Title	**Technical Specification**
Project	**Automated Warehouse**
Location	**Cumra / Konya / Turkey**

Revision: 1.1

Content

1 INTRODUCTION

This document is prepared to give the outlines of the Automated Warehouse project which will be implemented in the following address;

KONYA ŞEKER SAN. VE TİC. A.Ş.

ÇUMRA ŞEKER FABRİKASI 42500 – ÇUMRA / KONYA

We are planning a new high bay warehouse at our chocolate production facility plant at Çumra / Konya to store and distribute pallets.

The planned concept is generally based on a high bay warehouse (HBW) incl. a pallet conveyor system for in- and out feed of the pallets. Included in the concept is a tunnel picking area in the channel storage warehouse as well.

The high bay warehouse for pallets is built as a silo-type warehouse and therefore supports HBW roof and HBW cladding.

The goods are packed onto pallets and the load is secured by automated stretch wrapping machines. Transport and storage of the unit loads are automatic. The racks in the automated warehouse are served by automatically controlled, rail-mounted storage and retrieval machines. Pallet in feed and out feed is carried out using automatic pallet conveying tracks at the HBW front sides.

The automated material flow of the warehouse system is controlled by a WMS system. Material Flow Control (MFC) which is part of the proposal, as well as the Warehouse Management System (WMS) based on a SAP system solution (**must, other systems will not be accepted**).

2 GENERAL SPECIFICATIONS

2.1 Working Conditions

The planned working conditions for our future warehouse will be;

Operation time:	HBW: 6 days a week of each 24 hours (3 shifts)
	Production and picking area: 3 shifts / 8 hours
	Shipping area: 2 shifts / 8 hours

Ambient Conditions:	Non-hazardous area
Temperature :	+13°C - +23°C (Airconditioned)
Power supply :	3x400/230V ± 5%, 50Hz ± 2%, TN-C or TN-S
Humidity :	up to 80% relative humidity (not condensing)

2.2 Expected Scope Of Supply By The Contractor

We are expecting the contractors to prepare an offer according to the following specifications. The details will be presented throughout the document.

- Design according to the attached drawing
- Pallet storage rack as a SILO-system, not less than 33.000 pallet locations including picking tunnels
- 6 Storage and retrieval machines for multi deep storage/retrieval including aisle and electrical equipment, PLC and putting into operation
- 5 pcs. of picking tunnel with more than 650 static picking locations and the steel substructure for the tunnel floor slab
- At least 12 pcs. dynamic picking locations in the tunnel (2 pcs. per crane)
- Pallet conveying system for the complete in- and out feed of the pallets (both HBW sides) and associated controls incl. vertical lifts, pallet check stations including installation, PLC and putting into operation
- Steel mezzanines incl. 3 pcs. staircases for production area, HBW front zone area (production side) and HBW front zone area (shipping side)
- At least 33 pcs. gravity buffer lanes for shipping area with a capacity of 24 Euro-pallets per lane
- 1 pcs. automated stretch wrapping machines integrated in the conveyor system
- 4 pcs. standard fire doors (T90, not motorized) for conveyor system
- 4 pcs. standard roller doors for conveyor system

- Visual control system for maintenance and operation
- A complete Warehouse Management System (WMS) and Material Flow Control (MFC) system based on SAP system solution
- General system engineering including project management, site management, documentation, training, etc.
- Warehouse lighting
- Certification according to EC Machinery Directive and CE labeling

