miller
SAFETY & HEALTH CONSULTING, LLC

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millersafetyandhealth.com

Base Camp Brewing Company
930 SE Oak
Portland, Or. 97214 7/1/15
Attn.: Justin Fay

Re: Hazardous Materials Technical Opinion & Report; Rev. #1

Dear Justin,

Following is a Technical Opinion and Report (Rev.1), as required by the Oregon Specialty Structural Code, Section 414.1.3, regarding hazardous materials related issues covering the Base Camp Brewing facility in Portland, Oregon. This Report is based on a tour of the existing Base Camp Brewing facility and discussions with yourself, your design and construction team and the City of Portland fire and BDS officials.

Facility Description

Base Camp Brewing is proposing to expand the storage and processing of grains related to the brewing of beer by installing an Outdoor Silo. Presently, Base Camp is using super-sack and bag delivery for introducing grains to the grist mill. The Grist Mill and Grist Hopper are located in a Mill Room approximately 127sf in size. This Mill Room is presently classified as a S1occupancy and is not equipped with automatic sprinklers.

There will be the following areas or rooms, related to hazardous materials, discussed in this Report:

Table A: Rooms and Areas related to Process of Alcohol production and Storage

Room or Area #	Function of Room/Area	Occup-ancy*	Room/Area Size (sq. ft.)	Largest Container
Mezzanine Area	Storage of Grains in Super-sacks and Bags	S1	1296 (grains occupy small footprint)	Super-sack: 1 metric ton
Mill Room	Milling and Hopper Storage of Grains	S1	127	Hopper: 1 metric ton
Silo Area	Silo Area - Outdoors	NA	100	50,000 pounds

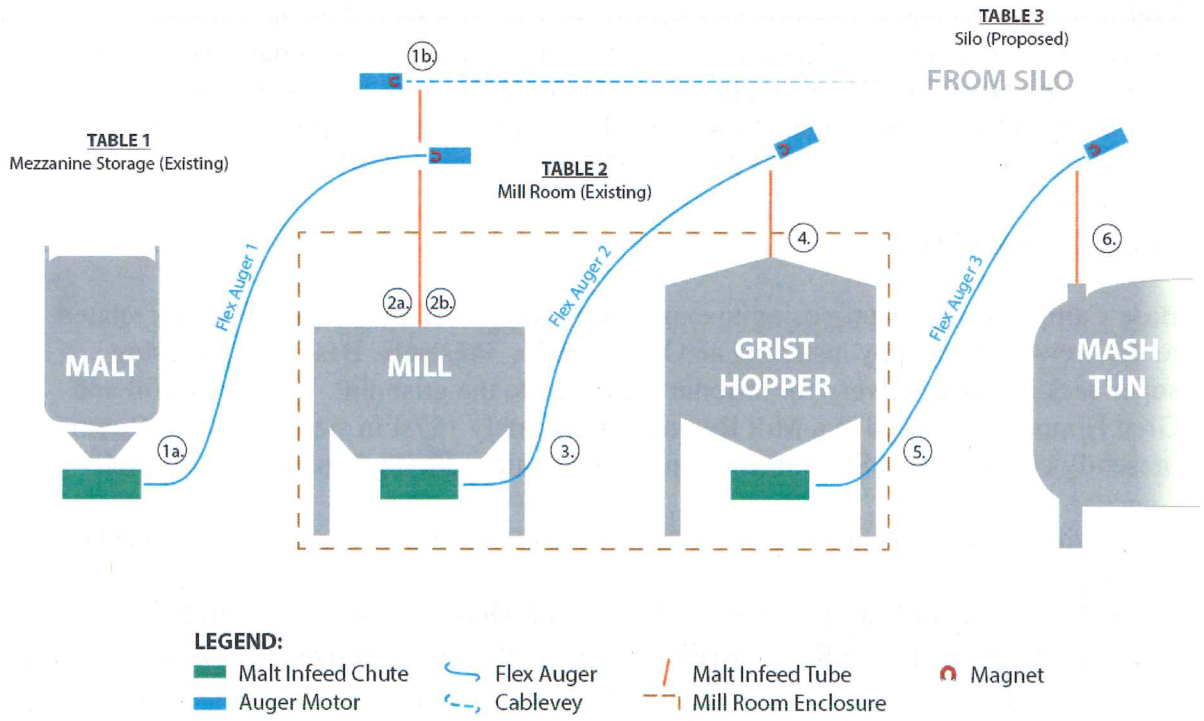
Hazardous Materials Discussion and Purpose of Report

Combustible dust is a possible resultant of the Grist Mill process that occurs in the Mill Room. It has been observed that the present Grist Mill produces small amounts of finely particulated dust. Presently, this dust is removed via housekeeping measures and to date there has not been any incidents related to the dust.

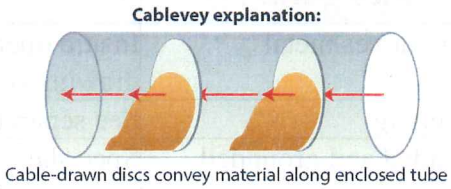
The purpose of this Report, per OSSC 414.1.3, is to establish that the combustible dust hazard can be mitigated using a variety of measures listed in the three Tables below. Mitigation of the dust hazards, in my professional opinion, can allow the Mill Room to remain a S1 occupancy and the Silo system to result in a safe conveyance system.

Process Description

See the diagram below with the text explanation following:



1a. Whole Kernel Malt enters system from super-sacks and/or 50 lb. bags via infeed chute, then conveyed through Flex Auger 1.
1b. *Proposed addition:* Whole Kernel Malt also enters system from Silo via Cablevey (a "cablevey" or "cableveyor" is an enclosed tubular disc conveyor; see figure below)



2a. Whole Kernel Malt enters Mill from Flex Auger 1 via infeed tube. Mill cracks open malt kernels.
2b. *Proposed addition:* Whole Kernel Malt also enters Mill from Cablevey via infeed tube.
3. Cracked Malt enters Flex Auger 2 from Mill via infeed chute, then conveyed through Flex Auger 2.
4. Cracked Malt enters Grist Hopper from Flex Auger 2 via infeed tube. All Cracked Malt for a single brew is collected in this vessel and weighed before moving to next step.
5. Cracked Malt enters Flex Auger 3 via infeed chute, then conveyed through Flex Auger
6. Cracked Malt exits system into Mash Tun via infeed tube. Cracked Malt is mixed with water as it enters the vessel.

Table 1: Existing Grain Delivery System

#	Equipment	Requirement	Comments
1	Conveyor and Auger	Magnet removes metal	Ensure operational adequacy
2	Area around grain storage	Housekeeping	See separate procedure
3	Coveyance system	Bonded and grounded	See attached spec sheet

Table 2: Combustible Dust Mitigation Measures in Exisitng Mill Room

#	Equipment	Mitigation Measure	Comments
1	Grist Mill	Seal System to prevent leakage of dust particulates	To be done prior to operation of Silo system
2	Grist Mill	Install Explosion Proof motor to remove possible ignition source	To be done priot to operation of Silo system
3	Grist Mill	Magnet removes metal	Insure operational adequacy
4	Grist Hopper	Magnet removes metal	Insure operational adequacy
4	Grist Room	Housekeeping	See separate procedure

5	Grist Room	Explosion proof lighting	Existing
6	Coveyance system	Bonded and grounded	See attached spec sheet

Table 3: Combustible Dust Mitigation Measures in New Silo System

#	Equipment	Requirement	Comments
1	Cablevey System	Magnet removes metal	Insure operational adequacy; see drawing on Page 3
2	Silo	Housekeeping	See separate procedure
3	Coveyance system	To be bonded and grounded	Spec sheet to be provided

Conclusions and Attachments of Report

1. If all of the Mitigation steps listed in the above Tables are institutued and adhered to, the Base Camp Brewery grain storage and milling operation will constitute a safe operation due to the removal of ignition sources and the significant reduction of combustible dust fines due to procedure and mechanical mitigating measures.

2. The following attachements are included for further explanation and clarity:
- Procedure for Maintenance of the Mill Room
- Flex Auger specifications
- New Conveyance and Silo specifications
- Photo of Milled Grain

It has been a pleasure working with you. Feel free to contact me with any questions regarding this Rev. 1 Report.

Sincerely,

Richard M. Miller, C.S.P.
ICC Certified Fire Inspector II

Cc: via email: Erica Dunn, Architect
Attachments: See Conclusion #2 for list

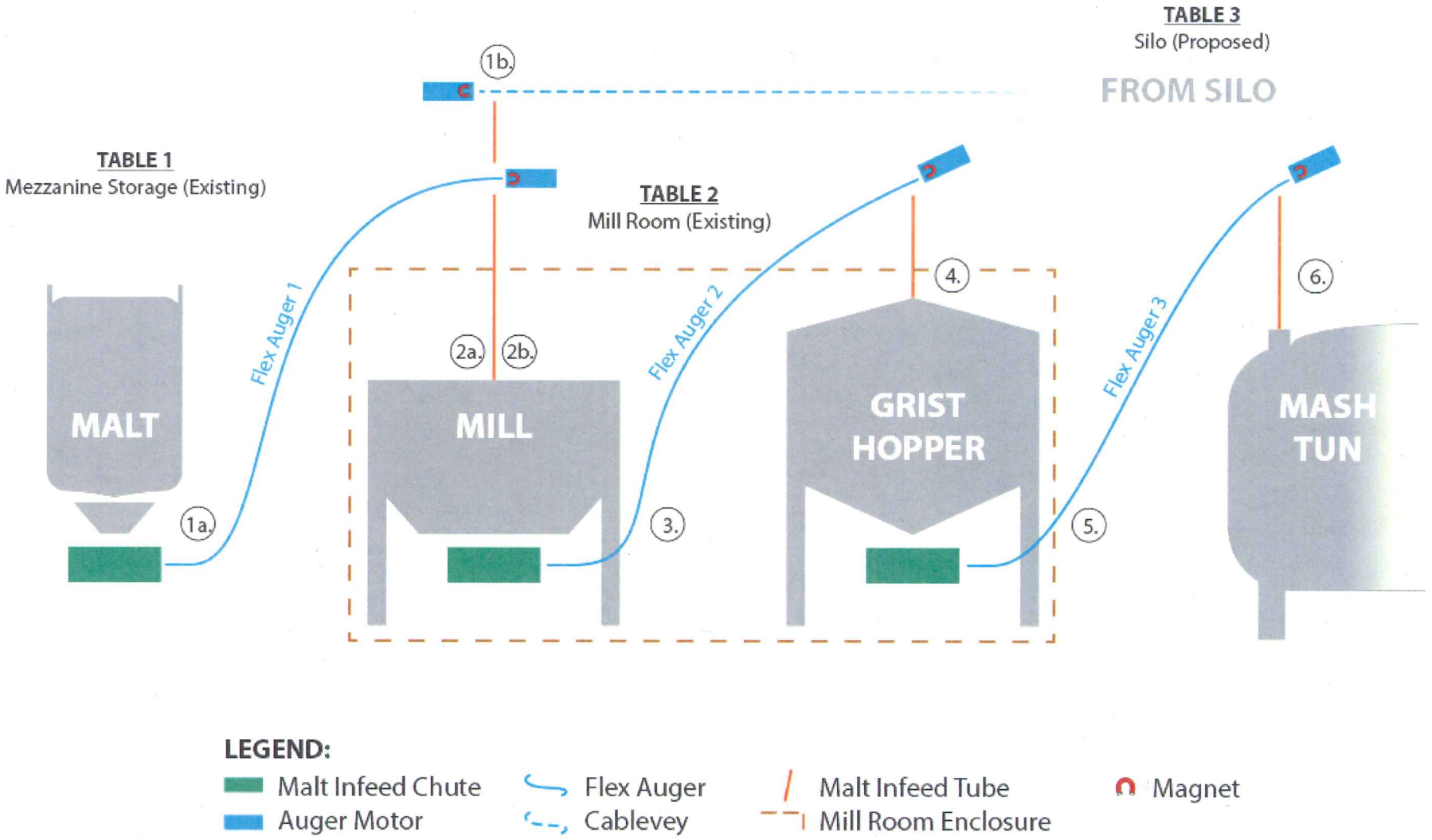


TABLE 3
Silo (Proposed)
FROM SILO
1b.
TABLE 1
Mezzanine Storage (Existing)
TABLE 2
Mill Room (Existing)
4.
6.
2a.
2b.
Flex Auger 1
Flex Auger 2
Flex Auger 3
MALT
MILL
GRIST HOPPER
MASH TUN
1a.
3.
5.
LEGEND:
Malt Infeed Chute
Auger Motor
Flex Auger
Cablevey
Malt Infeed Tube
Mill Room Enclosure
Magnet

Base Camp Brewing Company

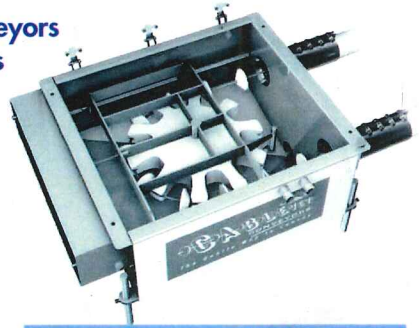
Last change made: 7-7-15

Brewer's Standard Operating Procedure for Mill Room housekeeping maintenance.

Purpose: Grain dust has a small chance of becoming a potential fire and explosion hazard if particulate matter in the air raises past a certain concentration. There are two ways in which we will abate this hazard.

1.) Remove source of dust. The mill and auger systems are sealed dust tight. If you notice dust gathering in a particular spot, a seal may have failed. Report to supervisor immediately. In addition, the entire mill room and equipment surfaces are to be vacuumed and cleaned immediately after use.

