Grain Tech newsletter

EQUIPMENT AND INSTALLATION APPLICATIONS FOR BULK INGREDIENT HANDLING AND BATCHING PROCESSES

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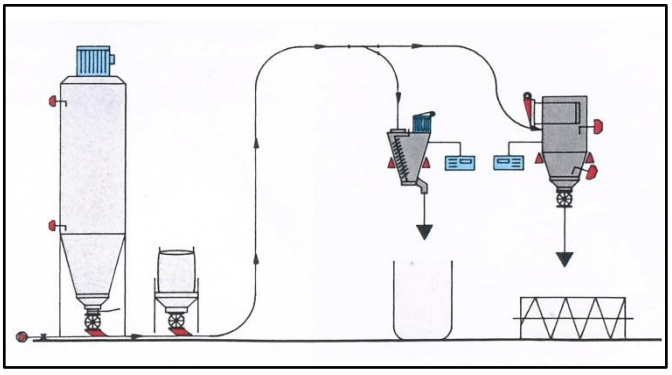
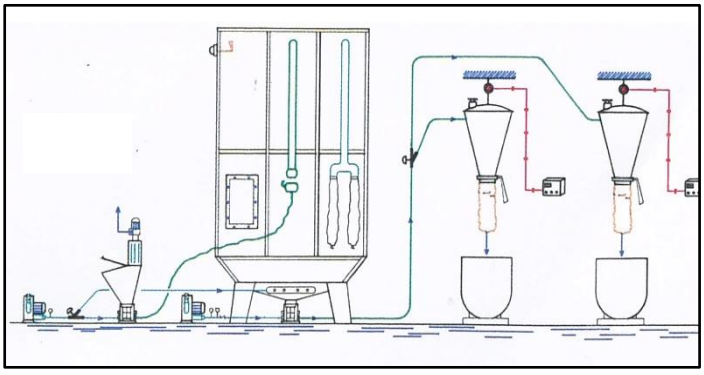
Weigh-Mix Systems and Bulk Ingredient Storage and Handling Installations





1. INTRODUCTION TO WEIGH-MIX SYSTEMS

1.0 To meet the variety of small, medium and large sized bulk ingredient handling and processing requirements, the Grain Tech Weigh-mix System offers bulk handling installations with accompanying batching facilities to cover a wide range, from 1 tonne capacity through to 30 tonne and up, with these being for either interior storage as well as exterior storage requirements.

1.1 The bulk storage units themselves are of either the standard 1 tonne bulk bag or ABS Trevira Flexible Silos for interior storage or the optionally designed panel bolt together aluminium or stainless steel Bulk Storage Silo units with the respective sizes and capacities being provided to suit the particular requirements for both internal and external applications.

1.2 The Conveying and Batch Weighing Systems are designed to optimise the mixer load cycles, with equipment incorporated having been fully proven within many operating systems to enable very high levels of accuracy to be maintained consistently with absolute reliability of the ingredient batched weight.

1.3 Various levels of automation may be built into each individual system to match the sequencing and load requirements. The total control system can be readily extended to control liquid addition by weight and temperature to give an integrated dry/wet ingredient batching system where required.

1.4 The type of Bulk Storage Silo and Weigh-mix System most suited to each installation is dependent upon a number of factors, i.e.:

- Weekly ingredient usage,
- Available internal space for bulk silo or storage,
- Number of mixing stations to be supplied,
- Whether significant volumes of secondary materials or alternative ingredients are necessary within the mix,
- Available head height within the building,
- Degree of automation required for weighing of other ingredients/liquids,
- Whether or not temperature control is required for liquids to be added,
- Requirement for integration of the batch mixing function with other downstream processes,
- Degree to which the system is to be expanded in the future.

The bulk storage facility can be one of the well proven Grain Tech Bulk Bag or various size ABS Trevira Flexible Silo units for internal storage applications or optionally the Silbox stainless steel or aluminium type silo for both internal and external instalations.

1.5 Bulk Bag Storage and Handling Systems offer a convenient means of enabling the smaller volume user to adapt to bulk handling without the need of a larger silo requiring head height, which may not be available or convenient. The bulk bags are stored within the plant warehouse area to be lifted up to the specially designed discharge unit for batch discharge metering to the process mixer via either a pneumatic transfer weighing system or metering auger dosing system. Discharge and metering by weight are controlled via the standard Weigh-mix Control System. Bulk Bag Handling incorporated within the Grain Tech Weigh-mix System offers an inexpensive and convenient way of changing to the advantages of bulk ingredient supply with automated weighing control.

1.6 Greater weekly usage requirements, where internal storage headroom is available, enable the incorporation of one of the various sized ABS Trevira Flexible Bulk Silos, which can be linked to the Weigh-mix Control System. This arrangement is suited to the medium to larger volume user and may be incorporated to deliver via either a pneumatic handling/weighing or metering coreless auger arrangement.

1.7 Where internal storage space is restricted the option of installing an external housed silo, with capacities from 3 tonne to 20 tonne, provide the ideal solution, particularly as these silos offer many advantages over standard painted steel silos due to their lightness of construction, durability and non-corrosive features, while also being very cost competitive relative to alternatives.

1.8 The Weigh-mix System load cell mixer mounting base unit is adaptalbe to take any variety of mixers operating within the Process Industries, and is a proven durable and highly accurate weighing module, while the programmable controller unit enables flexibility of mixer ingredient loading for both dry and liquid ingredients with the added facilities of sequential control, multi-mixer weigh capability and integration with other process controllers where required.

The increased mix accuracy, flexibility of operation and considerable advantages of bulk handling, in particular that of increased productivity, from a supplier of proven technology make the Grain Tech Weigh-mix Systems well worth considering for small, medium and large bulk handling and processing requirements.

1.9 ABS Silos are constructed from Trevira fabric, which has exceptional strength characteristics under load. The flexible silo concept also has many advantages over traditional silo construction. These include low installation costs which is helped by the lightweight design reducing foundation requirements, square design, and minimal discharge assistance means that height and floor space requirements are reduced and the hygienic nature of the fabric makes it suitable for use with most food products. (Trevira Tissue used is FDA approved).

The comparative low cost of an ABS Flexible Silo now opens up the possibility of bulk handling of raw materials to companies who previously could not justify the cost of the more expensive traditional bulk storage systems. Smaller bakeries in particular now, have the opportunity to consider bulk handling of flour with an ABS silo system. The low installation cost coupled with the reduced space requirements (often fitting into existing flour store areas), makes the ABS system within reach of a lot more smaller bakery operators.

For larger capacity indoor storage applications, the Silbox range of aluminium or stainless steel bolt together silos offers a wide range of options and are particularly suitable where the installation area is restricted.

Bulk Storage Silos for external installation are provided in food grade epoxy finished carbon steel or stainless steel fabrication incorporating a flex-flow coreless auger discharge or alternatively, pneumatic transfer to the following processes.

In addition to the Bulk Storage Silos, Grain Tech will also design and supply a cost effective handling/weighing system to meet each individual customer's requirements.

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2. REASONS FOR CHANGING FROM EXISTING SYSTEMS

2.1 There is at present, an increasing demand by the bakery and related industries to satisfy the need for accurate and consistent proportioning of <u>all</u> recipe ingredients.

There is a desire for a "one type" system to handle both dry and liquid ingredients. The facility to weigh all recipe ingredients is generally accepted as the most accurate method. To have the capability to weigh at the actual point of use – in the mixer – must be of vital importance.

A system of "weighing in the mixer" must be considered as a practical approach to:

(a) The re-modelling of existing manually loaded and simple weighing systems which normally incorporate volumetric metering of liquid ingredients.

(b) The design of a new factory initially planned to start with one or two production lines and eventually expanded to accommodate an unspecified number of lines.

(c) Satisfying the desire to simplify the control of handling operations while moving towards remotely controlled materials monitoring eliminating manual intervention.

To this end, "centralised" control and integration has been accepted for a considerable time. New systems involving this type of control are well proven within many processes.

2.2 FACTORS INFLUENCING THE INTRODUCTION OF "WEIGH-MIX"

(a) The major factor is undoubtedly the design of a low profile platform assembly coupled to a load cell weighing system which ignores the weight of the mixer and is capable of accurately weighing all the ingredients in a recipe possibly ranging from 0.5 kg up to 1000 kg.

(b) The largest ingredient in any recipe is flour and in the past it was considered necessary to blend a variety of flours accurately by weight in order to achieve the correct qualities for a particular recipe. This philosophy now appears to have considerably less importance and users generally have fewer suppliers of flour, the quality of which is established before delivery. In addition, in large operations, the equipment for the storage and discharge of flour has improved to the extent that to discharge several silos simultaneously and blend flours by volume is now a practical proposition.