2.3 Scope Of Supply By Konya Şeker San. Tic. A.Ş

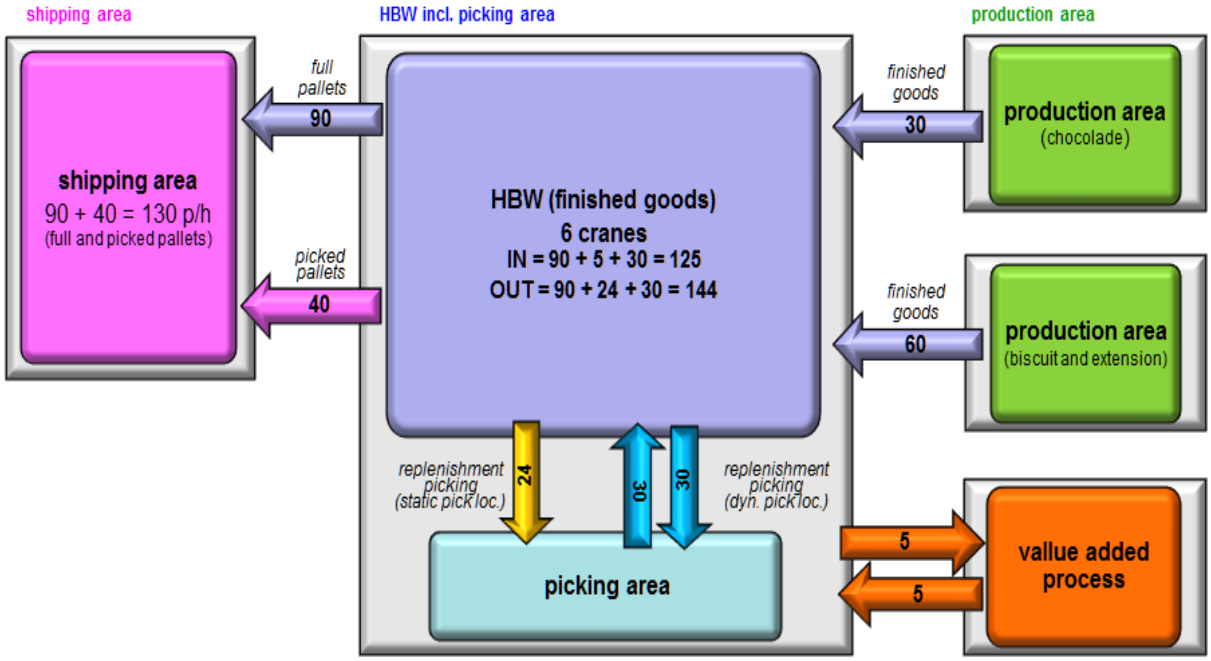
We will be providing the following items during the implementation;

- Roof & Wall cladding for horizontal panel cladding
- All civil engineering and building works like HBW floor slab, fire walls, front building for shipping etc.
- Concrete filling of the picking tunnel floor slab
- Emergency power supply for fire doors
- All PCs and barcode printers
- All electrical background till all cabinets
- Compressed air if required.
- Fire walls and wall openings for conveyor system.
- Crash barriers
- Network infrastructure

3 GENERAL DESCRIPTION OF OPERATION

3.1 Material Flow

The following diagram shows the number of pallets designed to be transferred during our processes;