Enclosed Tubular Drag Cable and Disc Conveyors to Gently Convey Your Friable Materials



6000 Series
Six-Inch Diameter (152.4mm) System
Up to 1,240 Ft³ (35.4 M³) / Hour

4000 Series
Four-Inch Diameter (101.6mm) System
Up to 525 Ft³ (14.87 M³) / Hour

2000 Series
Two-Inch Diameter (50.8mm) System
Up to 75 Ft³ (2.12 M³) / Hour

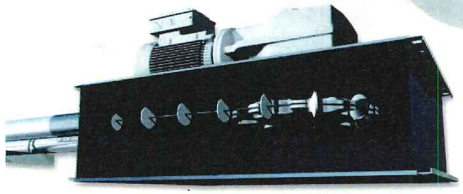
Energy Efficient

Electric Motor Operating Costs (Cablevey uses 1, 3 or 5 HP Drive Units)

Horsepower/ Kilowatts1	Full Load AMP	NEMA Efficiency	Annual Cost
(.75KW)	1.6	78.5	$414
3 (2.23KW)	4.2	85.6	$965
5 (3.72KW)	6.5	87.5	$1,476

Based on 460V continuous run @ $.10 per kilowatt hour

Discs attached to Ultra-Flex cable gently conveys product through the tube without the use of air



Testimonial

Before going with Cablevey, we used buckets, pneumatics, belt-drive and vacuum-load systems, but they were not efficient. After reviewing different solutions, we chose Cablevey on price, installation, turn-around time and flexibility.

Jean-François Vallee,
Engineering & Maintenance Manager
Van Houtte Inc. Montreal, Canada

"Bean Breakage decreased by 78% This decision was a no-brainer!"

CABLEVEY CONVEYORS

Customized Tubular Drag Cable Conveyors Since 1971

P O Box 148, 2397 Highway 23
Oskaloosa, Iowa 52577 U.S.A.
Tel: +1 (641) 673-8451 • Fax: +1 (641) 673-7419
Email: info@cablevey.com
www.cablevey.com

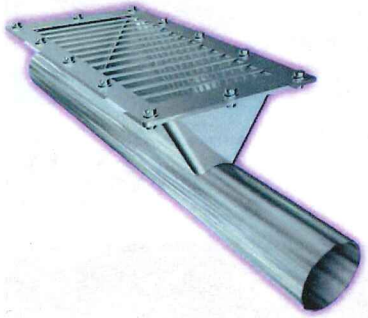
CABLEVEY CONVEYORS

Customized Tubular Drag Cable Conveyors Since 1971

- ✓ Dust-Free Enclosed System – No Filters!
- ✓ Gentle Handling – Less Breakage!
- ✓ Low Decibels – Quiet!
- ✓ Starts & Stops Under Load
- ✓ Clean-in-Place Options
- ✓ Minimal Footprint
- ✓ Energy-efficient

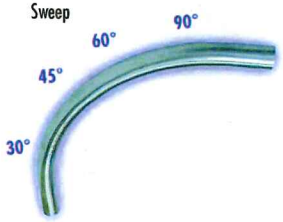
Gentle Clean Quiet Reliable Conveying

VARIOUS INLET TYPES
To Fit Your Application

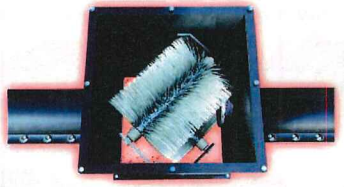


INSPECTION TUBE
Transparent View

DIRECTIONAL CHANGE
Sweep

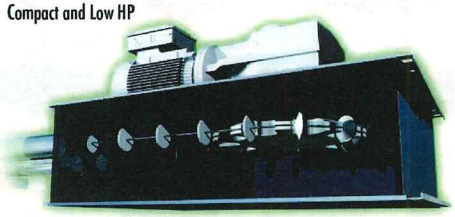


INLINE BRUSH BOX
Automatic Disc & Cable Cleaning

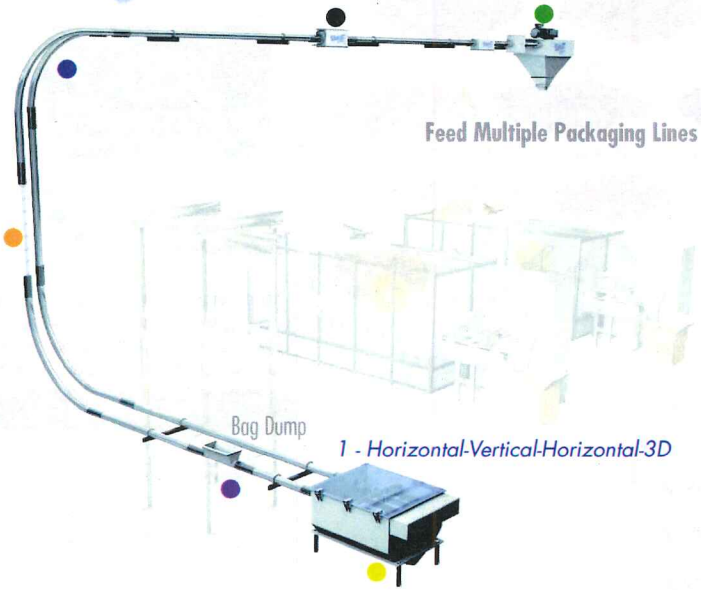


ROTARY DISCHARGE
Multiple Discharge Options (as needed)

DRIVE UNIT
Compact and Low HP

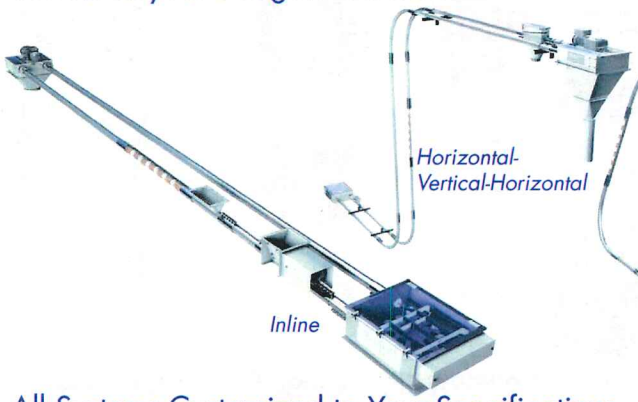


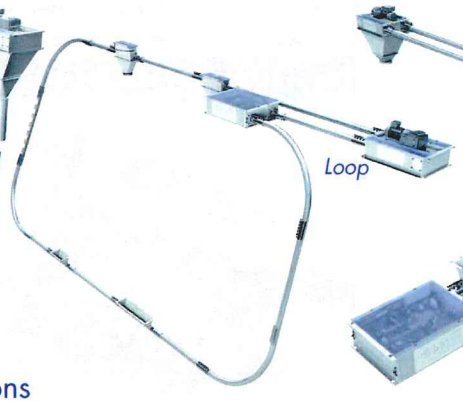
TENSION TURNAROUND UNIT
Self Adjusting



THE HEART OF THE SYSTEM-
CABLE & DISCS
1-Piece, 2-Piece, Coated or Uncoated
Ultra-Flexible, High-Tensile Strength,
Durable Stainless Steel Cable.

Various Layout Designs Available





All Systems Customized to Your Specifications

Slow Speeds (VFD controlled) Fight Degradation and Separation!

MODEL 9605HBT

notes

CUSTOMER: The Bratney Companies
ORDER #: 63389
PROJECT: Base Camp Brewing

LOCATION: Portland, OR

Prepared by: AMG

DATE: 8/20/2014

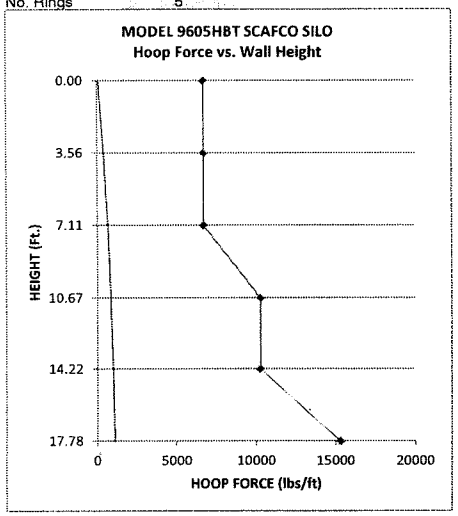
Approved by: MCH

Conforms to AISI S100-2007

W	D	μ	k
52	9	0.37	0.500

No. Rings 5

H+H1	H	T1, lb/in H.FORCE	T1, lb/ft H.FORCE	lb/in WALL D.L.	T2, lb/in Drawdown GL	lb/in D.L.+G.L.	WALL GA	RING NUM	WALL t, in	Allowable TENSION	Drawdown Stress, psi	Stiff Comp LL+GL	Multi Vert. Seam
0.80	0.00	8	90	0.00	0	0	20	6	0.034	6,713	7	0.50	1X3/8
4.35	3.56	36	428	0.45	7	7	20	5	0.034	6,713	199	0.50	1X3/8
7.91	7.11	57	680	1.35	20	22	20	4	0.034	6,713	600	0.50	1X3/8
11.46	10.67	72	869	3.40	39	43	17	3	0.052	10,267	758	0.50	1X3/8
15.02	14.22	84	1,009	6.12	62	68	17	2	0.052	10,267	1,199	0.50	1X3/8
18.58	17.78	93	1,114	10.85	88	99	14	1	0.072	15,309	1,226	0.50	1X3/8



SINGLE VERTICAL SEAM	
No. Stiffeners / W/S	2

Silo Body Height	17.78	feet
No. Stiffeners = N	6	
No. Columns = N	6	
Aspect Ratio (h/d) =	1.98	

Discharge Height	3.33	feet
Hopper Angle	60	degrees
Discharge Opening	22	inches

Silo Contents	1,334	ft^3
	1,147	bushels
	37.77	m^3

Hopper Height	6.21	feet
Height to Silo = H2	9.54	feet
Total Eave Height	27.32	feet

Silo Dead Weight	3.74	kips

Silo Contents Dead Weight	69.37	kips
W = Silo Dead + Contents	73.11	kips

Roof Loading Information

Roof Live Load	16.00	psf
Roof Dead Load	3.52	psf
Roof Peak Load	2,000	lbs

Calculate Stiffener Compression due to Roof Loads

Stiff. Comp. due to Roof Dead Load	0.04	kips
Stiff. Comp. due to Live Load	0.50	kips
Stiff. Comp. due to Roof Load (DL+LL)	0.54	kips

OK

OK

FIX COLUMN AND SELECT CROSS BRACE

OK

Access Doors	Quant.
Access Door 23 1/2" x 26"	0

Standard Sets of Wind Ring

EH			Silo Dia 12'-36'
0	≤ EH ≤	61	0
62	≤ EH ≤	71	1
72	≤ EH ≤	75	2
76	≤ EH ≤	85	3
86	≤ EH ≤	100	4
101	≤ EH ≤	121	5
Number of Wind Rings Req.			0

Calculate Seismic Loads for Seismic Zone = 2B

Lateral Seismic Force about center of gravity of stored material				
Description	Equation	Result		
h_n	h_n = Sum A_y / Sum A	16.978	feet	
Seismic Zone Factor	Z	0.20		
Total Design Base Shear	$V = C_v I W / R T$	60.28	kips	UBC (30-4)
Design Base Shear Need Not Exceed	$V = 2.5 C_a I W/R$	17.65	kips	UBC (30-5)
Design Base Shear Need Not Be Less	$V = 0.11 C_a I W$	2.25	kips	UBC (30-6)
Design Base Shear for Zone 4	$V = 0.8 Z N_v I W / R$	4.03	kips	UBC (30-7)
Total Design Base Shear	$V = 0.56 C_a I W$	11.46	kips	UBC (34-2)
Total Base Shear Zone 4 Min	$V = 1.6 Z N_v I W / R$	8.07	kips	UBC (34-3)

N_a	1.0	
N_v	1.0	
C_a	0.28	
C_v	0.40	
R_o	2.9	
C_t	0.020	

Structure Period	$T=Ct(h_n)^{3/4}$	0.17	UBC (30-8)
Importance Factor	I	1.0	
Redundancy Factor =	p	1.0	UBC 1634.1.2
Earthquake Load =	E_v	0	

Seismic Zone Table			
Zone	Z Factor	C_v	C_a
1	0.075	0.18	0.12
2A	0.15	0.32	0.22
2B	0.20	0.40	0.28
3	0.30	0.54	0.36
4	0.40	0.64 x Nv	0.44 x Na

Lateral Seismic Force about center of gravity of stored material				
Total Design Base Shear	V	17.65	kips	
Total Lateral Seismic Force	$E = p E_h + E_v$	17.65	kips	UBC (30-5) Controls Design
Earthquake Load	E = E / 1.4	12.60	kips	UBC 1612.3.1
Overturning Moment	$M_{ot} = E h_n$	214.00	foot-kips	
Resisting Moment	$M_{res} = W (D / 2)$	328.98	foot-kips	
Overturning Safety Factor	$SF = M_{res} / M_{ot}$	1.54		
Seismic Comp. / Stiffener	$(4 M_{ot}) / (N D)$	15.85	kips	Gaylord & Gaylord 23-6 (18)
Shear / Stiffener (Seismic Shear)	E / N	2.10	kips	
Tens. / Stiffener (Seismic Uplift)	$-(W / n) + 4 M_{ot} / N D$	3.67	kips	Gaylord & Gaylord 23-6 (18)