(c) Load cell mounted weigh stations complete with the mixer positioned on the platform assembly, have proven to be extremely reliable and accurate over many years in operation and under normal operating conditions require practically no maintenance.

(d) Suppliers of high speed dough mixers are well aware of the need for accurate recipe formulation into their machines and their designs incorporate the necessary new feeding and weighing techniques the new Weigh-mix concept offers.

2.3 ADVANTAGES

(a) The smallest bakery can now have, at a justifiable initial cost, a "proportioning by weight" system for all ingredients.

(b) The Weigh-mix unit is compatible with current bakery thinking and suits the broader issues of the "modular" production line.

(c) The high levels necessary to accommodate sieving machines, blending bins, central weighers and the associated distribution, is not needed providing considerable cost savings.

(d) High buildings to house and support service bins above mixers can be eliminated, again saving costs.

(e) When considering automatic handling of dry ingredients in a ground floor mixing room, it is usually found to be impossible to introduce weighing equipment above the mixers because of the height restrictions. By using the low profile Weigh-mix (250mm high) and a simple re-lift conveyor from a floor mounted service bin, the problem can be resolved.

(f) Considerable initial savings can be made by the elimination of a large central control panel with its associated manual back-up facilities.

(g) Second generation handling plants have, in some instances, included audit check weighing facilities for dry and liquid ingredients. The new Weigh-mix eliminates the need for such extra sophistication.

(h) The Weigh-mix System can be supplied with either:

i. Very simple manually controlled pneumatic switches;

or

ii. A sophisticated control panel.

(i) The Weigh-mix is important when the need is to dispense ingredients accurately, the weight of which may vary considerably from recipe to recipe.

(j) The system will monitor continuously and totalise by weight all the ingredients in a recipe.

(k) The control panel for a modern central weighing system in a new factory presents numerous problems of function, design and manufacture, the solving of which takes time. Because of the nature of the central system, the functions of the panel are usually the last to be determined. It is considered that the Weigh-mix concept, by virtue of its ease of modular application, will enable critical control decisions to be made earlier in the project study with consequent cost savings.

(l) The re-modelling of an existing handling plant is a difficult and expensive operation and involves consideration of:

i. Higher throughput,
li. Increased accuracy and consistency of recipe ingredients into the mixer,
iii. Data collection and recording of all ingredient usage,
iv. Minimum interruption of production,
v. The handling and control of ingredients of intermediate and minor weight,
vi. Alternate methods of dough mixing, e.g. batch or continuous.

3. THE WEIGH-MIX WEIGHING SYSTEM

The essence of the system is to ensure that a mixing vessel can receive exact quantities of material weighed in the mixer, overcoming the problems of loss of material in conveying piping, service bins, hoppers, filters, etc. associated with external weighing systems.

In our design, a mixer unit is mounted on a load gathering weighing system similar to that used with a conventional hopper scale. The major difference is that instead of finishing at a dial from which weight signals are taken, the load cell system, automatically provides the signal for integrated control of all of the associated handling equipment items, i.e. metering feeders, liquid valves, etc.

The ingredients within a recipe can vary widely from say 400 kg of flour to as little as 4 kg of liquid.

The Weigh-mix is capable of weighing accurately over those limits by the use of a load cell amplifier unit, splitting the weigher into two ranges of, for instance, a major scale reading from 0 to 800 kg by 1 kg increments and a minor scale reading from 0 to 100 kg by 200 g increments. On either scale accuracy will be of the order of ± 0.25% of full scale deflection.

Therefore, the major scale ingredients will be accurate to better than ± 2 kg and the minor scale ingredients to ± 250 g of a set weight.

The Weigh-mix can be supplied with an "auto-tare" device which automatically balances out material in the mixer.

This means that, at the start of the filling cycle, residual material from the previous batch may be left in the mixer and be ignored by the weigher. In order to use the final weight display as a recipe total weight check, it is necessary to record the residual weight before the weigher auto-tares to zero.

With the simpler control systems, it will necessitate the operator making a note of residual weight, but in the more sophisticted control units, the information can be stored and automatically deducted in order that a "print-out" will show "recipe weight" as well as total batch weight.

A further auto-tare device is available to "zero" the scale between each weighment to avoid the accumulation of small ingredient errors.

4. WEIGH-MIX SPECIFICATIONS

Control System comprising:

One Floor mounted console, in sheet steel, designed to house equipment detailed.

One MYCOS (Modular Micro) control system based on an WINCC Micro Processor Unit providing the following facilities:

Sequential weighing of up to 20 ingredients in cumulative of non-cumulative mode.

Recipe storage, in battery protected CMOS RAMS, complete with a hardware key operated write lockout feature. The recipe would be entered/changed in an off line mode via a V.D.U. (Visual Display Unit). Up to 50 recipes can be stored.

The weighing cycle has the following features:

- Zero check,
- Auto-tare,
- Feeder recall (for under weights),
- Inflight compensation (automatically adjusted by constantly checking the cut-off amounts and homing in on the actual weight required),
- Tolerance check and setting time,
- All the constants associated with the above facilities are entered into a table via the V.D.U.,
- A 20mA serial data loop feature is available for transmitting various pertinent data including tare, weight, target weight, recipe number, etc. This information could be intercepted by Addressable Display Units which can be mounted at any local or remote position with repeat displays possible.
- A bin allocation listing whereby the materials used in various bins or tanks can be identified by a 4 digit code which appears on the log format and printout format,
- An inventory control package provides totalised values of material usage and batches completed of each recipe.

5. WEIGH-MIX WITH MICROPROCESSOR CONTROL

Weigher: To weigh ingredients being fed to a high speed dough mixer. The mixer will stand on the weighing unit which will consist of:

One Three or four load cell weighing system. The support assembly is designed and stressed to withstand a 15,000 kg gross loading to support both nett and tare weights. It would be supplied with all necessary mounting plates and gussets for the support of the mixer from the load cells and the support of the base assembly system.

The fulcra will be ball loaded and the load cells specially designed for an adverse “tare to nett” ratio.

The complete mixer mounting system will be epoxy resin coated to be hygienic and will be mounted on suitably designed location pads.

One Load cell transmitter which will produce a 4 – 20 mA signal proportional to the nett weight of the material in the mixer.

One Batch controller complete with key board and monitor or optional touch control panel.

One High presusre air regulation and filter set comprising shut-off valve, pressure regulator, auto drain filter and panel mounted pressure gauge for shut off valve control.

One MCC containing the necessary contactor/starters, fuses, PLC, emergency lock out button and main power supply switch necessary to operate the batching system associated equipment items.

One Batching system programme.

Control System comprising:

All values and totals are accessed and resettable via the V.D.U.

A separate output for a printer provides, at the end of a weighing sequence, a formatted hard copy printout appertaining to that weighment. This printout is selectalbe via the V.D.U. and may either be a printout every time or only when an "out of tolerance" occurs. The printout may also be held until demanded, with totals of all materials used, batches completed, etc. This can be done at the end of each shift.

The V.D.U. and printer are both on optically isolated interfaces and can, therefore, be situated remote from the controller.

A production schedule of the batching requirements can be set up via the V.D.U. which allows future requirements to be set up in advance. The system can be made to halt between batches. Any additional item may easily be added to the schedule after the event either as priority requirement or as a straight addition to it.

The formula required can also be entered by the operator from a remote station using a password in the event of a production schedule amendment being called for.

Fully monitored 1/0 modules allows easy plant/equipment fault diagnosis with fully optical isolation for high noise immunity.

This specification is for the supply of the Weigher and Controls and does not include any equipment for feeding of materials.

6. METHODS OF FEEDING DRY INGREDIENTS TO MIXERS

When considering the installation of a Weigh-mix System, there are a number of major aspects:

a) The ingredients and the required accuracy of weight.

b) The method and sequence of ingredient delivery to the mixer.

c) The disposition of the mixer in relation to the building and consequently to the mechanisms feeding the mixer.

Accordingly, Grain Tech engineers have prepared these notes and sketches to assist the designer.

6.1 The Mixer

It is necessary to know the type and style of the mixer. The name of the manufacturer and a drawing of the machine would be most useful. Required details include:

a) Overall dimensions of the machine.

b) The number and type of dry ingredient filling points and whether fitted with automatic isolating valves.

c) The number and type of liquid ingredient filling points.

d) The total weight of the empty machine including motors and any supporting platforms or castings inherent to the machine.

e) The maximum mixing capacity of the mixing bowl.

6.2 Layout

It is important to be aware of building details in respect of mixer location.

a) Will it be on the ground floor, on a special mezzanine or on a higher floor?

b) The strength of the floor intended to support the mixer.

c) The height of the mixer floor to indicate space available for feeding mechanisms.

d) Floors above and below the mixer floor when considering b) and c).

e) The position of any relevant bulk ingredient plant in relation to the mixer.