Picture 1 – Material Flow Diagram

3.2 Load Units

We are planning to use EURO pallets according to **DIN EN 13698-1**

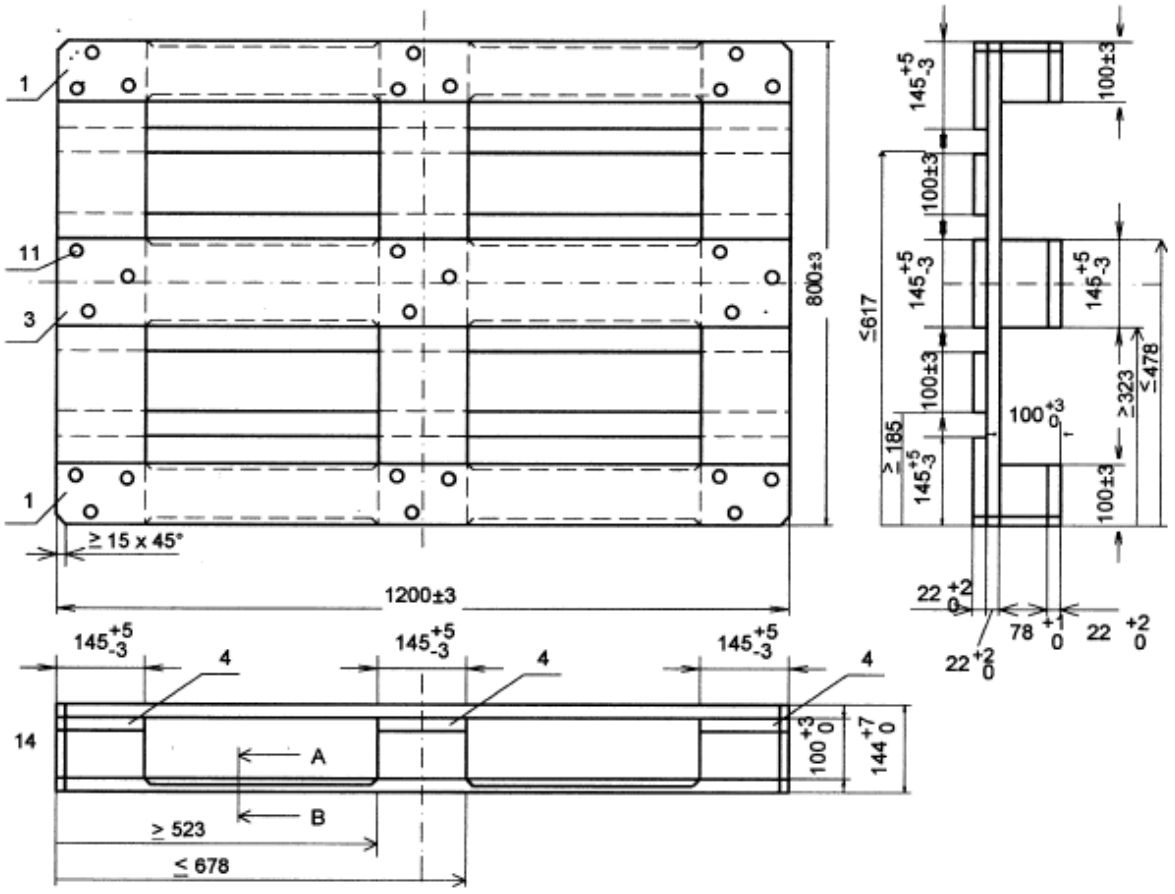
Size

Length = 1.000 mm

Width = 800 mm

Height = 144 mm

Material = wood



Picture 2 – Euro Pallet Dimensions

The loaded pallet dimensions will be;

Type	Max. overload [mm]	Max. length [mm]	Max. width [mm]	Height class [mm]	Max. weight [kg]	Ø weight [kg]
Euro (fished goods)	80	1.360	960	1.100 1.800 2.200	750	450

Picture 3 – Loaded Pallet Dimensions

3.3 Operational Processes

The new warehouse is built as a distribution center for finished goods.

The system is provided for:

- Inbound conveyor system from chocolate production to HBW (level 0,0 and 5,0)
- Outbound conveyor system from HBW to value added process (level 0,0)
- Inbound conveyor system from biscuit production to HBW (level 0,0 and 5,0)
- Storage area for finished goods, max. +18°C (channel storage)
- Tunnel picking area (level 0,0)
- Shipping area (incl. gravity lanes)

The layout is shown in the attached drawing

4 RACK AND STEEL CONSTRUCTION

4.1 General

The high-bay storage rack system will be built as silo rack in a welded and bolted design. The design calculations shall take into consideration all the forces due to effective load, dead weight and travelling load. Each row of racks shall form a stable structure with the horizontal and vertical bracings to provide transversal and longitudinal stability.

The rack construction of the high-bay warehouse has to be designed according to the **FEM 9.831 guidelines**, "Basis of Calculation for S/R Machines; Tolerances and Clearances in a High-Bay Storage Rack System".