Calculate Wind Load on Enclosure

Wind Speed	90	mph
Exposure	C	
C_e	0.8	
q_s	20.80	
Structure type	V	
I_w	1	

Diameter	9	feet
Eave Height	27.32	feet
Roof Pitch	30	degrees
Roof Rise	2.60	feet
Discharge Ht.	3.33	feet
Hopper Height	6.21	feet

$F_{w\ Total}$	$F_{w\ (walls)} + F_{w\ (Roof)} + F_{w\ (Hopper)}$	4.55	kips
$M_{ot\ Total}$	$M_{ot\ (walls)} + M_{ot\ (Roof)} + M_{ot\ (Hopper)}$	73.25	foot-kips
Wind Comp. / Stiffener	$(4 M_{ot}) / (N D)$	5.43	kips
Shear / Stiffener (Wind Shear)	F_w / N	0.76	kips
Tens. / Stiffener (Wind Uplift)	$-(W / n) + 4 M_{ot} / N D$	0.00	kips

SEISMIC SHEAR CONTROLS ANCHOR DESIGN
SEISMIC OVERTURNING CONTROLS ANCHOR DESIGN

Wind Force Calculations Table 1

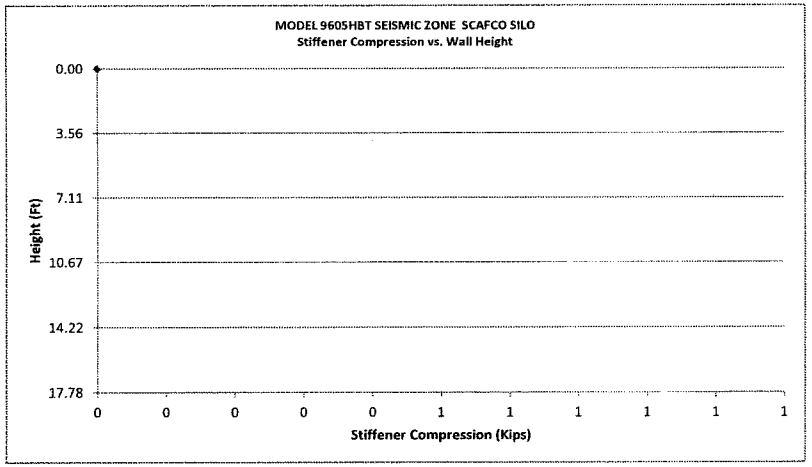
Height		Combined Height, Exposure, Gust Factor	Design Wind Pressure	Wind Force Walls	Wind Force Roof	Wind Force Hoper	Overturning Moment Walls	Overturning Moment Roof	Overturning Moment hopper
h_1	h_2	C_e	P (PSF)	$F_{w\ (wall)}$	$F_{w\ (roof)}$	$F_{w\ (hopper)}$	$M_{ot\ (wall)}$	$M_{ot\ (roof)}$	$M_{ot\ (hopper)}$
0	15	1.06	17.64	2.38	0.00	0.59	17.859	0.000	2.62
15	20	1.13	18.80	0.85	0.00	0.00	14.808	0.000	0.00
20	25	1.19	19.80	0.89	0.00	0.00	20.049	0.000	0.00
25	30	1.23	20.47	0.43	0.24	0.00	11.168	6.744	0.00
30	40	1.31	21.80	0.00	0.00	0.00	0.000	0.000	0.00
40	60	1.43	23.80	0.00	0.00	0.00	0.000	0.000	0.00
60	80	1.53	25.46	0.00	0.00	0.00	0.000	0.000	0.00
80	100	1.61	26.79	0.00	0.00	0.00	0.000	0.000	0.00
120	140	1.67	27.79	0.00	0.00	0.00	0.000	0.000	0.00
140	160	1.79	29.79	0.00	0.00	0.00	0.000	0.000	0.00
TOTALS				4.55 kips			73.25 foot-kips		

Equations Used in Table		
	$P = C_e C_q q_s I_w$ UBC (20-1)	From UBC 97 Division III
	$F_w = P A$	
	$M_{ot} = F_w y$	

Description	Equation	Seismic			Wind			
Bolt Type	F1554 Gr 36, Gr 55, or Gr 105	F1554 Gr 36	F1554 Gr 55	F1554 Gr 105	F1554 Gr 36	F1554 Gr 55	F1554 Gr 105	
Quant. of Anchor Bolts per Baseplate	# of Bolts	1	1	1	1	1	1	quantity
Shear / Anchor	Shear per Stiff. / # of Bolts	2.10	2.10	2.10	0.76	0.76	0.76	kips
Required Diameter of Anchor Bolt (Shear)	(4 (Shear per Stiff.) / (Fv π))1/2	0.521	0.458	0.355	0.313	0.275	0.213	inches
DIAMETER TO USE -->	Bolt Diameter	3/4	3/4	3/4	3/4	3/4	3/4	inches
Shear Area furnished	(π / 4) D2 (# of Bolts)	0.44	0.44	0.44	0.44	0.44	0.44	in2
fv	Shear / Area	4.76	4.76	4.76	1.71	1.71	1.71	ksi
Allowable Tensile Stress	Ft = 24.94 - 1.8 fv < 20 or Ft = 0.43 Fu - 1.8 fv < 0.33 Fu	16.38	23.69	41.25	20.00	24.75	41.25	ksi
Tension / Anchor	-(W' / n) + 4 Mot / N D or D / N + (Wind Comp. / Col.)	3.67	3.67	3.67	0.00	0.00	0.00	kips
Allowable Tension on Anchor Bolts	A F'nt	5.47	7.91	13.78	6.68	8.27	13.78	kips
Bolt Stress Check	OK or NO !!!	OK	OK	OK	OK	OK	OK	

	Bolt Type	Quantity (#)	Diameter (in)
Summary of Bolt Calcs	F1554 Gr 36	1	3/4
	F1554 Gr 55	1	3/4
	F1554 Gr 10	1	3/4

Depth H	DL	LL+GL	Seismic Comp. SL	Compression DL + 0.75*(LL+GL+SL)	Stiff.	Allow. Comp.
Feet	kips	kips	kips	kips	Gauge	kips



STIFFENER SPECIFICATIONS & ALLOWABLE LOADS

Gauge	t	A	I_x	r_x	Allow. Comp	S_x	F_y	I_y	r_y	S_y	In Use?
	inches	sq. in.	in^4	inch	kips	in^3	ksi	in^4	inch	in^3	Yes / No
18M	0.046	0.713	1.169	1.281	13.47	0.69	50.0	6.48	3.0151	1.294	No
17M	0.052	0.806	1.319	1.279	17.54	0.82	50.0	7.33	3.0153	1.4622	No
16M	0.058	0.899	1.468	1.278	21.41	0.86	57.0	8.18	3.0157	1.6304	Yes
15M	0.064	0.992	1.618	1.277	25.03	1.00	57.0	9.02	3.0161	1.7982	No
14M	0.072	1.115	1.814	1.276	35.05	1.06	57.0	10.12	3.013	2.016	Yes
13M	0.088	1.357	2.206	1.275	40.74	1.29	57.0	12.24	3.0031	2.4398	No
12M	0.102	1.568	2.544	1.274	52.31	1.49	57.0	14.09	2.9971	2.8087	Yes
11M	0.116	1.779	2.88	1.273	56.32	1.77	57.0	15.91	2.9908	3.1719	No
10M	0.130	1.993	3.214	1.270	66.25	1.88	57.0	17.85	2.9921	3.552	Yes
9M	0.148	2.269	3.639	1.267	76.37	2.12	57.0	20.32	2.9926	4.0361	Yes
7M	0.171	2.622	4.285	1.2783	86.56	2.49	57.0	23.11	2.9685	4.6009	Yes
5M	0.200	3.067	4.916	1.266	100.17	2.84	57.0	27.01	2.968	5.3832	Yes
3M	0.220	3.352	5.33	1.2609	106.16	3.08	57.0	29.20	2.9515	5.8417	No
7M+14M	0.243	3.736	6.173	1.2853	122.77	3.44	57.0	33.14	2.9784	6.5027	Yes
7M+13M	0.259	3.979	6.575	1.2856	123.51	3.65	57.0	35.25	2.9764	6.9182	No
7M+12M	0.273	4.190	6.924	1.2855	140.50	3.82	57.0	37.08	2.9748	7.2769	Yes
7M+11M	0.287	4.405	7.268	1.285	139.35	3.99	57.0	38.88	2.9725	7.6296	No
7M+10M	0.301	4.615	7.612	1.2843	155.31	4.17	57.0	40.80	2.9734	7.9929	Yes
7M+8M	0.319	4.891	8.048	1.283	164.92	4.39	57.0	43.27	2.9744	8.4582	Yes
7M+7M	0.342	5.244	8.609	1.281	176.67	4.67	57.0	46.46	2.9764	9.0408	Yes
5M+7M	0.372	5.688	9.247	1.275	190.95	5.03	57.0	50.36	2.9755	9.8014	Yes
3M+7M	0.392	5.995	9.670	1.270	189.85	5.26	57.0	53.06	2.97	10.326	No
5M+5M	0.400	6.133	9.878	1.269	194.22	5.34	57.0	54.33	2.9762	10.604	No
3M+5M	0.440	6.440	10.302	1.265	203.93	5.58	57.0	57.03	2.9759	11.108	No
3M+3M	0.480	6.757	10.73	1.260	213.98	6.34	57.0	60.05	2.981	11.681	No
(2)7M+12M	0.444	6.816	11.26	1.286	230.17	5.87	57.0	60.56	2.9808	11.711	Yes
5M+7M+13M	0.459	6.987	11.655	1.288	221.26	6.13	57.0	61.62	2.9615	11.865	No
(2)7M+10M	0.472	7.239	12.01	1.288	244.80	6.19	57.0	64.16	2.977	12.38	Yes
(2)7M+8M	0.490	7.469	12.41	1.289	252.69	6.36	57.0	66.17	2.9766	12.74	Yes
(3)7M	0.513	7.866	13.23	1.297	267.31	6.71	57.0	69.10	2.964	13.351	Yes
5M+(2)7M	0.542	8.311	13.89	1.293	281.77	7.07	57.0	73.01	2.964	14.106	Yes
3M+(2)7M	0.562	8.617	14.32	1.289	272.88	8.06	57.0	75.70	2.964	14.627	No
(2)5M+7M	0.571	8.757	14.51	1.287	296.01	7.39	57.0	77.02	2.9658	14.881	Yes
(3)5M	0.600	9.200	15.190	1.285	310.59	7.68	57.0	80.86	2.97	15.635	Yes
(2)3M+7M	0.611	9.371	15.36	1.280	296.75	7.83	57.0	82.48	2.9668	15.936	No
(2)3M+5M	0.640	9.814	16.043	1.279	310.78	8.13	57.0	86.32	2.966	16.69	No
(3)3M	0.660	10.120	16.44	1.275	320.47	8.10	57.0	90.25	2.9864	17.23	No