The series of sketches illustrate some options available for feeding mechanisms. It is appreciated that other solutions may be found, and indeed, may be necessary. When considering the sketches, important points to note are:

f) The differences involving single or double dry ingredient inlets.

g) Service bins either above or at the same level as the mixer.

h) Service bins either with or without individual filter units where pneumatic conveying is involved.

i) One service bin feeding simultaneously to two mixers.

6.3 Mixing Cycle

There are three stages in a complete mixing cycle: FILLING – MIXING – EMPTYING. These stages are indicated on the Mixer Cycle Chart, page 9, which shows:

a) Individual ingredients and their weight.

b) The sequence of ingredient additions, weigher and mixer operations.

c) The origin of ingredients and whether multiple mixers have to queue or not for a particular ingredient. For example, flour could be fed simultaneously to all mixers from individual service bins over each mixer = "NON QUEUE", whereas fat may have to be fed to one mixer at a time from one common source = "QUEUE".

d) Ingredient filling times.

e) Weigher operation times.

f) Mixer operations, without times.

g) Total weight of ingredients.

h) Total time to get ingredients into the mixer.

NOTE:

The chart illustrates that the Weigh-mix filling sequence timing can be equal to or quicker than, traditional (or generally accepted) methods. It must be emphasised that during this filling sequence, the Weigh-mix accurately weighs each ingredient where it is needed – IN THE MIXER.

THE MIXING operation will be determined by recipe and production requirements and will be set by time, by temperature and by energy input (or mixer revolutions).

THE DISCHARGE time will be governed by the style of mixer, the dough consistency and the angle of discharge of the mixer bowl.

MIXER CYCLE CHART

Typical Wholemeal Biscuit Recipe

	INGREDIENT	WT	ORIGIN	OPERATION	TIMES	
1				Mixer empty. Closed	-	-
2				Start cycle	-	2
3				Auto-tare. Main Scale	-	5
4	Sugar	87	S/Bin NQ	Fast feed. 20 T/hour	16	-
5	Sugar	28	S/Bin NQ	Slow feed. 10 T/hour	10	-
6				Store data. Change scale to Amp	-	8
7	Salt	8	S/Bin NQ	Gravity feed	12	-
8				Store data. Change scale to Main	-	8
9	Fat	130	Bulk Q	Pump 120 ltrs/min	63	-
10				Store data. Change scale to Amp	-	8
11	Liquid pre-mix with recipe water	60	Bulk NQ	Gravity feed	20	-
12				Store data. Auto-tare. Lock weigher electrically	-	12
13				Cream. Run mixer ? time	-	*
14	Wholemeal	107	S/Bin NQ	Fast feed. 20 T/hour	19	-
15	Wholemeal	28	S/Bin NQ	Slow feed. 10 T/hour	10	-
16				Store data. Accumulate	-	2
17	Flour	218	S/Bin NQ	Fast feed. 30 T/hour	26	-
18	Flour	42	S/Bin NQ	Slow feed. 15 T/hour	10	-
19				Store data. Auto-tare. Change scale to Amp	-	8
20	Hand additives	5	NQ		12	-
21	(Total Weight)	713		Store data. Auto-tare. Display total recipe weight	-	10
22				Final mix ? time	-	*
23				Discharge mixer ? time	-	*
				TOTAL FILLING TIME - Seconds	198	-
				TOTAL WEIGHER TIME - Seconds	-	63

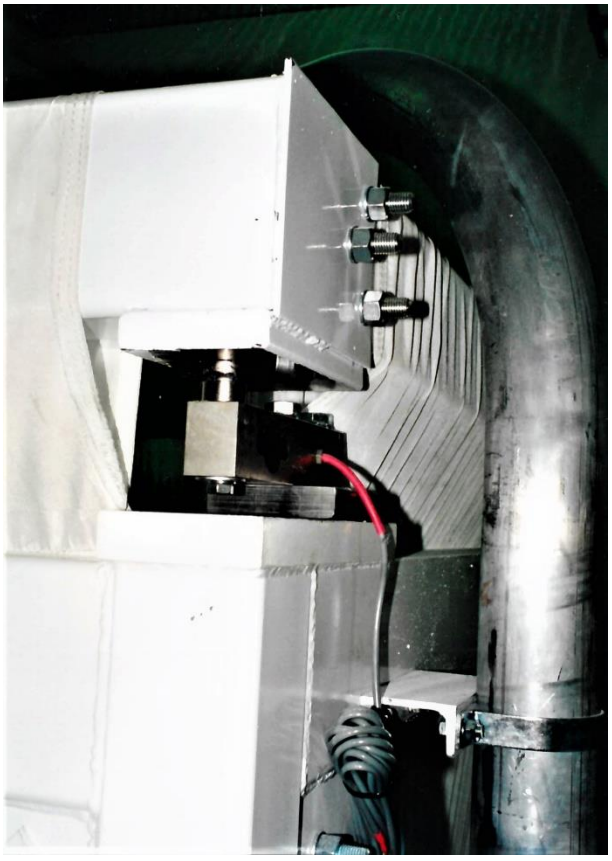
TOTAL TIME EXCLUDING MIXER OPERATION = 4 minutes 21 seconds

ABS Bulk Storage Silo Installation Procedure

1. The silo installation area is prepared as a separate enclosure or stand-alone arrangement within an existing processing or storage area. The silo support framework is pre-fabricated and moved into place.

2. The flexible silo is fitted up to the top section of the support framework, complete with filling entry unit and level sensor bracket. Load cells may be installed in the top section where required.

3. The completed top section with the bulk storage silo fitted is assembled up to the support framework in situ with all cross bracing and bracketing being provided simply to be easily bolted together on site.



4. Load cells for accurate bulk silo product weight indication can be fitted up to the top support framework where required.

5. The assembled storage silo is completely self-supporting and has an evaser discharge hopper section for complete emptying. Discharge may be via either of a flex-flow conveyor or pneumatic transfer system where a long distance is called for from the silo to the weigh-hopper.

6. An optional security sifting of the product discharging from the silo prior to conveying to the weigh-hopper may be installed where required.

7. All ancillary equipment items, i.e. weigh-hopper, support framework, etc, is provided in a pre-fabricated form ready for simple installation on site.

8. The silo filling conveying line and auxiliary exhaust connections are fitted within the building to suit the customer's installation requirements.

9. The transfer from the bulk storage silo may be to a stand-alone weigh-hopper complete with load cells and weighing controller.

10. Alternatively, the product transfer may be directly to a mixing unit installed on a load cell fitted based unit.

In either case, the selected weight for the respective batch is controlled from a batch controller with auto tare and digital readout features.

11. Product supply to the bulk storage silo is direct via a transfer line from the delivery tanker utilizing either a site-blowing rig or a tanker fitted blowing unit.

12. All equipment supplied is installed to suit the application within the area available. Variations to meet the process needs are planned in prior to fabrication and installation with the component items being provided to suit, enabling easy and quick erection in situ.

Industrial Silos

made of polyester fabric, coated or uncoated

1. Applications

Food and Condiment products:
flour, starch, semolina, milk powder, wheat meal, sugar, spices, tea, tobacco powder, cocoa, etc.

Plastics:
S-PVC, E-PVC, granulars, pellets, styrofoam, styrofoam chips, foil parings and formed pieces such as bottles, cans, capsules, caps, pins, dowels, etc.

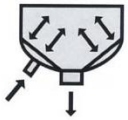
Industry in general:
talcum, kaolin, gypsum, titaniumdioxide, pigments, filling material, wood flour, sawdust, cork flour, corks, etc.

2. Discharge

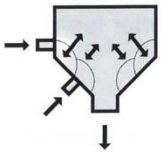
a) Simple cone for fluidizable materials such as semolina, cereals, plastic pellets, corks, caps

b) With fluidizing bottom for powders and dust, also for fluidizable materials: flour, cocoa, talcum, kaolin, coloring pigments as well as powder with rough share

c) Fulling bottom for poor flowing not fluidizable bulk materials: wet sand, moist saw dust, plastic grinding stock, recycled rubber



d) Combination of fulling bottom and fluidizing bottom with silos as of 3 m to 8 m Ø with flat or little inclined bottoms of cement or steel



e) Fluidizing bottom for subsequent erection in existing silos, containers and pipes.

3. Features of fabric silos

- Continuous trouble free discharge
- No condensation water with silos made of uncoated fabric
- Self-cleaning respectively simple to clean by means of brushing off
- Silos made of polyester fabric are corrosion-proof, making them similar to fine steel
- Certified for food contact, copy available on request
- All silos up to 500 m^3 can be shipped by common carrier
- Optimal outflow properties
- Air-permeable, therefore suitable for being used simultaneously as filter
- Non air-permeable, made of coated, air-proof fabric

4. Durability

The first silos were manufactured approx. 30 years ago and are still in operation today!