The racks shall **only** be supplied by either of the following manufacturers;

- Kocher
- Voestalpine
- Schaefer

4.2 Dimensions of the Building

Length of the warehouse:	approx.	113,72	mm
Width of the warehouse:	approx.	55,20	mm
Height of the warehouse:	approx.	29,30	mm

4.3 Storage Concept

The racking consists of aisles with racks arranged on each side.

The design shall include 6 aisles, 2 outer blocks (4 channels deep) and 5 inner blocks (7 channels deep). (see. dwg)

4.4 Calculations

The following values shall be considered during design;

Snow loads according to Turkish Standard TS 498: 0.75 kN/m²

Wind loads according to TS498: V = 0.5 kN/m² (0 – 8 m)
0.8 kN/m² (8 – 20 m)
1.1 kN/m² (ab. 20 m)

Earthquakes according to Turkish Standard:

Seismic zone :	Zone 3
Ground acceleration coefficient	A0 = 0.2g
Local site class:	Z3
	TA = 0,15s
	TB = 0,60s

4.5 Design Documentation

We expect contractors to provide following design documentations;

- Approval drawings and anchor plans
- Static calculation documents

4.6 Warranty

We expect warranty of at least 4 years for rack structure.

5 STACKER CRANES

We expect contractors to use the following values for calculation;

- - hoisting classification accord. to FEM 9311: H1
- - load spectrum accord. to FEM 9512: 3
- - exposure group accord. to DIN 15018: B4
- - group of mechanism accord. to FEM 9512: 4 m

We also expect the scope of supply for S/R machines as follows;

- Complete mechanical supply of 6 no. of single mast S/R machines
- Supply of all electrical equipment
- Supply of driving and positioning control incl. cabling of control cabinet
- Mechanical and electrical Installation and commissioning of S/R machines
- Traveling rails
- Four hydraulic stop bumpers per aisle
- Two (2) aisle switch-off devices in the x-direction in each aisle

5.1 Warranty

We expect warranty of at least 2 years after official handover.

6 CONVEYING SYSTEM

We expect the contractors to supply whole conveyor system according to attached drawings.

We also expect the scope of supply for conveying system as follows;

- Complete mechanical supply conveyor systems
- Supply of all electrical equipment
- Supply of driving and positioning control incl. cabling of control cabinets
- Mechanical and electrical Installation and commissioning of conveyor system

6.1 Warranty

We expect warranty of at least 2 years after official handover.

7 VISUAL CONTROL SYSTEM

We expect the contractors to supply a visual control system to support operation and maintenance.

The control system shall have a system simulation that simulates the system, instantly display how the system works and indicates faults as they arise.

The scope of supply shall consist of programming and all the necessary hardware including PCs for this system.

8 WAREHOUSE LIGHTING

We expect the contractors to supply the warehouse lighting which includes the following areas;

- Lighting of the SRM-aisles in HBW (lights underneath the first horizontal rack beam).
- Lighting of the SRM-aisles in in-house rack (empty pallet storage) (lights underneath the first horizontal rack beam).
- Lighting of the tunnel picking area within the HBW
- Lighting of the maintenance positions of the SRM and the maintenance access within the HBW
- Emergency lighting in the HBW
- Lighting of escape routes in HBW

The lighting of the aisle shall consist of fluorescent lamps 1x18W, that are located underneath the first horizontal rack beam of every third rack compartment.

The picking area and the corridors, the maintenance positions and the maintenance accesses shall also be lit by fluorescent lamps 1x58W. These shall be suspended above the conveyor system or mounted to the wall or to the fence.

The picking area and the corridors, the maintenance positions and the maintenance accesses shall also be lit by fluorescent lamps 1x58W. These shall be suspended above the conveyor system or mounted to the wall or to the fence.