HOOP STRENGTH OF SCAFCO CORRUGATED GALVANIZED STEEL WALL SHEETS Fu (17-20 Ga) 65.0 Fu (14-16 Ga) 70.0 Fu (5-13 Ga) 75.0

Wall Sheet Gauge	Design	Yield Stress	Wall Sheet Allowable Hoop Tension	Sgl. Row 3/8" Bolt Allow.	Dbl.Row 3/8' Bolt Allow.	Dbl. Row 7/16" Bolt Allow.	Tpl. Row 7/16" Bolt Allow.	Quad. Row 7/16" Bolt Allow.	Five Row 7/16" Bolt Allow.	Six Row 7/16" Bolt Allow.	(7) Row 7/16" Ø Allow.	(8) Row 7/16" Ø Allow.	In Use?	
	t	Fy = ksi	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Lb/Foot	Yes / No	
20	0.034	45.0	8469	6713	13426	15663	23495	31327	39158	46990	54822	62654	Yes	CREST AND VALLEY VERTICAL SEAM PUNCHING
19	0.041	50.0	11347	8095	16190	18888	28332	37776	47220	56665	66109	75553	Yes	
18	0.046	50.0	12731	9082	18164	21192	31787	42383	52979	63575	74171	84767	Yes	
17	0.052	50.0	14391	10267	20534	23956	35934	47912	59889	71867	83845	95823	Yes	
16	0.058	57.0	18299	12332	24665	28775	43163	57551	71938	86326	100713	115101	Yes	
15	0.064	57.0	20192	13608	27216	31752	47628	63504	79380	95256	111132	127008	Yes	
14	0.072	57.0	22716	15309	30618	35721	53582	71442	89303	107163	125024	142884	Yes	
13	0.088	57.0	27764	20048	40095	46778	70166	93555	116944	140333	163721	187110	Yes	
12	0.102	57.0	32182	23237	46474	54219	81329	108439	135548	162658	189768	216878	Yes	
11	0.116	57.0	36599	26426	52853	61661	92492	123323	154153	184984	215814	246645	Yes	
10	0.130	57.0	41016	29616	59231	69103	103655	138206	172758	207309	241861	276413	Yes	
8	0.148	57.0	46695	29821	59641	78671	118007	157343	196678	236014	275349	314685	Yes	
7	0.171	57.0	53951	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
~~5~~	~~0.200~~	~~57.0~~	~~63101~~	~~29821~~	~~59641~~	~~81178~~	~~121767~~	~~162357~~	~~202946~~	~~243535~~	~~284124~~	~~324713~~	~~No~~	
~~2x12~~	~~0.204~~	~~57.0~~	~~57927~~	~~29821~~	~~59641~~	~~81178~~	~~121767~~	~~162357~~	~~202946~~	~~243535~~	~~284124~~	~~324713~~	~~No~~	
2x11	0.232	57.0	~~65877~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x10	0.260	57.0	~~73828~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x8	0.296	57.0	~~84051~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
~~3x12~~	~~0.306~~	~~57.0~~	~~86890~~	~~29821~~	~~59641~~	~~81178~~	~~121767~~	~~162357~~	~~202946~~	~~243535~~	~~284124~~	~~324713~~	~~No~~	
2x7	0.342	57.0	~~97113~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x11	0.348	57.0	~~98816~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x10	0.39	57.0	~~110742~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
~~2x5~~	~~0.4~~	~~57.0~~	~~113582~~	~~29821~~	~~59641~~	~~81178~~	~~121767~~	~~162357~~	~~202946~~	~~243535~~	~~284124~~	~~324713~~	~~No~~	
3x8	0.444	57.0	~~126076~~	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
~~3x7~~	~~0.513~~	~~57.0~~	~~145669~~	~~29821~~	~~59641~~	~~81178~~	~~121767~~	~~162357~~	~~202946~~	~~243535~~	~~284124~~	~~324713~~	~~No~~	
20C	0.034	50.0	9410	6713	13426	15663	23495	31327	39158	46990	54822	62654	Yes	CREST ONLY VERTICAL SEAM PUNCHING
19C	0.041	50.0	11347	8095	16190	18888	28332	37776	47220	56665	66109	75553	Yes	
18C	0.046	50.0	12731	9082	18164	21192	31787	42383	52979	63575	74171	84767	Yes	
17C	0.052	50.0	14391	10267	20534	23956	35934	47912	59889	71867	83845	95823	Yes	
16C	0.058	57.0	18299	11451	22903	26720	40080	53440	66800	80160	93520	106880	Yes	
15C	0.064	57.0	20192	12636	25272	29484	44226	58968	73710	88452	103194	117936	Yes	
14C	0.072	57.0	22716	14216	28431	33170	49754	66339	82924	99509	116093	132678	Yes	
13C	0.088	57.0	27764	17375	34749	40541	60811	81081	101351	121622	141892	162162	Yes	
12C	0.102	57.0	32182	20139	40277	46990	70485	93980	117475	140970	164465	187961	Yes	
11C	0.116	57.0	36599	22903	45806	53440	80160	106880	133599	160319	187039	213759	Yes	
10C	0.130	57.0	41016	25667	51334	59889	89834	119779	149723	179668	209613	239558	Yes	
8C	0.148	57.0	46695	29221	58442	68182	102273	136364	170454	204545	238636	272727	Yes	
7C	0.171	57.0	53951	29821	59641	78778	118166	157555	196944	236333	275721	315110	Yes	
5C	0.200	57.0	63101	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x12C	0.204	57.0	57927	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x11C	0.232	57.0	65877	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x10C	0.260	57.0	73828	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x8C	0.296	57.0	84051	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x12C	0.306	57.0	86890	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x7C	0.342	57.0	97113	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x11C	0.348	57.0	98816	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x10C	0.39	57.0	110742	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
2x5C	0.4	57.0	113582	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	
3x8C	0.444	57.0	126076	29821	59641	81178	121767	162357	202946	243535	284124	324713	Yes	

Note: Laminated Wallsheets are based on 90% Confidence Level for Laminated Connections

FALSE

Compression Ring Design	
Size	NONE
Height	0 inches

Fy (ksi) = 50

COMPRESSION RING RULES	DIA	MAX EH
DIAMETERS WITH NO COMP RING	15	
DIAMETERS THAT HAVE BOTH	18	7
	21	7
DIAMETERS WITH COMP RING	24	

Column Design				
Description	Result			
Size	12M			
Cross Brace Qty.	2			
Unbraced Length	4.77	feet	57.24	inches
Height	9.54	feet	114.48	inches
Height (Below Comp. Ring)	9.54	feet	114.48	inches

Allowable Column Compression Calculation			
Description	Equation	Result	
Radius of Gyration X direction	R_x	#N/A	inches
Radius of Gyration Y direction	R_y	#N/A	inches
Area	A	#N/A	in^2
Slenderness Ratio X direction	$(K L_u) / R_x$	#N/A	
Slenderness Ratio Y direction	$(K L_u) / R_y$	#N/A	
Column Design Parameter	C_c	107.00	
$((K L_u) / R) / C_c$	$((K L_u) / R) / C_c$	#N/A	
Column Design Parameter	C_a	#N/A	
Allowable Stress	$F_y C_a$	#N/A	ksi

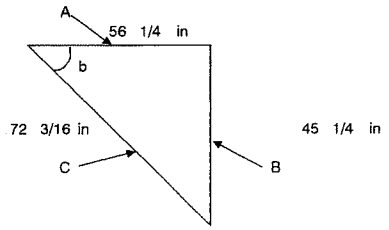
Allowable M style Leg Compression Calculation		
Description	Equation	Result
Rad. of Gyr. X direction	R_x	1.27
Rad. of Gyr. Y direction	R_y	3.00
Area	A	1.57
Slenderness Ratio X direction	$(K L_u) / R_x$	89.87
Slenderness Ratio Y direction	$(K L_u) / R_y$	19.10
Elastic Flexural Buckling Strength	$F_e = (\pi^2 E) / ((K L_u) / R_y)$	36.05
Column Slenderness Parameter	$\lambda_c = SQRT(F_y / F_e)$	1.26
Nominal Flexural Buckling Stress	$F_n = ((0.658)^{(\lambda_c^2)}) F_y$	29.41
	$F_n = ((0.877) / (\lambda_c^2)) F_y$	31.61
Capacity	$P_n = A_e F_n / \Omega$	25.62

Load Calculations			
Description	Equation	Result	
Silo Dead Load	DL	3.74	kips
Live Load	$LL_{(Roof)}$	1.02	kips
Grain Load (Drawdown)	GL	69.37	kips
Total Vertical Load	(DL + LL + GL)	74.13	kips
Allowable Column Compression	$P_n = F_a A$	#N/A	kips
Vertical Load Per Column	(DL + LL + GL) / N	12.35	kips
Seismic Compression Per Colum	(4 Mot) / (N D)	15.85	kips
Total Load Per Column	Vertical Load + Seismic Compression	28.21	kips
Design Load Per Column	(DL + (0.75*(LL + GL + Seismic))	21.31	kips

LOADING INFORMATION		
Silo Dead Load	3,741	lbs
Roof Live Load	1,018	lbs
Silo Contents	69,366	lbs
Total Vertical Load	74,125	lbs
Total Load Per Leg	12,354	lbs
Total Vertical Load	56,529	lbs (factored)
Total Load Per Leg	9,422	lbs (factored)

Final Check									
	USE			12M					
Induced (Kips)	12.35	kips	OK	15.85	kips	OK	21.31	kips	OK
Allowable (Kips)	25.62	kips		25.62	kips		25.62	kips	

Cross Brace Design		
Earthquake Force	12.60	kips
Discharge Height	3.33	feet
Hopper Height	6.21	feet
Bin Diameter	9.00	feet
Set(s) of Cross Bracing	2	
Number of Columns	6	
Quantity of Cross Bracing	24	
Angle, b	38.81	degrees
Leg Height	9.54	feet
A	56.25	inches
B	45.24	inches
C	72.18	inches
$T_{NR} = 2E/Ncos(b)$	5.39	kips



Gaylord & Gaylord Red (8-27)

SINGLE ANGLE DESIGN

Selection	2" X 2" 12 GA brace with 2 1/2" Ø Bolts

Description	Equation	Result	
Size	Leg_1	#N/A	inches
Size	Leg_2	#N/A	inches
Cross Bracing Thickness	Gauge	#N/A	GA
Bolt Ø	Bolt Diameter	#N/A	inches
Hole Size Ø	Bolt Diameter + 1/16	#N/A	inches
Bolt Rows	Select	#N/A	rows
Bolt Type	ASTM A325 or SAE GR. 8.2	#N/A	
Allow Tensile Strength	$F_t = 0.6\ F_y$	#N/A	ksi
Req'd Area	$A_{req'd} = T_{NR} / F_t$	#N/A	in^2
Net Area Furnished	A	#N/A	in^2
Safety Factor	SF	#N/A	
Qty. of Bolts Req'd	# of Bolts Per Row	#N/A	
Radius of Gyration Z Direction	r_z	#N/A	in^3
Slenderness Ratio Z Direction	$(K L) / r_z$	#N/A	

Bolt Summary	Bolt Type	Quantity (#)	Dia. (in)	
	#N/A	#N/A	#N/A	#N/A

DOUBLE ANGLE DESIGN

Selection	2" X 2" 14 GA brace with 1 1/2" Ø Bolts

Description	Equation	Result	
Size	Leg_1	2	inches
Size	Leg_2	2	inches
Cross Bracing Thickness	Gauge	14	GA
Bolt Ø	Bolt Diameter	1/2	inches
Hole Size Ø	Bolt Diameter + 1/16	0.5625	inches
Bolt Rows	Select	1	rows
Bolt Type	ASTM A325 or SAE GR. 8.2	SAE GR. 8.2	
Allow Tensile Strength	$F_t = 0.6\ F_y$	34.2	ksi
Req'd Area	$A_{req'd} = T_{NR} / F_t$	0.158	in^2
Net Area Furnished	A	0.521	in^2
Safety Factor	SF	3.30	
Qty. of Bolts Req'd	# of Bolts Per Row	0.490	

Bolt Summary	Bolt Type	Quantity (#)	Dia. (in)	
	SAE GR. 8.2	1	1/2	OK

SINGLE CHANNEL DESIGN

Selection	3" X 1" 14 GA brace with 2 1/2" Ø Bolts

Description	Equation	Result	
Size	Leg_1	3	inches
Size	Leg_2	1	inches
Cross Bracing Thickness	Gauge	14	GA
Bolt Ø	Bolt Diameter	1/2	inches
Hole Size Ø	Bolt Diameter + 1/16	0.5625	inches
Bolt Rows	Select	2	rows
Bolt Type	ASTM A325 or SAE GR. 8.2	SAE GR. 8.2	
Allow Tensile Strength	$F_t = 0.6\ F_y$	34.2	ksi
Req'd Area	$A_{req'd} = T_{NR} / F_t$	0.158	in^2
Net Area Furnished	A	0.271	in^2
Safety Factor	SF	1.72	
Qty. of Bolts Req'd	# of Bolts Per Row	0.490	

Bolt Summary	Bolt Type	Quantity (#)	Dia. (in)	
	SAE GR. 8.2	2	1/2	OK

DOUBLE CHANNEL DESIGN

Selection	3" X 1" 14 GA brace with 2 1/2" Ø Bolts

Description	Equation	Result	
Size	Leg_1	3	inches
Size	Leg_2	1	inches
Cross Bracing Thickness	Gauge	14	
Bolt Ø	Bolt Diameter	1/2	inches
Hole Size Ø	Bolt Diameter + 1/16	0.5625	inches
Bolt Rows	Select	2	rows
Bolt Type	ASTM A325 or SAE GR. 8.2	SAE GR. 8.2	
Allow Tensile Strength	$F_t = 0.6\ F_y$	34.2	ksi
Req'd Area	$A_{req'd} = T_{NR} / F_t$	0.158	
Net Area Furnished	A	0.621	in^2
Safety Factor	SF	3.94	
Qty. of Bolts Req'd	# of Bolts Per Row	0.245	

Bolt Summary	Bolt Type	Quantity (#)	Dia. (in)	
	SAE GR. 8.2	2	1/2	OK

RESULTS

DESIGN:	Option	Safe	Size (in X in)			Gauge	Bolt Type	Bolt Ø (in)	Hole Ø (in)	Bolts	Rows	Area	Area	Weight
S. A. Trial	1	#N/A	#N/A	X	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
D. A. Trial	2	OK	2	X	2	14	SAE GR. 8.2	1/2	9/16	1	1	0.158	0.521	12
S. C. Trial	3	OK	3	X	1	14	SAE GR. 8.2	1/2	9/16	2	2	0.158	0.271	7
D. C. Trial	4	OK	3	X	1	14	SAE GR. 8.2	1/2	9/16	2	2	0.158	0.621	15

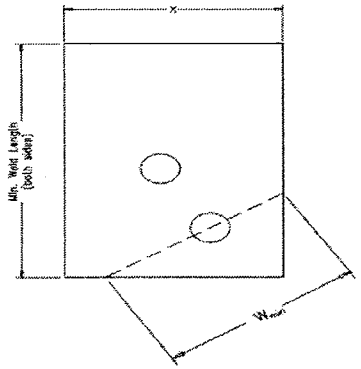
1

KNIFE PLATE DESIGN			
Description	Equation	Result	
Knife Plate Thickness	Gauge	0.5	GA
Fillet Weld Thickness	t	1/4	in
Width Perpendicular to Force	W	0.499	in
Min Width Perpendicular to Force	W_{min}	#N/A	in
Min Weld Length	WL_{min}	0.540	in

KNIFE PLATE DIMENSIONS			
Description	Equation	Result	
Minimum Knife Plate Width	X	#N/A	in
Minimum Knife Plate Height	Y	#N/A	in
Total Area	Area	#N/A	in^2
Knife Plate Weight	Weight	#N/A	lb

COLUMN ASSEMBLY WEIGHT			
Description	Equation	Result	
Column or Leg Weight	W	69.843	lbs
Knife Plate Weight	W	#N/A	lbs
Top Column Plates	W	9.349	lbs
Base Plate Weight	W	7.012	lbs