2 storage silos for E.P.S. in a mixing apparatus for plaster manufacturing. Volume of 70 m^3 each.

5. Construction

Four-sided polyester fabric for hanging on a sustainer or for the placement on a steel frame.

6. Silo sizes

Up to 500 m^3

7. Capacity

Up to 35.000 kg

8. Engineering

We plan complete installations in the area of bulk material storage.

This planning includes:

Appropriate selection of the silo composition and the storage volume in cooperation with the customer.

Best determination of the control functions, taking into consideration the manufacturing process.

Selection of the necessary units and accessories.

The carrying out of such projects are offered complete with erection and delivery of the necessary equipment.

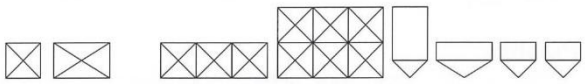
- Take advantage of our know-how -

Silo and conveying machinery with weighing technique for the manufacture of washing detergent (powder). Volume of 30 m^3 each.

9. Silo forms and types of set-ups

- Silo form: rectangular or square in standard size or on request
- Set-up type: individual, in rows, battery set-up

Silo form **Set-up type**



2 storage silos for kaolin with fluidizing bottom in a picture frames factory. Volume of 40 m^3 each.

10. Guarantee

The guarantee for fabric silos is of 5 years. We also offer fabric silos for experimental purposes.

11. Delivery time

Silos made of polyester fabric in approx. 2-3 weeks, with steel frame approx. 3-5 weeks.

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ON THE FIFO PRINCIPLE

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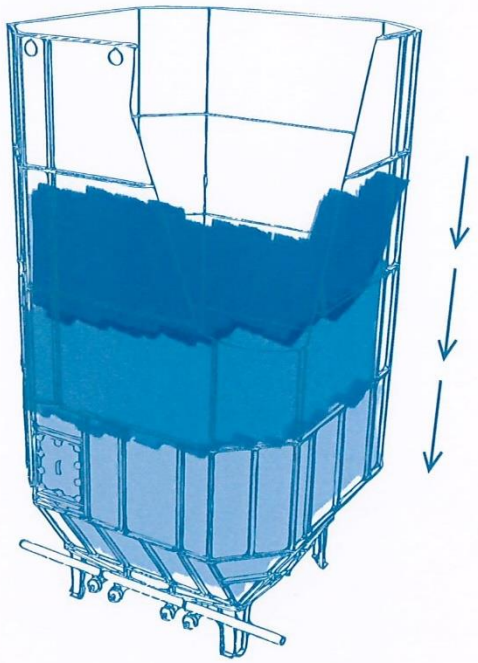
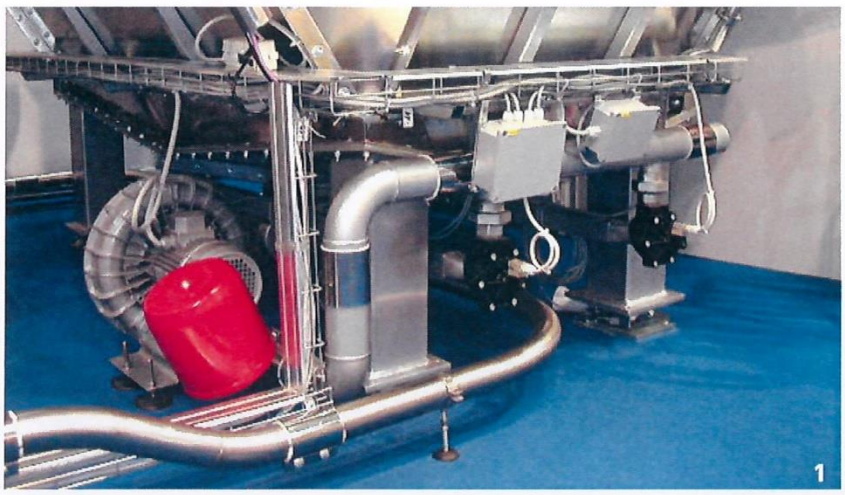
SPECIAL EMPTYING METHOD
FOR SUGAR, STARCH, BRAN

SILOS FOR COUS-COUS
AND SHORT PASTA

For the food, chemical, pharmaceutical, pet-food, plastic, paper…industries

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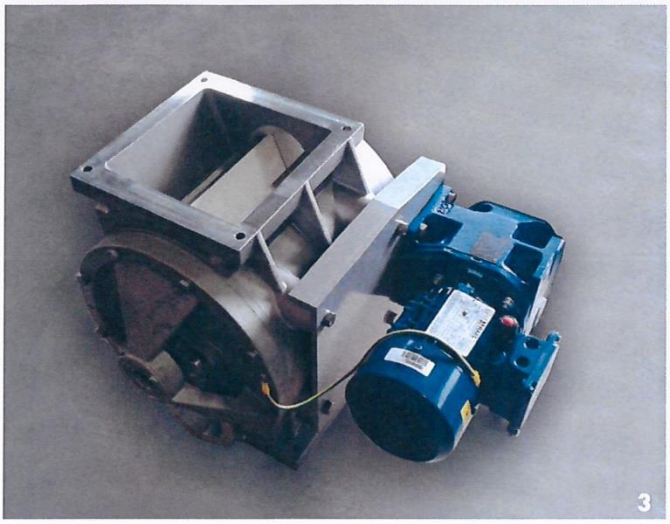
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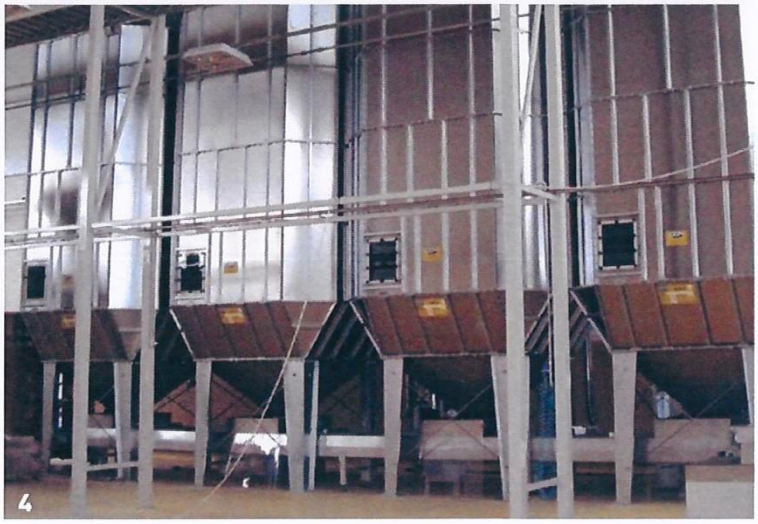
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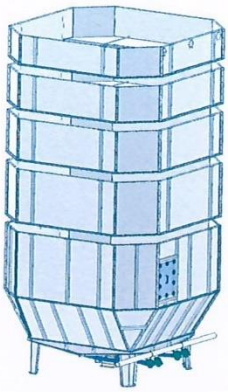
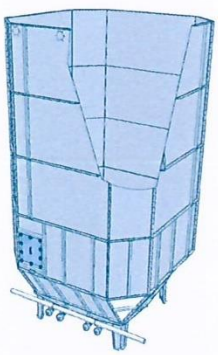