Expected scope of delivery: **Area**	**Illumination level (Lux)**	**Emergency lighting**
Lighting of 6 aisle	20 lx	partially
Maintenance access	100 lx	NO
Corridors commissioning	100 lx	NO
Picking areas	200 lx	partially
Lighting of escape routes	5 lx	Yes

9 WAREHOUSE CONTROL SYSTEM

9.1 General Expectations

We expect a scope of supply from the contractors as:

- WMS based on SAP SCM EWM 7.02
- MFC based on SAP SCM EWM 7.02
- WMS/MFC installation, including:
- Project management
- Detailed specifications
- Programming and Customizing
- In-house tests
- Documentation
- Training
- Commissioning
- Go-live
- RF-terminals including all required services
- 15 RF handhelds with integrated scanner

The following tables show which party is expected to cover the required functionalities.

The tick on the included column shows that the functionality will be supplied by the contractor whereas the HOST will be supplied by us.

9.2 Interfaces and Communication

SAP ERP system

Function	Included	Not included	HOST
Communication via interface with ERP-EWM standard interface (CIF, qRFC)	✓		

Subordinate control level

Function	Included	Not included	HOST

Function	Includ-ed	Not includ-ed	HOST
Communication with subordinate control system for pallet conveyors	✓		
Communication with subordinate control system for ASRS machines	✓		
Communication with external controls of machines, e.g. automatic labeller, stretcher, palletiser, robot…	✓		

User interface

Function	Included	Not in-cluded	HOST
User Interface Mobile: Communication with mobile RF terminals via ITS	✓		
User Interface SAPGUI: Communication with SAP standard SAPGUI	✓		

9.3 Goods in and Storage Area Decision

Function	Includ-ed	Not includ-ed	HOST
Goods in function based on ERP advices	✓		
Goods in function with manual input of all data	✓		
Handling of returned goods with additional functions, be-yond the typical goods in functions		✘	✓
Label printing (identification label) – ID is attached in pro-duction area – printing done by SAP ERP		✘	✓
Repacking from pallets to pallets (returns, scrap, value added services)	✓		✓

9.4 Storage

Identification on material handling equipment

Function	Includ-ed	Not includ-ed	HOST
Automatic identification point on the conveying system without user interaction by scanning the label (with unique identifier) on the load unit	✓		
Special functions for error handling (NOK), e.g. modification of host advice, manual data input	✓		

Automatic storage areas

Function	Includ-ed	Not includ-ed	HOST
Standard storage strategies for high-bay: height classes, buffer occupation, balancing of articles	✓		
Extended storage strategies for high-bay: multiple-deep storage, monitoring maximum column weight	✓		
Automatic optimisation of storage compartments by re-storage of load units	✓		
Automatic replenishment from HBW to picking slots (Tunnel picking)	✓		

Manual area (Picking tunnel)

Function	Includ-ed	Not includ-ed	HOST
Guiding system to control picking vehicles	✓		
Manual storage area with article management on load unit base	✓		
Manual storage area with location management	✓		

Function	Includ-ed	Not includ-ed	HOST
Warehouse administration based on paper documents		✘	
Warehouse administration based on RF-terminals	✓		
Automatic compartment assignment by the system	✓		
Manual compartment assignment by worker		✘	
Replenishment for manual picking storage areas	✓		

9.5 Order Handling and Picking

General functions

Function	Includ-ed	Not includ-ed	HOST
Order release management	✓		
Transport planning	✓		
Customer order management	✓		
Manual or automatic order start	✓		
Summary (in advance) material reservation	✓		
Automatic material selection under consideration of batch-es, FIFO (daily accurate) and availability	✓		
Project specific material selection, e.g. customer different minimum time periods until maturity of best before date, a customer may not get goods with a shorter best before date as he got before, consideration of package units		✘	
Manual selection of load units by the operator	✓		
Pallet calculation (Pick-HU)	✓		

Planning- / control centre functions

Function	Includ-ed	Not includ-ed	HOST
Route (Tour) building and assignment of orders to routes		✘	✓
Order preplanning and optimisation – sequencing for stag-ing	✓		
Order scheduling, e.g. scheduling under consideration of available capacities, monitoring of resources		✘	
Synchronisation of picking orders with full pallet orders	✓		