*HOLE PATTERN WILL CHANGE



CONNECTION PLATE DIMENSIONS			
Description	Equation	Result	
Minimum Connection Plate Width	X	#N/A	in
Minimum Connection Plate Height	Y	1.000	in
Connection Plate Thickness	t	0.500	in
Total Area	Area	#N/A	in^2
Connection Plate Weight	Weight	#N/A	lb

Cross Bracing & Knife Plate Summary				
Bracing				
Size	Gauge		Shape	
#N/A	#N/A		Single Angle	
Bolts				
Type	Rows	Quantity	Diameter	
#N/A	#N/A	#N/A	#N/A	
Knife Plate				
Gauge	Weld		$Weld\ Length_{min}$	
1/2"	1/4"		1"	

LOADING INFORMATION				
DEFINITION	US UNITS		METRIC UNITS	
SILO DEAD LOAD:	3.7	KIPS	1.7	MTON
OVERTURNING MOMENT DUE TO SEISMIC:	214	FT-KIPS	290	KN-M
OVERTURNING MOMENT DUE TO WIND:	73	FT-KIPS	99	KN-M
SEISMIC BASE SHEAR PER COLUMN:	2.10	KIPS	9.34	KN
WIND SHEAR PER COLUMN:	0.76	KIPS	3.37	KN
SEISMIC COMPRESSION PER COLUMN :	15.85	KIPS	70.51	KN
UPLIFT/TENSION PER BASEPLATE (SEISMIC) :	3.67	KIPS	16.31	KN
UPLIFT/TENSION PER BASEPLATE (WIND):	0.00	KIPS	0.00	KN
ANCHOR BOLT DIAMETER	3/4	INCHES	19.05	MM
ANCHOR BOLT QUANTITY	6	BOLTS	6	BOLTS
ANCHOR BOLTS PER BASEPLATE	1	BOLTS	1	BOLTS

SCAFCO GRAIN SYSTEMS COMPANY

By: AMG
Date: 8/20/2014
Subject: 9605HBT
Sheet 1 of 1
Job No. 63389

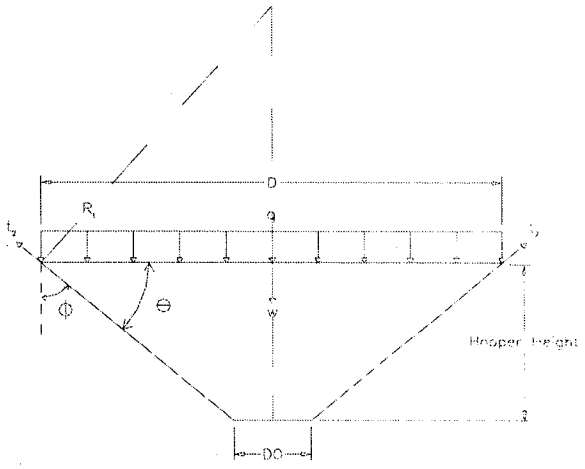
5400 E. Broadway Ave. - P.O. Box 11215 - Spokane, WA 99211 - U.S.A.
Telephone: (509) 535-1571 - Fax: (509) 535-9130 - E-Mail: mail@scafco.com - www.scafco.com

HOPPER DESIGN

Design suspended hopper bottom to carry full weight of bincontents. Use analysis method described in Structural Engineer's Handbook (Gaylord & Gaylord)

Bin Information

Description	Equation	Result	
Diameter of Tank	D	9	feet
Average Ht of Grain Above Hopper		18.58	feet
Mean Dia	D_{mean}	8.95	feet
Outlet Diameter	D_{outlet}	22	in.
Height of Bin Above Hopper	EH	17.78	feet
Material Density	W	52	pcf
Drawdown	DD	88	lb / in
Hopper Angle	θ	60	degrees
Outside Hopper Angle	φ	30	degrees
Hopper Height	H_{hopper}	6.17	feet
Estimated Hopper Weight	W	300	lbs
Height of Comp Ring	H_{cr}	114	inches



Hopper Calcs

Description	Equation	Result	
Radius at top of Cone	R_1	62.02	inches
Weight	$W = (\pi r^2 \rho) / 3 + W_{hopper}$	8687	lbs
Bottom Pressure	q = (Contents Wt - DD) / A	3.42	psi

$$t_2 = \frac{R_1}{2}\left(q + \frac{w}{\pi R_1 \cos^2 \varphi}\right)$$

$$q_n = q(k \cos^2\varphi + k \sin^2\varphi)$$

Description	Equation	Result	
Hopper Tension 2	t_2	136	lbs / in
Normal Bottom Pressure	$q_n = q\ (K \cos^2\theta + \sin^2\theta)$	2.14	psi
Hopper Tension 1	$t_1 = q_n R_1$	133	lb / in

Check Bolt Shear @ Hopper Panel Splices

Description	Equation	Result	
Max Force In Panel	$Max(T_1, T_2)$	136	lbs / in
Bolt Diameter	D	3/8	inches
Bolt Spacing	Distance	3 1/8	in O.C.
Hopper Gauge	Gauge	16	GA
Hopper Thickness	t	0.057	ksi
Steel Strength	F_y	57	ksi
Shear / Bolt	(Max Force) (Bolt Spacing)	0.42	kips
Allowable Bolt Shear	$A F_v$	3.09	kips
Bolt Stress Check	OK or NO !!!	OK	

Check Bolt Bearing @ Hopper Panel Splices

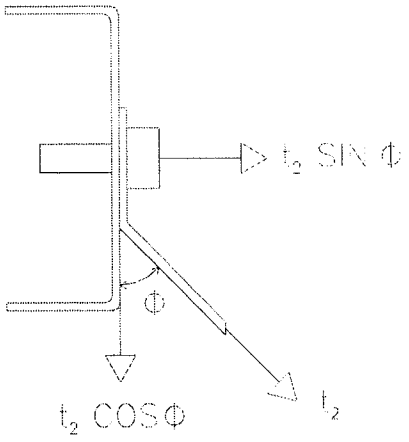
Description	Equation	Result	
ASD Design Coefficient	Ω	2.50	
Bearing Factor	C	3	
Modification Factor	m_f	0.750	
Diameter of Bolt	D	3/8	inches
Hopper Thickness	t	0.057	inches
Ultimat Panel Strength	F_u	70	ksi
Max Force in Panel	$Max(T_1, T_2)$ (Spacing)	0.424	kips / in
Panel Bearing Capacity	$C\ m_f\ d\ t\ F_u / \Omega$	1.35	kips / in
Bolt Stress Check	OK or NO !!!	OK	

Check Tension in Hopper Panels

Description	Equation	Result	
Max Force In Panel	Max(T_1 , T_2)	136	lbs / in
Hopper Gauge	Gauge	16	GA
Hopper Thickness	A_g / inch	0.057	inches
Steel Strength	F_y	57	ksi
Induced Tension Direction	Max(T_1 , T_2) / 1000	0.14	kips
Allowable Tension	$f_y = .6\ F_y$	1.949	in^2 / inch
Net Area	A_n	0.05	in^2 / inch
Ultimate Panel Strength	F_u	70	ksi
Induced Tension Direction	(Max Force) / (Bolt Spacing)	2.770	ksi
Allowable Tension	$F_a = .6\ F_y$	34.20	ksi
Bolt Stress Check	OK or NO !!!	OK	

Check Bolt Combined Shear and Tension @ Hopper to Bin Connection

Description	Equation	Result	
Hopper Tension 2	T_2	0.136	kips / in
Bolt Spacing	Distance	3 1/8	inches
Shear / Bolt	$V = T_2 \cos\varphi$ (Bolt Spacing)	0.37	kips / bolt
Required Diameter of Bolt (Shear)	$(4$ (Shear per Stiff.) $/ (F_v\ \pi))^{1/2}$	0.129	inches
DIAMETER TO USE -->	Bolt Diameter	3/8	inches
Shear Area furnished	$(\pi / 4)\ D^2$	0.11	in^2
Shear Stress	$f_v = V / A$	3.33	ksi
Allowable Tensile Stress	$F_{nt} = SQRT(54^2 - 3.75\ f_v^2)$	53.61	ksi
Tension / Anchor	$T_2 \sin\varphi$ (Bolt Spacing)	0.21	kips
Allowable Tension on Anchor Bolts	$A\ F'_m/\Omega$	2.09	kips
Bolt Stress Check	OK or NO !!!	OK	



Check Tension in Hopper Panels @ Hopper to Bin Connection

Description	Equation	Result	
Max Force In Panel	Max(T_1 , T_2)	136	lbs / in
Hopper Gauge	Gauge	16	GA
Hopper Thickness	A_g / inch	0.057	inches
Steel Strength	F_y	57.00	ksi
Induced Tension Direction	Max(T_1 , T_2) / 1000	0.14	kips
Net Area	A_n	0.05	in^2 / inch
Ultimate Panel Strength	F_u	70	ksi
Induced Tension Direction	(Max Force) / A_n	2.770	ksi
Allowable Tension	fy = .6 Fy	34.20	ksi
Bolt Stress Check	OK or NO !!!	OK	

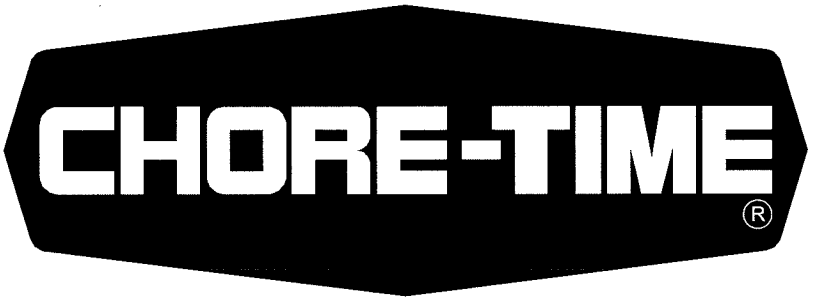
Check Bolt Bearing @ Hopper to Bin Connection

Description	Equation	Result	
ASD Design Coefficient	Ω	2.50	
Bearing Factor	C	3	
Modification Factor	m_f	0.750	
Diameter of Bolt	D	3/8	inches
Hopper Thickness	t	0.057	inches
Ultimat Panel Strength	F_u	70	ksi
Max Force In Panel	Max(T_1 , T_2)	0.424	kips / in
Panel Bearing Capacity	$C\ m_f\ d\ t\ F_u / \Omega$	1.35	kips / in
Bolt Stress Check	OK or NO !!!	OK	

Summary of Hopper Design

Hopper Panel		
Hopper Gauge	16	GA
Bolt Diameter	3/8	inch
Bolt Spacing	3 1/8	inches
Hopper To Comp Ring		
Bolt Diameter	3/8	inch
Bolt Spacing	3 1/8	inches

Reference Manual



FLEX-AUGER® Reference Manual

MODEL 55, 75, HMC, 90, & 108
MULTIFLO®
Drop Feeding
FLAG™

Reference Manual

May 2007

MA1922A

Chore-Time Warranty

Chore-Time Poultry Production Systems, a division of CTB, Inc., ("Chore-Time"), warrants each new CHORE-TIME® product manufactured by it to be free from defects in material or workmanship for one-year from and after the date of initial installation by or for the original purchaser. If such a defect is found by Chore-Time to exist within the one-year period, Chore-Time will, at its option, (a) repair or replace such product free of charge, F.O.B. the factory of manufacture, or (b) refund to the original purchaser the original purchase price, in lieu of such repair or replacement. Labor costs associated with the replacement or repair of the product are not covered by the Manufacturer.

Additional extended warranties for the equipment and/or systems listed below are provided to the original purchaser as follows (for all other CHORE-TIME® products purchased, the one-year warranty period shall apply):

1. TURBO® and RLX™ fans, less motors - 3 years
2. TURBO® fan fiberglass housings, polyethylene cones, and cast aluminum blades - for the life of the product
3. TURBO® fan motors and bearings - 2 years
4. TURBO® fan components (including plastic shutters) - 3 years
5. Poultry feeder pans that become unusable within five years from the date of installation - Warranty prorated after three years usage
6. Rotating centerless augers, excluding applications involving high moisture feed stuffs (exceeding 18%), for ten years from the date of installation. Note: MULTIFLO® and applications involving high moisture feed stuffs are subject to a one-year warranty
7. Chore-Time manufactured roll-formed steel auger tubes for ten years from the date of installation
8. ULTRAFLO® Breeder Feeding System auger and feed trough are warranted for a period of five years from the date of original installation against repeated breakage of the auger or wear-through of the feed trough caused solely by the auger
9. ULTRAPAN® Feeding System augers are warranted for a period of five years from the date of installation

CONDITIONS AND LIMITATIONS

1. The product must be installed by and operated in accordance with the instructions published by the Manufacturer or Warranty will be void.
2. Warranty is void if all components of the system are not original equipment supplied by the Manufacturer.
3. This product must be purchased from and installed by an authorized distributor or certified representative thereof or the Warranty will be void.
4. Malfunctions or failure resulting from misuse, abuse, negligence, alteration, accident, or lack of proper maintenance shall not be considered defects under the Warranty.
5. This Warranty applies only to systems for the care of poultry and livestock. Other applications in industry or commerce are not covered by this Warranty.

Chore-Time shall not be liable for any consequential or special damage which any purchaser may suffer or claim to suffer as a result of any defect in the product. "Consequential" or special damages" as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost orders, lost income, increased overhead, labor and incidental costs and operational inefficiencies.

THIS WARRANTY CONSTITUTES THE MANUFACTURER'S ENTIRE AND SOLE WARRANTY AND THIS MANUFACTURER DISCLAIMS ANY AND ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSES SOLD AND DESCRIPTION OR QUALITY OF THE PRODUCT FURNISHED HEREUNDER.