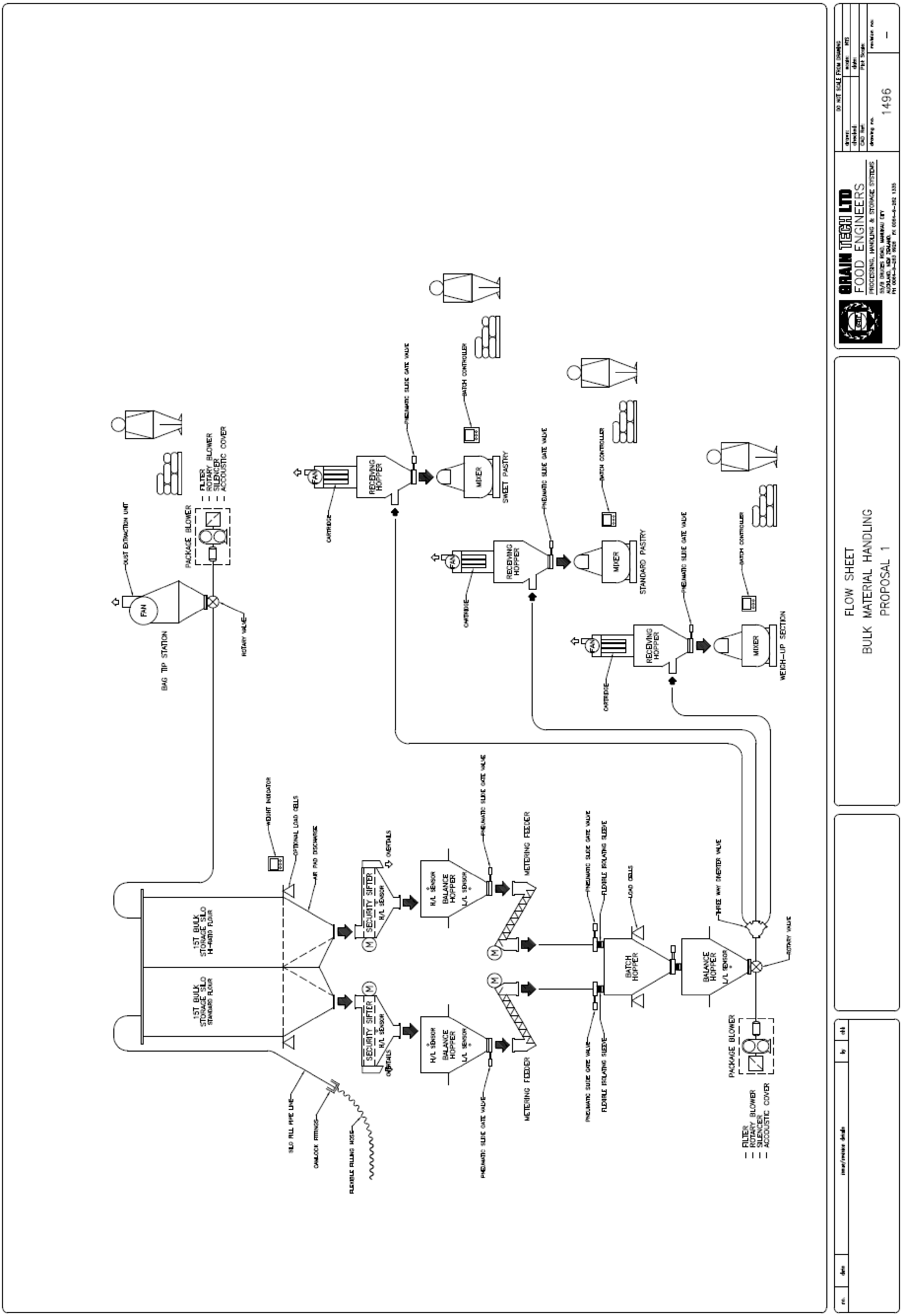
Modularity

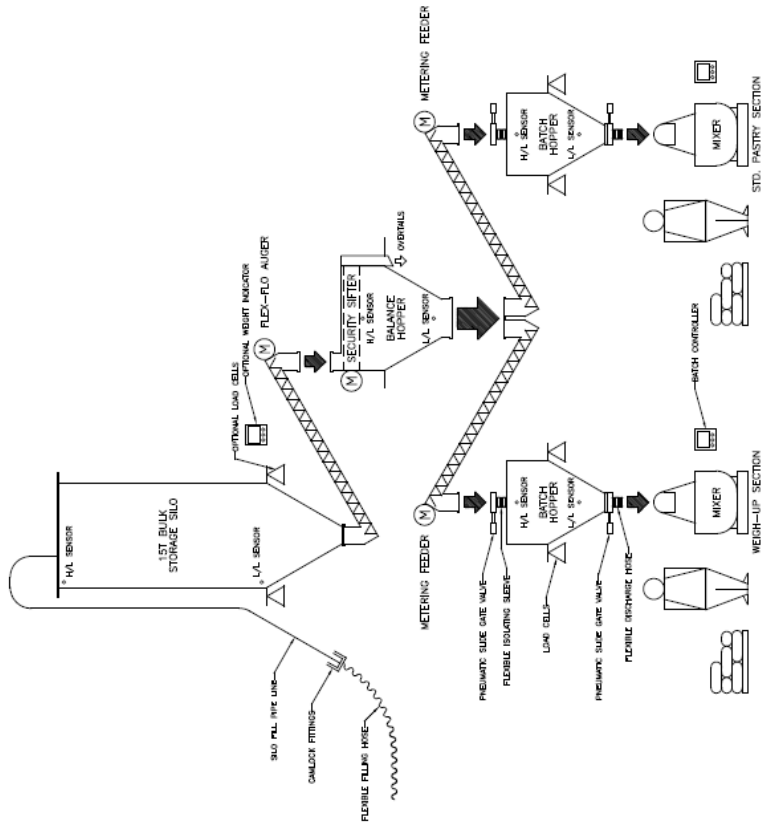
Fludization



Extraction with fluidized bed

Weighing on cells and weight control in real time with WP104

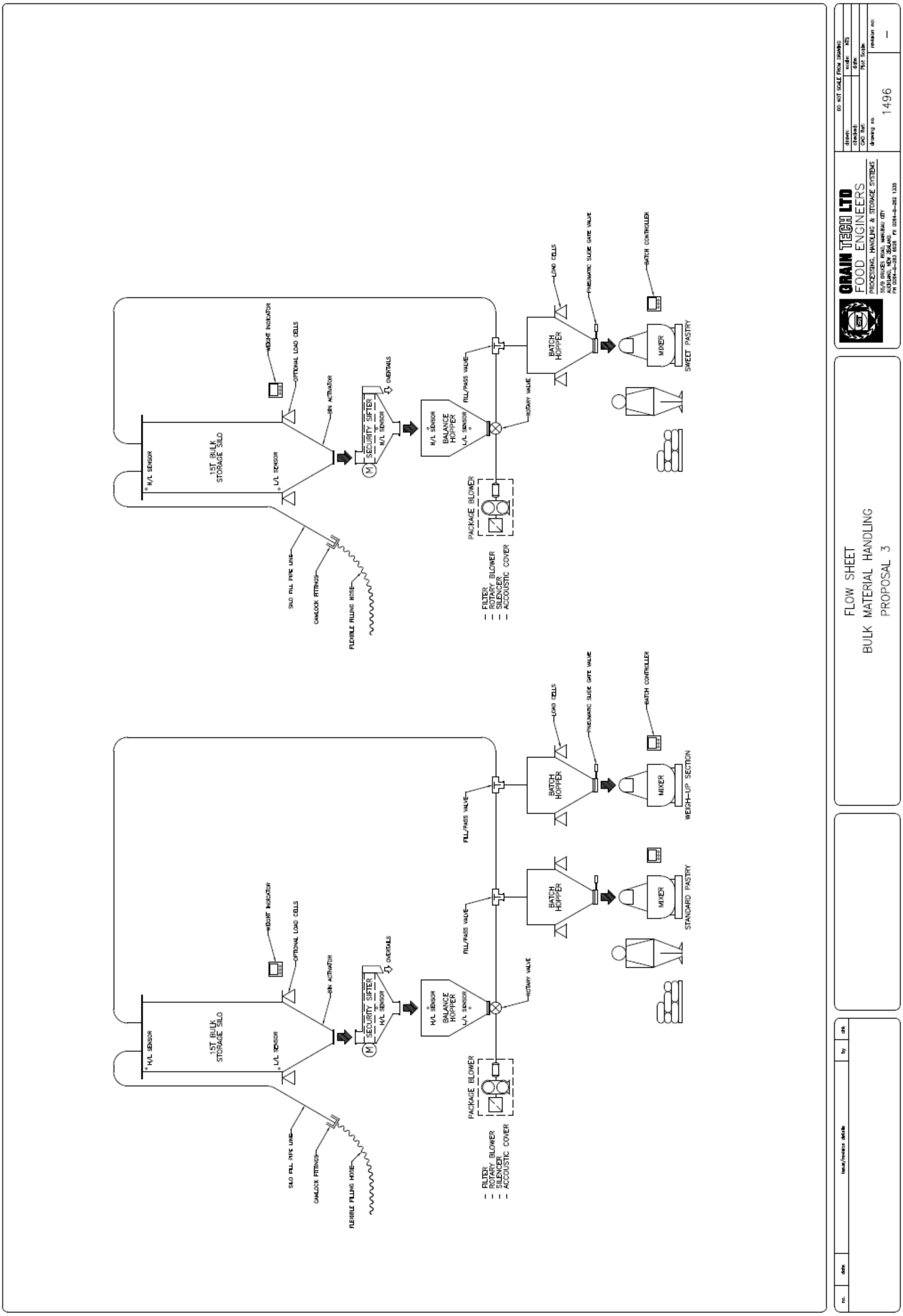

15T BULK STORAGE SILO HI-RATIO FLOUR
15T BULK STORAGE SILO STANDARD FLOUR
SECURITY SIFTER
H/L SENSOR
L/L SENSOR
BALANCE HOPPER
METERING FEEDER
BATCH HOPPER
LOAD CELLS
PACKAGE BLOWER
FILTER
ROTARY BLOWER
SILENCER
ACOUSTIC COVER
BAG TIP STATION
FAN
RECEIVING HOPPER
CARTRIDGE
MIXER
SWEET PASTRY
STANDARD PASTRY
WEIGH-UP SECTION
BATCH CONTROLLER
PNEUMATIC SLIDE GATE VALVE
ROTARY VALVE
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS
FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 1
1496

