Stainless steel surfaces, both inside and outside, shall be pickled and passivated.

5.3 Machined and bearing surfaces shall be protected with varnish or thick coat of grease.

6.0 PACKAGING AND IDENTIFICATION

6.1 All packaging shall be done in such a manner as to reduce the volume. The equipment may be dismantled into major components, suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly match marked for site erection.

6.2 Attachments, spare parts of the equipment and small items shall be packed separately in wooden-cases. Each item shall be appropriately tagged with identification of main equipment, item denomination and reference number of the respective assembly drawing.

6.3 Detailed packing list in water-proof envelope shall be inserted in the package together with equipment.

6.4 Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number, name of manufacturer etc.

6.5 Vendor shall furnish procedure for prolonged storage of supplied equipment/ material at site.

7.0 SPARE PARTS

7.1 Vendor shall submit list of spare parts with recommended quantities and itemised prices for first two years of operation of the equipment. Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment is facilitated.

7.2 Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.

7.3 Vendor shall also submit a list of commissioning spares with quantities. The commissioning spares shall be sufficient for trouble free commissioning of the system at site. Any commissioning spares required during commissioning, over and above, the commissioning

spares supplied, shall be made available by the vendor without any cost and time implication to purchaser. If for any reason, during commissioning, vendor needs to utilise spares from 2 years' operational spares, the same shall be replenished by vendor within a reasonable time without any cost implication to purchaser.

1.0 GENERAL

This specification outlines the minimum requirements under which the manufacturer shall design, manufacture, test and supply the Electric Wire Rope Hoist with electric drives, complete with all accessories.

2.0 CODES AND STANDARDS

This standard is based on following Indian Standards, and the standards referred therein, which shall be deemed to be part of this standard.

IS 305	:	Aluminium Bronze Ingots and Castings
IS - 2365	:	Specification for steel wire suspension ropes for lifts, elevators and hoists
IS - 3938	:	Specification for Electric wire rope hoists
IS - 3973	:	Code of Practice for selection, installation and maintenance of wire ropes
IS - 15560	:	Specification for Point hooks with shank up to 160 Tonne
EIL Std.-7-76-0103	:	Instructions to Vendor for Site Performance guarantee Requirements for Package units.

Latest revision of the above-mentioned standards as on the date of enquiry shall be applicable.

2.2 Other international standards may also be acceptable subject to their being equivalent or superior with prior approval of purchaser.

2.3 For provisions not covered by the above codes & standards, applicable engineering practices & norms shall govern.

2.4 National Laws and statutory provisions together with any local bylaws for the state wherein package is required to be installed shall be complied with.

3.0 TECHNICAL REQUIREMENTS

Technical requirements of Electric Wire Rope Hoist shall be as per Codes and Standards referred in clause 2.1 above, subject to the following additions, deletions and modifications:

3.1 Addition / Deletion / Modification to IS- 3938: 1983 (Reaffirmed 2008)

i) Clause no. 1 (Addition): The type of electric wire rope hoist shall be trolley suspended, unless otherwise specified in data sheet.

ii) Clause no. 4 (Addition): The duty class of electric wire rope hoist shall be as specified in data sheet.

iii) Clause no. 5.7 (Addition): Creep speed, if specified in data sheets shall be provided with one of the following means:

a) Pole changing motors