Chore-Time Distributors are not authorized to modify or extend the terms and conditions of this Warranty in any manner or to offer or grant any other warranties for Chore-Time products in addition to those terms expressly stated above.

An officer of CTB, Inc. must authorize any exceptions to this Warranty in writing. Chore-Time reserves the right to change models and specifications at any time without notice or obligation to improve previous models.

Effective: **July 2004**

Chore-Time Poultry Production Systems
A division of CTB, Inc.
410 N. Higbee Street • Milford, Indiana 46542 • U.S.A.
Phone (574) 658-4101 • Fax (877) 730-8825
E-mail: ctb@ctbinc.com • Internet: www.choretimepoultry.com

Thank You

The employees of Chore-Time would like to thank your for your recent Chore-Time purchase. If a problem should arise, your Chore-Time distributor can supply the necessary information to help you.

*Chore-Time Poultry Feeder Pan Pro Rata Schedule

Year from date of installation during which pan becomes unusable	Charge to be paid by the purchaser for replacement.
0 - 1 years	NO CHARGE
1 - 2 years	NO CHARGE
2 - 3 years	NO CHARGE
3 - 4 years	4/10 of then current list price
4 - 5 years	5/10 of then current list price

Contents

About This Manual

The intent of this manual is to help you in two ways. One is to follow step-by-step in the order of assembly of your product. The other way is for easy reference if you have questions in a particular area.

Important: Read ALL instructions carefully before starting construction.

Important: Pay particular attention to all SAFETY information.

- *Metric measurements are shown in millimeters and in brackets, unless otherwise specified.* " " " equals inches and " ' " equals feet in English measurements.
  Examples:
  1" [25.4]
  4' [1 219]

- Optional equipment contains necessary instructions for assembly or operation.

- Very small numbers near an illustration (*i.e.*, 1257-48) are identification of the graphic, not a part number.

Note: The original, authoritative version of this manual is the English version produced by CTB, Inc. or any of its subsidiaries or divisions, (hereafter collectively referred to as "CTB"). Subsequent changes to any manual made by any third party have not been reviewed nor authenticated by CTB. Such changes may include, but are not limited to, translation into languages other than English, and additions to or deletions from the original content. CTB disclaims responsibility for any and all damages, injuries, warranty claims and/or any other claims associated with such changes, inasmuch as such changes result in content that is different from the authoritative CTB-published English version of the manual. For current product installation and operation information, please contact the customer service and/or technical service departments of the appropriate CTB subsidiary or division. Should you observe any questionable content in any manual, please notify CTB immediately in writing to: CTB Legal Department, P.O. Box 2000, Milford, IN 46542-2000 USA.

Safety Information

Caution, Warning and Danger Decals have been placed on the equipment to warn of potentially dangerous situations. Care should be taken to keep this information intact and easy to read at all times. Replace missing or damaged safety decals immediately.

Using the equipment for purposes other than specified in this manual may cause personal injury and/or damage to the equipment.

Safety–Alert Symbol

This is a safety–alert symbol. When you see this symbol on your equipment, be alert to the potential for personal injury. This equipment is designed to be installed and operated as safely as possible...however, hazards do exist.

Understanding Signal Words

Signal words are used in conjunction with the safety–alert symbol to identify the severity of the warning.

DANGER indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, MAY result in minor or moderate injury.

Safety Instructions

Follow Safety Instructions

Carefully read all safety messages in this manual and on your equipment safety signs. Follow recommended precautions and safe operating practices.

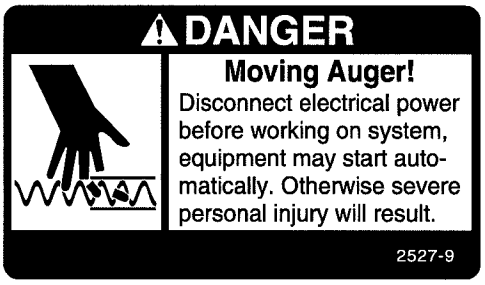
Keep safety signs in good condition. Replace missing or damaged safety signs.

Decal Descriptions

DANGER: Moving Auger

This decal is placed on the Panel Weldment.

Severe personal injury will result, if the electrical power is not disconnected, prior to servicing the equipment.



DANGER: Electrical Hazard

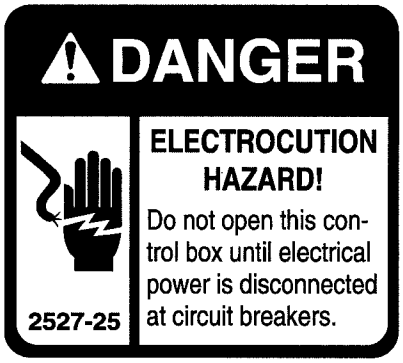
Disconnect electrical power before inspecting or servicing equipment unless maintenance instructions specifically state otherwise.

Ground all electrical equipment for safety.

All electrical wiring must be done by a qualified electrician in accordance with local and national electric codes.

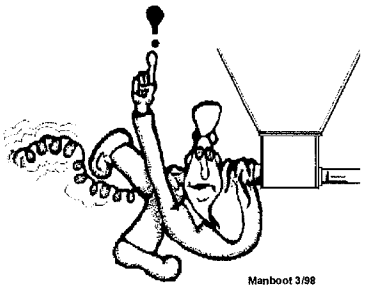
Ground all non-current carrying metal parts to guard against electrical shock.

With the exception of motor overload protection, electrical disconnects and over current protection are not supplied with the equipment.



CAUTION:

Use caution when working with the Auger—springing Auger may cause personal injury.



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The absence of a registered trademark, trademark, service mark or logo from this list does not constitute a waiver of CTB's trademark or other intellectual property rights concerning that mark or logo.

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ACCUTROL®
AGRI-TIME & DESIGN®
ALL-OUT®
C-CENTRAL™
C-COLLECT®
CHORE-TIME & DESIGN®
CHORE-TIME®
CHORE-TRONICS & DESIGN®
CHORE-TRONICS®
CTB & DESIGN®
CTB®
DURA-THERM™
E-Z START®
FLEX AUGER & DESIGN®
FLEX-AUGER®
HYFLO®
LEADERSHIP THROUGH INNOVATION®
LINEAR-LIFT™
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MEAL-TIME™
MODEL 2000™
MODEL ATF™
MODEL ATF™ PLUS
MODEL C2M™
MODEL C2®
MODEL C2® PLUS
MODEL C™
MODEL G™
MODEL G™ PLUS
MODEL H2™
MODEL H2™ PLUS
MULTI-LIFT®
MULTI-MODEL™
MULITFLO®
PDS™
PRODUCT LEADERSHIP™
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REVOLUTION®
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SHAKER-PLATE®
SHUR-LOCK®
SMART SM
SNAP-TOP™
SUPER 6™
SUPER-LIFT™
SUPER-SELECTOR®
SUPER-VISOR®
TURBO-COOL™
TURBO®
ULTRA-HP™
ULTRA-JET™
ULTRA-RAY®
ULTRA-RAY® HI-BEAM
ULTRA-RAY® LITE-BEAM
ULTRA-RAY® PLUS
ULTRA-VECTION™
ULTRAFLO®
ULTRAPAN®
VANGUARD™
VANGUARD™ PLUS
VOLUMATIC™
WEIGH-MATIC®

Livestock and Poultry Feed Consumption

Poultry

Poultry applications use automatic feeding systems sized for the building density. The FLEX-AUGER® feed delivery system's delivery rate should be sized to match or exceed the sum of the delivery rates of the automatic feeders supplied.

CHORE-TIME® Floor Feeding System	Delivery Rates
MODEL C2, C2 PLUS, H2, H2 PLUS, G and G PLUS with 216 RPM Power Unit	10.8 lbs or 4.89 kg/min.*
MODEL C2, C2 PLUS, H2, H2 PLUS, G and G PLUS with 348 RPM Power Unit	17.0 lbs or 7.71 kg/min.*
MODEL ATF	18.0 lbs or 8.16 kg/min.*
Pan Breeder Feeder System	35.0 lbs or 15.87 kg/min.*
ULTRAFLO Breeder Feeder (per Hopper)	52.0 lbs or 23.58 kg/min.*
ULTRAPAN Feeding System (per Hopper)	50.0 lbs or 22.68 kg/min.*

*Based on 40lbs/ft^3 density (64 kg/m^3)

Hogs

Live weight-lbs/Hog	Total Average Daily Feed-lbs/Head
10-25 (4.5-11.3 kg)	1.2 (.54 kg)
25-50 (11.3-22.7 kg)	2.5 (1.13 kg)
50-75 (22.7-34 kg)	4.0 (1.81 kg)
75-125 (34-56.7 kg)	5.2 (2.35 kg)
125-175 (56.7-79.4 kg)	6.7 (3.04 kg)
175-225 (79.4-102 kg)	7.8 (3.54 kg)
Gestating Sows	5.0 (2.26 kg)

Dairy

Milk/Cow/Day-lbs Average	Concentrates*/Cow/Day-lbs Average
30 (13.61 kg)	10 (4.53 kg)
50 (22.68 kg)	20 (9.07 kg)
70 (31.75 kg)	30 (13.61 kg)
80 (36.28 kg)	40 (18.14 kg)

TO DETERMINE THE RUNNING TIME PER DAY - Multiply the number of animals by the feed consumption/ head (figures from the charts) to get total feed consumption.

Divide total feed consumption by the stated delivery rate of the FLEX-AUGER feed delivery system to get running time per day in minutes. Divide this by 60 to get running time per day in hours.

Fill System Power Unit Selection Guide

230 V, 60 Hz, Single Phase Power Units						
	Model 75 Fill System			Model 90 Fill System		
No. of FLAG™ Lines	348 RPM Maximum Length			348 RPM Maximum Length		
	80'*[24 m]*	150'*[46 m]*	200'*[61 m]*	30'*[9 m]*	90'*[27 m]*	150'*[46 m]*
2	3259-51	3259-52	3259-49	---	---	---
3	3259-51	3259-52	3259-49	---	---	---
4	3259-51	3259-52	3259-49	---	---	---
5	---	---	---	3259-51	3259-52	3259-49
6	---	---	---	3259-51	3259-52	3259-49

230/460 V, 60 Hz, Three Phase Power Units						
	Model 75 Fill System			Model 90 Fill System		
No. of FLAG™ Lines	348 RPM Maximum Length			348 RPM Maximum Length		
	80'*[24 m]*	150'*[46 m]*	200'*[61 m]*	30'*[9 m]*	90'*[27 m]*	150'*[46 m]*
2	3259-119	3259-119	3259-117	---	---	---
3	3259-119	3259-119	3259-117	---	---	---
4	3259-119	3259-119	3259-117	---	---	---
5	---	---	---	3259-119	3259-119	3259-117
6	---	---	---	3259-119	3259-119	3259-117

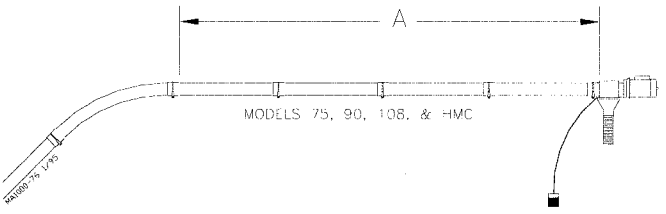
220 V, 50 Hz, Single Phase Power Units						
	Model 75 Fill System			Model 90 Fill System		
No. of FLAG™ Lines	348 RPM Maximum Length			348 RPM Maximum Length		
	80'*[24 m]*	150'*[46 m]*	200'*[61 m]*	30'*[9 m]*	90'*[27 m]*	150'*[46 m]*
2	3259-88	3259-88	3259-89	---	---	---
3	3259-88	3259-88	3259-89	---	---	---
4	3259-88	3259-88	3259-89	---	---	---
5	---	---	---	3259-87	3259-88	3259-89
6	---	---	---	3259-87	3259-88	3259-89

220/380 V, 50 Hz, Three Phase Power Units						
	Model 75 Fill System			Model 90 Fill System		
No. of FLAG™ Lines	348 RPM Maximum Length			348 RPM Maximum Length		
	80'*[24 m]*	150'*[46 m]*	200'*[61 m]*	30'*[9 m]*	90'*[27 m]*	150'*[46 m]*
2	3259-103	3259-104	3259-105	---	---	---
3	3259-103	3259-104	3259-105	---	---	---
4	3259-103	3259-104	3259-105	---	---	---
5	---	---	---	3259-103	3259-104	3259-105
6	---	---	---	3259-103	3259-104	3259-105

FLEX-AUGER® System

System Information

MODEL 55, 75, 90, HMC, and 108 FLEX-AUGER® Fill Systems (Standard)



All standard fill systems include enough components for horizontal length indicated. This is dimension "A" on the chart. For example: a 40' *[12 m]* length, order a Model 55, 75, 90, HMC, or 108-40 system. All standard systems, as referred to in system price assume use of a 30 degree boot (not included), and include a 348 rpm power unit, control unit, hopper level control, elbows, PVC tube, PVC cement, suspension kits, contactor (if needed) and auger adequate for a 45 degree incline, rising to a 9' *[2.7 m]* elevation.

Models 55 through 108 systems utilize 5' *[1.5 m]* radius elbows requiring the bin to be centered 12' *[3.7 m]* from the building. Adequate elbows are supplied for closer bin placement to a maximum of 60 degree incline (utilizing 30 degree boot).