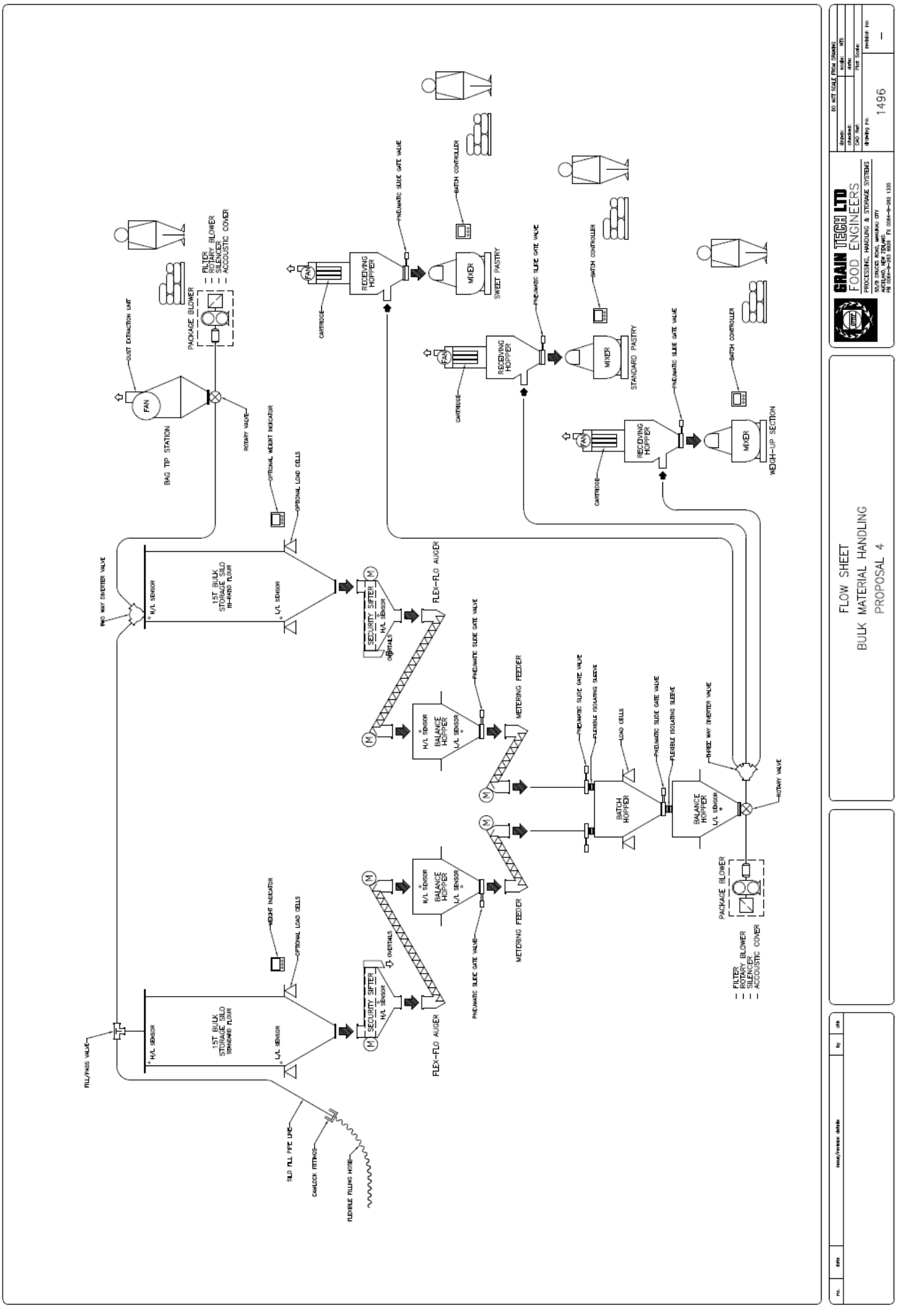


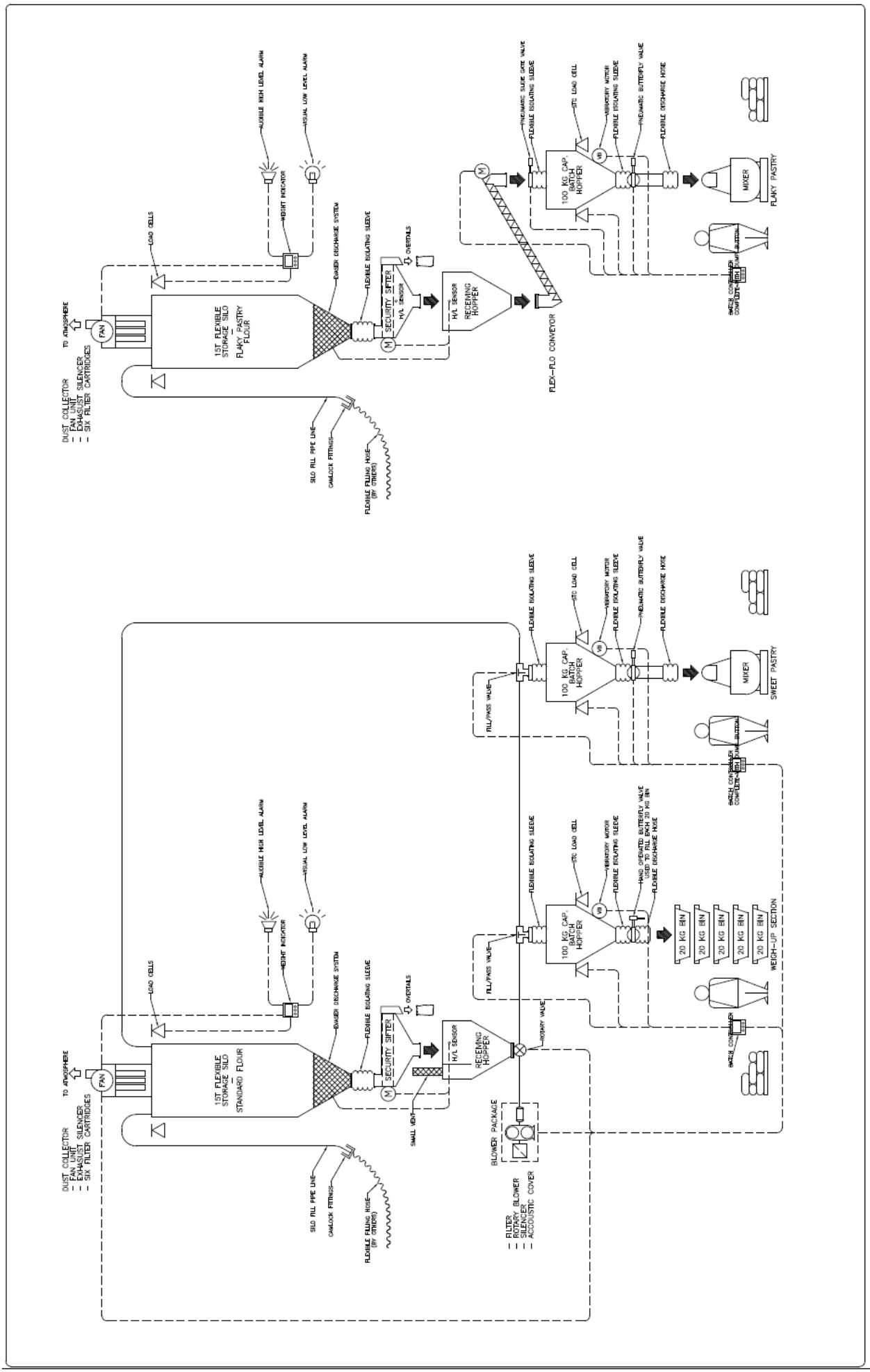
FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 2