“Person-to-goods” picking

Function	Includ-ed	Not includ-ed	HOST
Picking locations with static (changeable with dialog) article assignment, i.e. load units can’t be restored automatically with the S/R machine	✓		
Picking locations with dynamic article assignment planned and controlled by system (reversible chain conveyors)	✓		
Paperless dialog based picking “Person-to-goods” with forklift / picking vehicle with RF-terminal	✓		
Picking with paper documents, creation of documents or labels		✘	
Assignment of picking order to pallet with a continuous ID-label from the roll	✓		
Order consolidation, related to a Pick-HU	✓		

9.6 Goods Out

Function	Included	Not included	HOST
Consolidation	✓		
Pallet supply on staging lanes after specific sequencing logic	✓		
Load protection (stretching / strapping) and dispatch labelling including interface to machines		✗	
Printing functions: Shipping documents, invoice		✗	✓
Loading control with RF-terminals	✓		

9.7 Material Flow Control System

Function	Included	Not included	HOST
Material flow controller	✓		
Complex material flow logic: consideration of retrieval sequences, consideration of utilisation of conveyor lanes	✓		
MFC exception handling	✓		
Picking area: Guidance system for picking vehicles with active assignment of jobs to the forklifts, i.e. the system selects an transport order under consideration from different criteria (e.g. priority, waiting time, location of picker) and assigns it to the forklift	✓		

9.8 General Logistic Functions

Overlapping functions

Function	Includ-ed	Not includ-ed	HOST
Warehouse administration for automatic warehouses	✓		
Warehouse administration for semi-automatic warehouses (tun-nel picking)	✓		
Article master data	✓		
Stock management	✓		
Receiving and shipping planning including termination and resource planning		✘	
Base stocktaking function without statistic support, i.e. the opera-tor selects from a dialog with different filter criteria (e.g. load units which are not moved since...) the load units which have to be counted	✓		
Material flow oriented statistics: load units per material flow point, storage and retrievals	✓		
Value added services	✓		✓
Standard EWM warehouse monitor	✓		
Archiving of load unit movements	✓		
Archiving of stock movements	✓		
User permission control	✓		

9.9 Broadband RF-System

We expect contractors to offer including broadband equipment according to 802.11b/g standard in the following areas:

Area	Handheld	Remark
Tunnel picking	6	
Goods issue	8	
Backup / Reserve	1	
	-	
	-	
Σ	**15**	

The relevant accessories (terminal fixtures, chargers, exchange batteries and belt for handheld RF terminals) shall be included in their offer. The RF infrastructure and the necessary survey will be handled by us. The exact number of access points will be determined after a RF surveying is completed.

Mobile handheld terminal: Example: Handheld Intermec CK-71 with integrated bar-code scanner, WLAN 802.11 a/b/g/n, IP67

10 OTHER CONDITIONS AND DEADLINES

10.1 Documentations To Be Supplied

We expect the contractors to provide the following documents;

- Reference list (especially for those in aeronautics and space parts industries)
- Brands to be used.
- All preliminary project drawings.
- Crane and load handling device specifications and FEM calculations.
- Work program within the permitted duration.
- Information regarding continuous program support structure in Turkey.

10.2 Submit Date

We expect the contractors to prepare its quotation latest until 15.11.2012.

10.3 Special Requirement / Option

We expect the contractors to provide another quotation as an option for a solution with **3 aisles and two tunnels** (please see the attached drawings).

10.4 Contact Personnel

For any questions and further inquiry please contact;

Hasan BOZAN
Logistic Manager
E-mail: hbozan@konyaseker.com.tr
Tel (Çumra): 332 221.7300 (1800)
Fax: 332 221.7304
Tel(Konya): 332 324.0353 (1244)
Fax: 332 324. 0345