For each additional 45 degree elbow ordered for Model 55-108 systems, 5' *[1.5 m]* additional auger is required. On all systems, for each 90 degree of additional elbow, decrease maximum line length for each power unit size by 30' *[9 m]*.

Extended Length Models 55 through 108 Systems

The extended length systems are supplied with adequate components to complete the system; including extension boot, 348 rpm power unit, PVC tube, PVC cement, suspension kits, and auger. Extended length systems require direct drive power units.

Boots

Select the correct boot for the system(s). All boots are shipped without a switch. If a switch is desired see component listing. Straight-out boots require 5' *[1.5 m]* additional auger and decrease maximum line length for each power unit size by 30' *[9 m]*.

Tandem Bin Systems

Where extra feed storage, or dual rations are required, CHORE-TIME recommends the straight-through tandem system, or 90 degree two motor tandem system. Tandem systems are available on Models 75, 90, HMC, &108 systems. For each straight-through tandem system (75, 90, HMC, & 108), decrease maximum line length for each power unit size by 50' *[15 m]*.

Feed Level Controls

Select the proper feed level control for the application. The control unit does have a safety switch. This switch is **ONLY** a back-up and **MUST** have a feed level control used with it.

Time Control

A timing device is recommended for all systems--set for slightly longer than normal running time. This will prevent excess operation with an empty auger and also protect against other malfunctions. See control listing for options such as the auger/safety timer.

High-Moisture Applications

The Model HMC and 108 systems can be used to convey higher moisture content feeds. THE SYSTEM IS NOT TO BE USED TO CONVEY ANY PRODUCT ABOVE 27% MOISTURE! Warranty on a system used to convey high-moisture feeds (feeds of 18-27% moisture content) is one year for the date of installation.

Feed Delivery Rates

The FLEX-AUGER® feed delivery systems have different delivery rates that should be matched to the requirements of the application.The system should be sized so the **MAXIMUM** operating time is four hours per day (24 hours).

TO DETERMINE THE OPERATION TIME PER DAY: Multiply the number of animals by the feed consumption/ head figures to get total feed consumption. Divide the total feed consumption by the stated delivery rate of the selected FLEX-AUGER delivery system to get operation time per day in minutes. Divide this by 60 to get the operation time per day in hours.

FLEX-AUGER®

System Specifications

System	Tube Diameter	Delivery Rate*	Feed Type	Max. Particle Size
MODEL 55	2-1/4" (55 mm)	15 lb/min (7 kg/min)	Mash, crumbles 18% moist. content	5/32" x 1/2" (4 mm x 13 mm)
MODEL 75	3" (75 mm)	50 lb/min (22 kg/min)	Mash, crumbles 18% moist. content	5/32" x 1/2" (4 mm x 13 mm)
MODEL 90	3-1/2" (90 mm)	100 lb/min (45 kg/min)	Mash, pellets, shelled corn 18% moist. content	3/16" x 1/2" (5 mm x 13 mm)
MODEL 108	4-1/2" (108 mm)	220 lb/min (100 kg/min)	High-moisture corn, small pellets, crumbles, mash 27% moist. content	3/16" x 1/2" (5 mm x 13 mm)
MODEL HMC	3-1/2" (90 mm)	50 lb/min (22 kg/min)	High-moisture corn, large pellets, crumbles, mash 27% moist. content	3/8" x 3/4" (10 mm x 20 mm)

***Conveying capacity is based on feed with 40 pounds per cubic foot (640 kg. per cubic meter) density. Conveying capacities for all FLEX-AUGER® systems are determined using 348 RPM power units.**

Horse Power Requirements

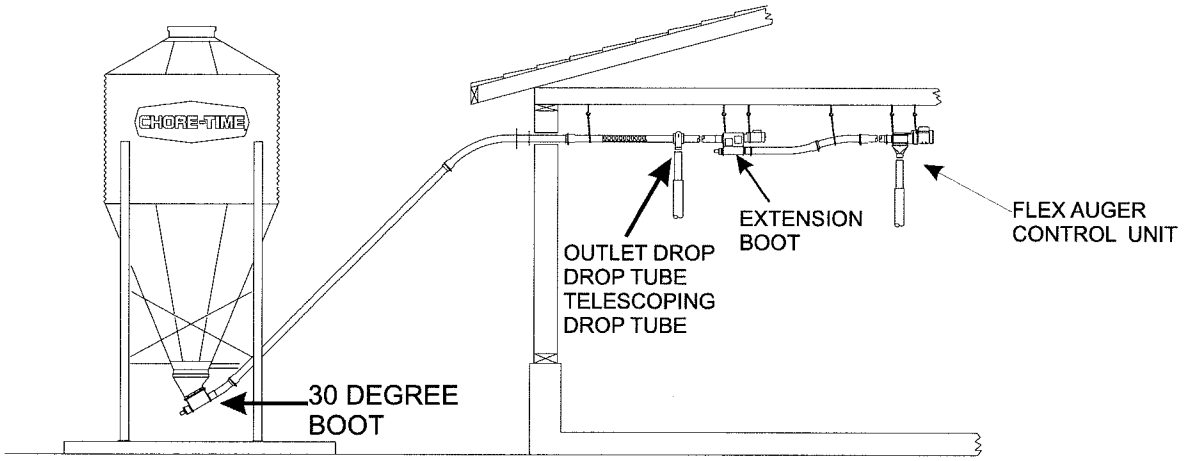
Horse power requirements are based on length of the FLEX-AUGER® systems and type of system installed, number of turns, tandem systems, etc. The charts included show maximum line lengths for FLEX-AUGER systems plus maximum lengths for systems using extension hoppers.

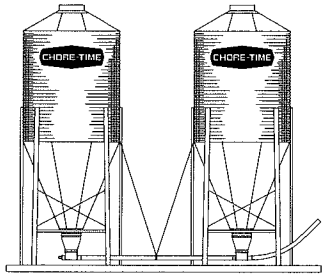
Note: Line length should be reduced by 20% for use on 208 volt 60 Hz.

MODEL 55			MODEL 90		
Motor H.P	**Maximum Line Length**	**Maximum Extension**	**Motor H.P**	**Maximum Line Length**	**Maximum Extension**
1/3	150' (46 m)	185' (56 m)	1/2	30' (9 m)	65' (20 m)
1/2	250' (76 m)	286' (87 m)	3/4	90' (27 m)	125' (38 m)
			1	150' (46 m)	185' (56 m)
MODEL 75			**MODEL 108**		
Motor H.P	**Maximum Line Length**	**Maximum Extension**	**Motor H.P**	**Maximum Line Length**	**Maximum Extension**
1/2	80' (24 m)	125' (38 m)	3/4	50' (15 m)	75' (23 m)
3/4	150' (46 m)	185' (56 m)	1	100' (31 m)	135' (41 m)
1	200' (61 m)	245' (75 m)	1-1/2	150' (46 m)	185' (56 m)
MODEL HMC			**MODEL 108 HI Capacity**		
Motor H.P	**Maximum Line Length**	**Maximum Extension**	**Motor H.P**	**Maximum Line Length**	**Maximum Extension**
1/2	30' (9 m)	55' (17 m)	1	50' (15 m)	75' (23 m)
3/4	90' (27 m)	105' (32 m)	1-1/2	100' (315 m)	135' (41 m)
1	150' (46 m)	185' (56 m)	2	150' (46 m)	185' (56 m)

This layout shows a 30 degree boot installation with one extension hopper and Flex auger control unit. The outlet drops show, drop tube with telescoping drop tube to allow the raising and lowering of the feed hoppers.

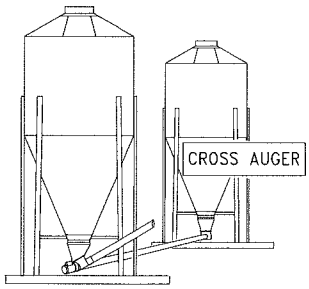
This layout may be used on Model 555, 75, 90, HMC & 108





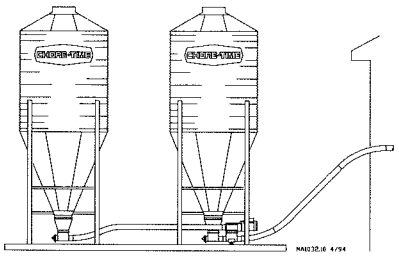
The layout at the left shows two feed bins with a straight through tandem . The auger passes through the intermediate bin allowing the feed to be pulled from either bin. Slides should not be pulled out of both bins, this could cause the auger to overload.

This layout may be used on Model 75, 90, HMC & 108



The 30 Degree Two Motor Tandem System to the left uses a motor to pull from the terminal bin into the intermediate bin.

This layout may be used on Model 75, 90, HMC

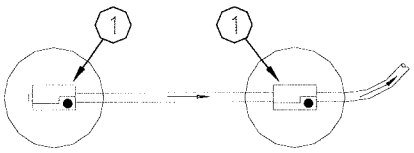


TWO MOTOR TANDEM SYSTEM MODEL 108

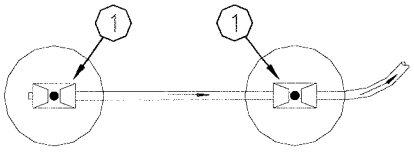
LAYOUT.CDR

Straight-Thru Tandem

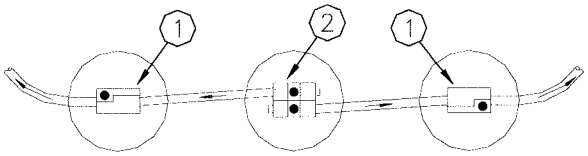
Model 75 Single Straight-Through System



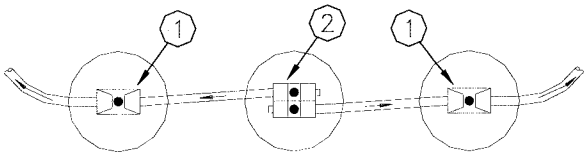
Model 90 and HMC Single Straight-Through System



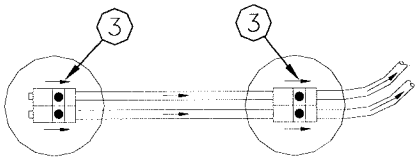
Model 75 Combination Single-Twin Straight Through System



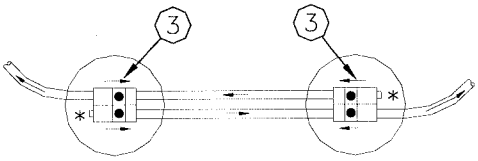
Model 90 Combination Single-Twin Straight Through System



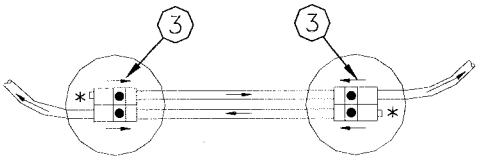
Model 75, 90, or HMC Twin Straight-Through System



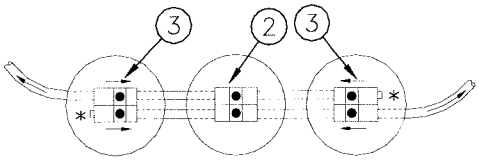
Model 75, 90, or HMC Twin Straight-Through System



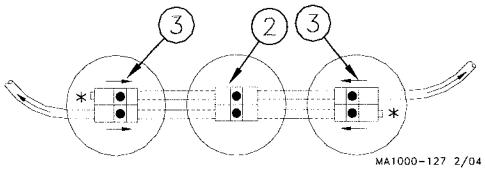
Model 75, 90, or HMC Twin Straight-Through System



Model 90 Three Bin System Twin Straight-Through System



Model 90 Three Bin System Twin Straight-Through System

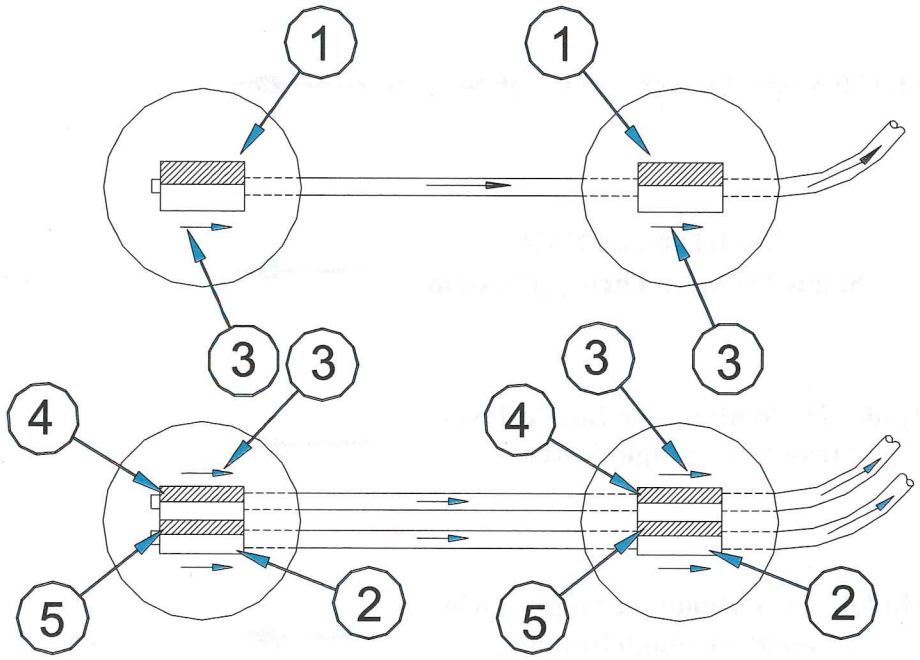


Key	Description
1	Single Baffled Boot
2	Twin Baffled Boot (Model 75 or 90) Mount Either Direction
3	Arrow Tape