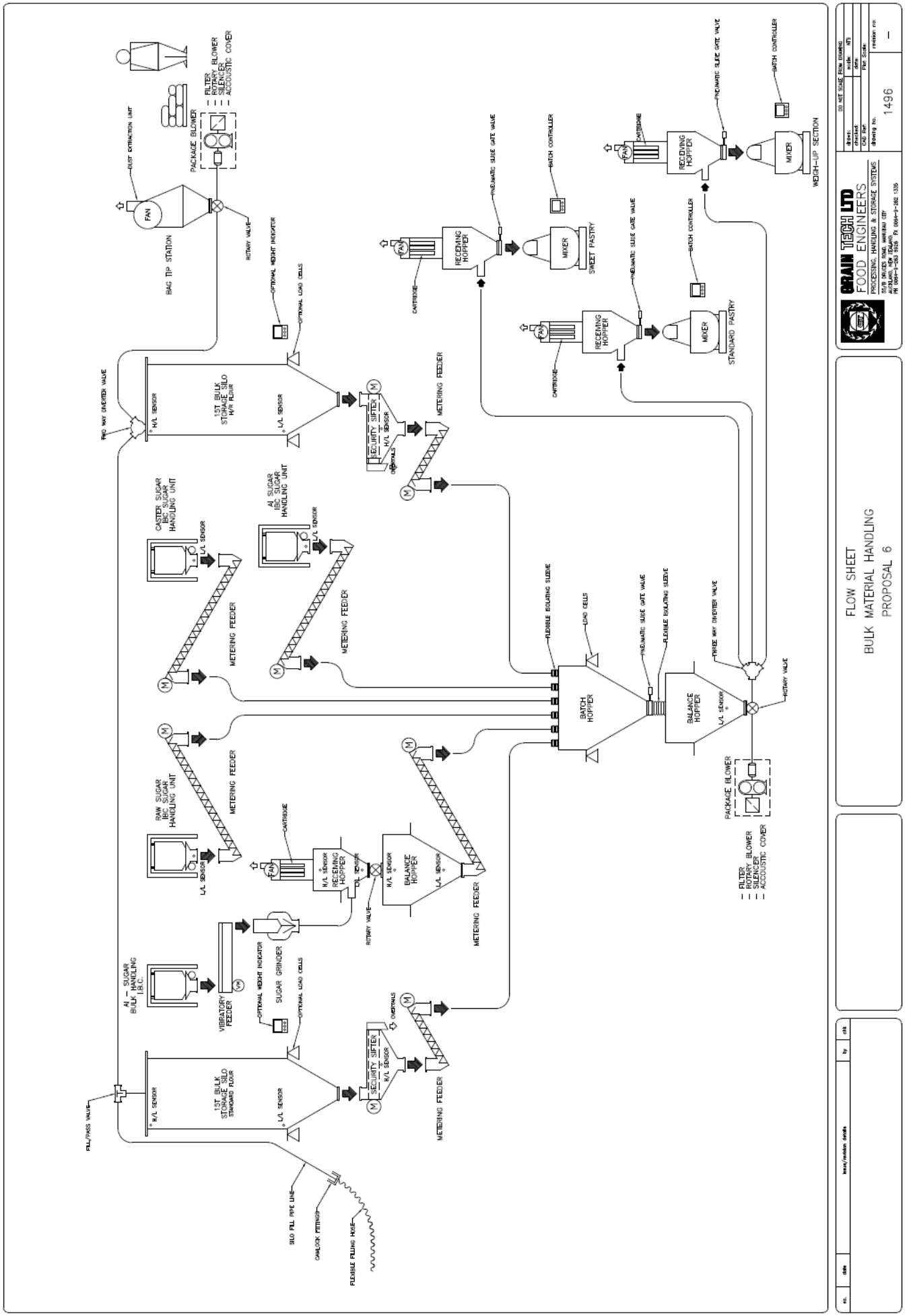
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS

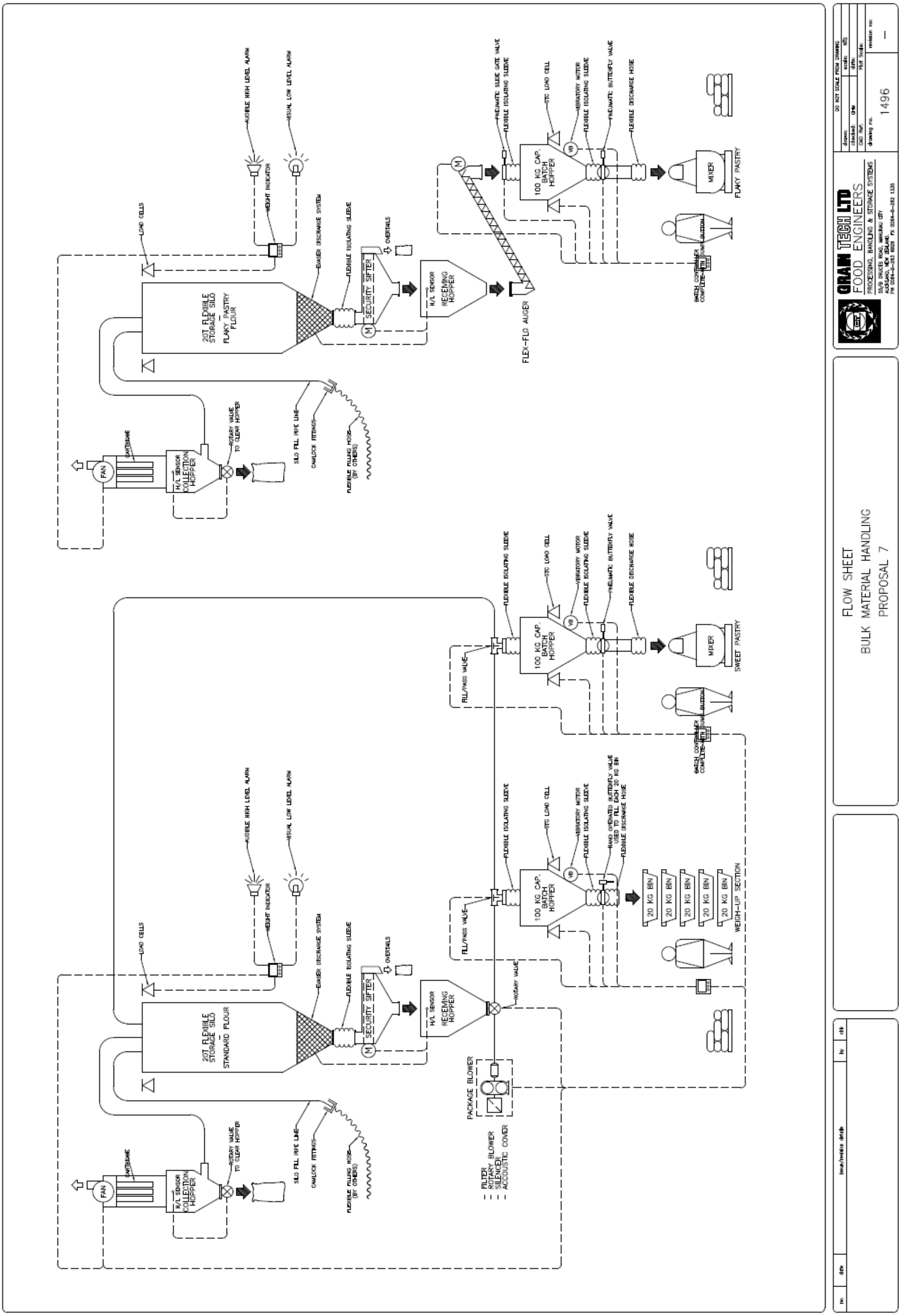
drawing no. 1496
revision no. –

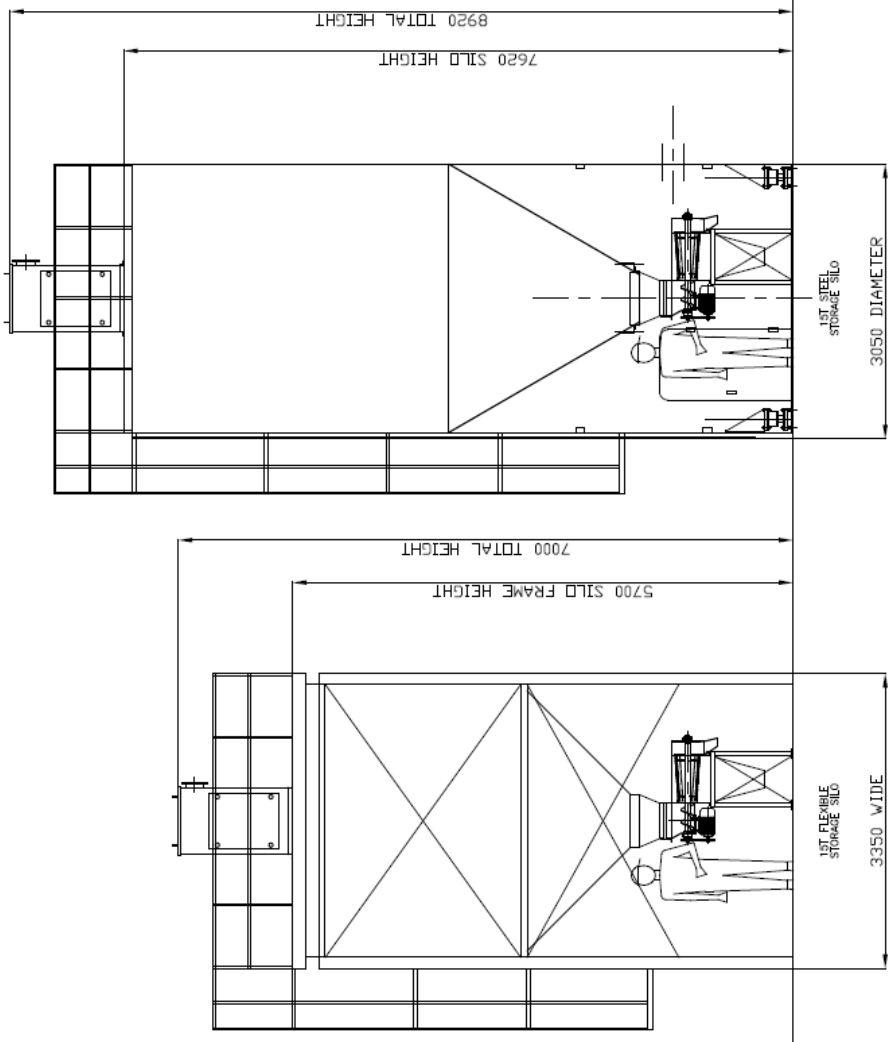

15T BULK STORAGE SILO
H/L SENSOR
L/L SENSOR
WEIGHT INDICATOR
OPTIONAL LOAD CELLS
BIN ACTIVATOR
SECURITY SIFTER
H/L SENSOR
OVERTAILS
BALANCE HOPPER
H/L SENSOR
L/L SENSOR
ROTARY VALVE
PACKAGE BLOWER
- FILTER
- ROTARY BLOWER
- SILENCER
- ACCOUSTIC COVER
SILO FILL PIPE LINE
CAMLOCK FITTINGS
FLEXIBLE FILLING HOSE
FILL/PASS VALVE
BATCH HOPPER
LOAD CELLS
PNEUMATIC SLIDE GATE VALVE
BATCH CONTROLLER
MIXER
SWEET PASTRY
STANDARD PASTRY
WEIGH-UP SECTION
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS
FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 3
DO NOT SCALE FROM DRAWING
drawing no.
1496
revision no.


FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 4
GRAIN TECH LTD
FOOD ENGINEERS
1496
BAG TIP STATION
DUST EXTRACTION UNIT
PACKAGE BLOWER
FILTER
ROTARY BLOWER
SILENCER
ACOUSTIC COVER
FAN
ROTARY VALVE
OPTIONAL WEIGHT INDICATION
OPTIONAL LOAD CELLS
TWO WAY DIVERTER VALVE
1ST BULK STORAGE SILO HI-PANTO FLOUR
1ST BULK STORAGE SILO STANDARD FLOUR
H/L SENSOR
L/L SENSOR
SECURITY SIFTER
OVERTAILS
FLEX-FLO AUGER
BALANCE HOPPER
METERING FEEDER
PNEUMATIC SLIDE GATE VALVE
FLEXIBLE ISOLATING SLEEVE
LOAD CELLS
BATCH HOPPER
THREE WAY DIVERTER VALVE
FILL/PASS VALVE
SILO FILL PIPE LINE
CAMLOCK FITTINGS
FLEXIBLE FILLING HOSE
RECEIVING HOPPER
CARTRIDGE
MIXER
SWEET PASTRY
STANDARD PASTRY
BATCH CONTROLLER
WEIGH-UP SECTION


DUST COLLECTOR
FAN UNIT
EXHAUST SILENCER
SIX FILTER CARTRIDGES
TO ATMOSPHERE
FAN
1ST FLEXIBLE STORAGE SILO
FLAKY PASTRY FLOUR
LOAD CELLS
AUDIBLE HIGH LEVEL ALARM
VISUAL LOW LEVEL ALARM
WEIGHT INDICATOR
RUBBER DISCHARGE SYSTEM
FLEXIBLE ISOLATING SLEEVE
SECURITY SIFTER
OVERFILLS
H/L SENSOR
RECEIVING HOPPER
SILO FILL PIPE LINE
CAMLOCK FITTINGS
FLEXIBLE FILLING HOSE (BY OTHERS)
FLEX-FLO CONVEYOR
PNEUMATIC SLIDE GATE VALVE
FLEXIBLE ISOLATING SLEEVE
STC LOAD CELL
VIBRATORY MOTOR
FLEXIBLE ISOLATING SLEEVE
PNEUMATIC BUTTERFLY VALVE
FLEXIBLE DISCHARGE HOSE
100 KG CAP. BATCH HOPPER
MIXER
FLAKY PASTRY
BATCH CONTAINER COMPLETE WITH DUMP BUTTON
1ST FLEXIBLE STORAGE SILO
STANDARD FLOUR
SMALL VENT
BLOWER PACKAGE
FILTER
ROTARY BLOWER
SILENCER
ACCOUSTIC COVER
FILL/PASS VALVE
ROTARY VALVE
HAND OPERATED BUTTERFLY VALVE USED TO FILL EACH 20 KG BIN
20 KG BIN
WEIGH-UP SECTION
SWEET PASTRY
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS
DO NOT SCALE FROM DRAWING
drawn:
checked:
CAD ref:
drawing no.
1496
revision no.
-
FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 5


FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 6
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS
1496
BAG TIP STATION
DUST EXTRACTION UNIT
FAN
PACKAGE BLOWER
FILTER
ROTARY
SILENCER
ACCOUSTIC COVER
ROTARY VALVE
OPTIONAL WEIGHT INDICATOR
OPTIONAL LOAD CELLS
1ST BULK STORAGE SILO H/A FLOUR
H/L SENSOR
L/L SENSOR
TWO WAY DIVERTER VALVE
SECURITY SIFTER
OVERSIZE
METERING FEEDER
CASTER SUGAR IBC SUGAR HANDLING UNIT
AI SUGAR IBC SUGAR HANDLING UNIT
RAW SUGAR IBC SUGAR HANDLING UNIT
AI – SUGAR BULK HANDLING I.B.C.
VIBRATORY FEEDER
SUGAR GRINDER
CARTRIDGE
RECEIVING HOPPER
BALANCE HOPPER
BATCH HOPPER
FLEXIBLE ISOLATING SLEEVE
LOAD CELLS
PNEUMATIC SLIDE GATE VALVE
THREE WAY DIVERTER VALVE
BATCH CONTROLLER
MIXER
SWEET PASTRY
STANDARD PASTRY
WEIGH-UP SECTION
FILL/PASS VALVE
SILO FIL PIPE LINE
CAMLOCK FITTINGS
FLEXIBLE FILLING HOSE


FLOW SHEET
BULK MATERIAL HANDLING
PROPOSAL 7
GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS
1496
20T FLEXIBLE STORAGE SILO - FLAKY PASTRY FLOUR
20T FLEXIBLE STORAGE SILO - STANDARD FLOUR
LOAD CELLS
HEIGHT INDICATOR
AUDIBLE HIGH LEVEL ALARM
VISUAL LOW LEVEL ALARM
BIASER DISCHARGE SYSTEM
FLEXIBLE ISOLATING SLEEVE
SECURITY SIFTER
OVERTAILS
H/L SENSOR
RECEIVING HOPPER
FLEX-FLO AUGER
100 KG CAP. BATCH HOPPER
PNEUMATIC SLIDE GATE VALVE
STC LOAD CELL
VIBRATORY MOTOR
PNEUMATIC BUTTERFLY VALVE
FLEXIBLE DISCHARGE HOSE
MIXER
FLAKY PASTRY
SWEET PASTRY
BATCH CONTROLLER
COMPLETE
FILL/PASS VALVE
ROTARY VALVE
20 KG BIN
WEIGH-UP SECTION
HAND OPERATED BUTTERFLY VALVE USED TO FILL EACH 20 KG BIN
PACKAGE BLOWER
- FILTER
- ROTARY BLOWER
- SILENCER
- ACCOUSTIC COVER
FAN
CARTRIDGE
H/L SENSOR COLLECTION HOPPER
ROTARY VALVE TO CLEAR HOPPER
SILO FILL PIPE LINE
CAMLOCK FITTINGS
FLEXIBLE FILLING HOSE (BY OTHERS)



FLEXIBLE vs STEEL CONSTRUCTION

GRAIN TECH LTD
FOOD ENGINEERS
PROCESSING, HANDLING & STORAGE SYSTEMS

drawing no. 1496
revision no. -