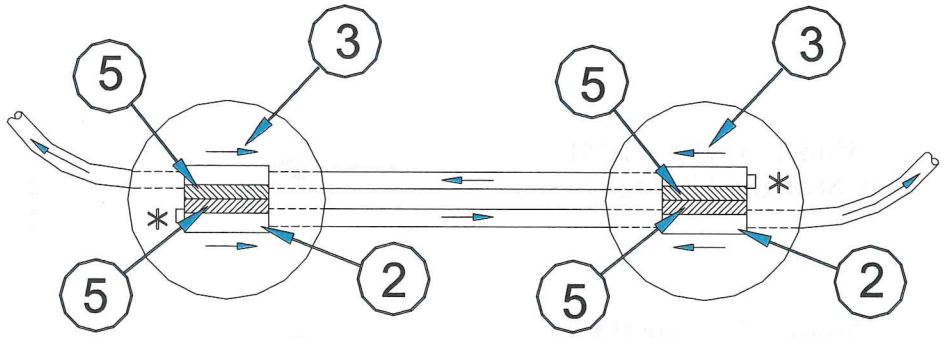
***Note: On twin systems running in opposite directions, follow the tape on the bearing end of the system.**

MODEL 108 Boot and Baffle

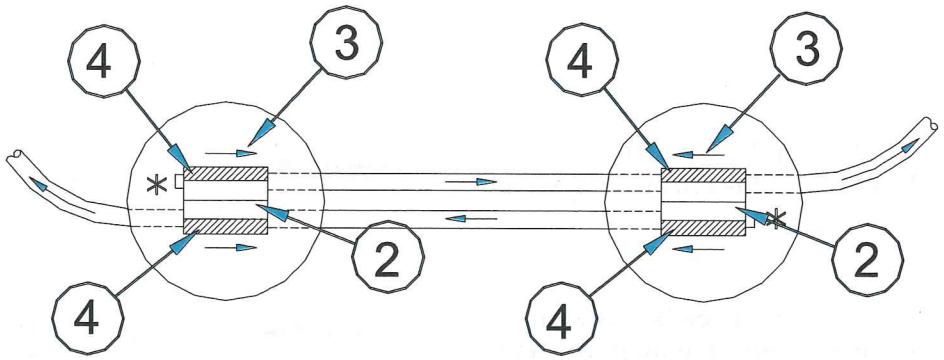
STANDARD
AS SHIPPED



MUST ORDER
(2) 35624



MUST ORDER
(2) 35615



KEY	DESCRIPTION
1	SINGLE BAFFLED BOOT
2	TWIN BAFFLED BOOT
3	ARROW TAPE
4	35615 CLEAN-OUT WELDMENT
5	35624 CENTER BAFFLE PLATE

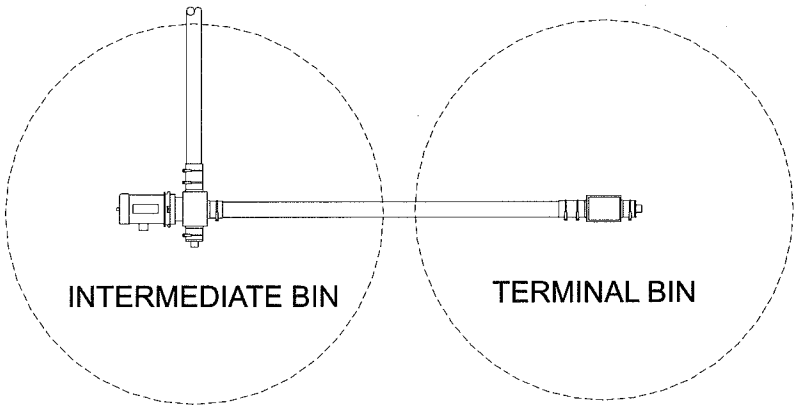
* INDICATES BEARING END

PLAN#2.CDR

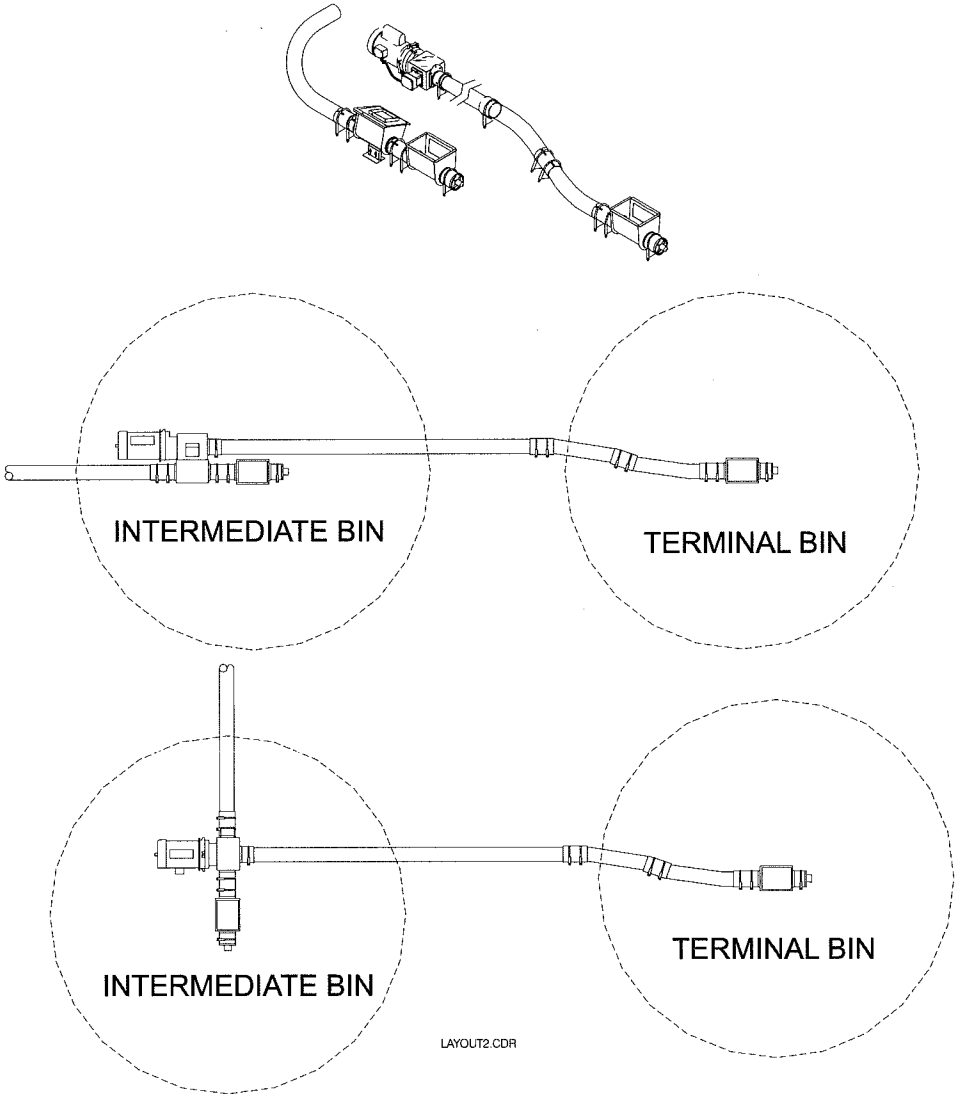
Two-Motor Tandem Systems

30 DEGREE TWO-MOTOR TANDEM

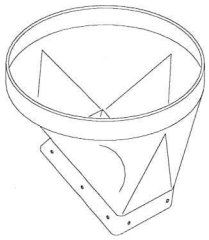
AVAILABLE IN MODEL 75, 90 AND HMC



MODEL 108 TWO-MOTOR TANDEM



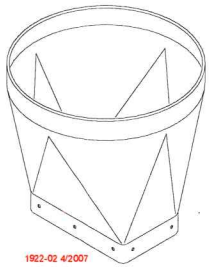
Boot Accessories



Upper boot straight out. The upper boot provides a transfer from the bin to the lower boot.

*6093R is a Straight-Out Boot (Red)

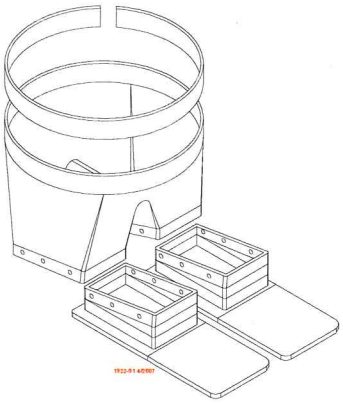
*6093C is a Straight-Out Boot (Clear)



The upper boot provides a transfer from the bin to the lower boot.

*4347R is a 30 Degree Boot (Red)

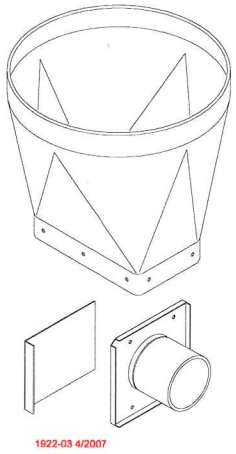
*4347C is a 30 Degree Boot (Clear)



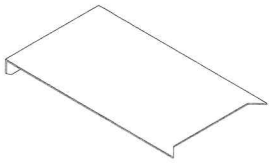
Twin boot assembly: 03102308 Includes: Upper boot with collar shim, (2) slide and transfer plates.

Use with 3-32467 reinforced collar (7' 67° Bin)

Use with 3-32466 reinforced collar (9' 60° Bin)



Clean out valve kit: 13722

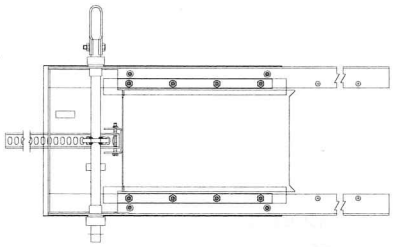


Optional Boot Slide: 43755SS-50

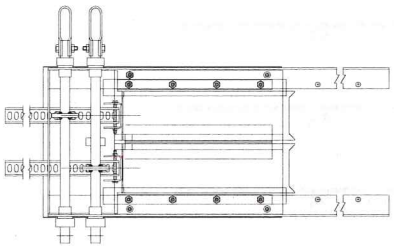
This slide is made of Stainless Steel and can be used in the 6284 slide and transfer kit.

If ordering 4357SS-50 it should be noted that an order of quantity (1) will result in 50 slides.

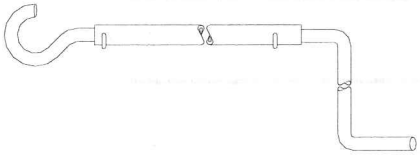
Boot Slides



Single manual slide agitator: 46934

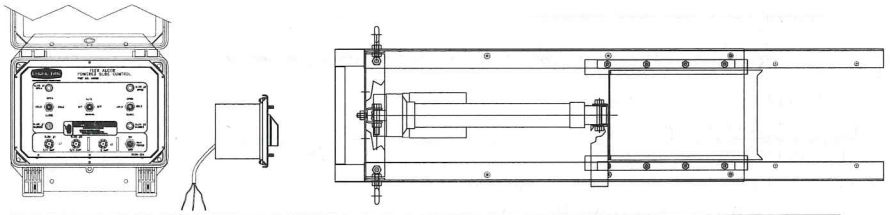


Twin manual slide agitator: 46935

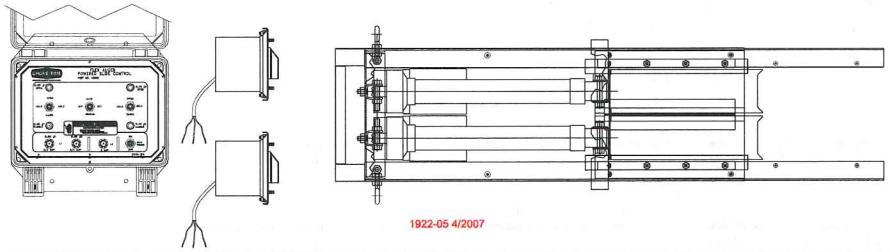


Telescoping drive handle: 47638

Telescopes from 5' to 8'

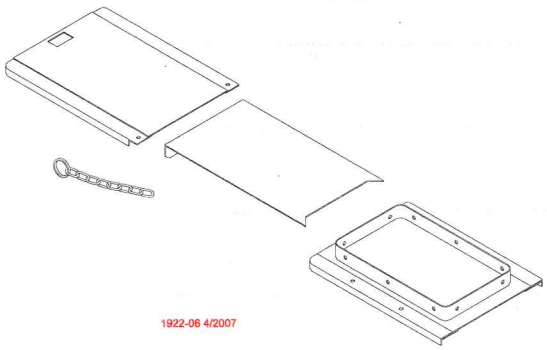


Single tandem auto slide kit: 47578



Twin tandem auto slide kit: 47580

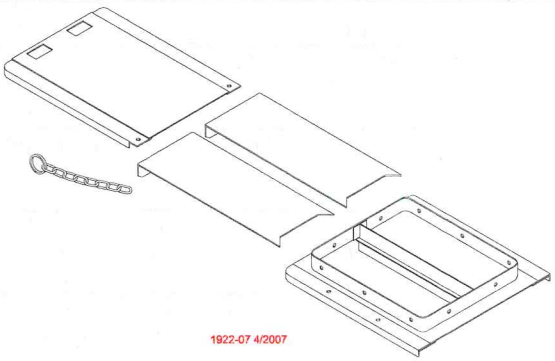
1922-05 4/2007



1922-06 4/2007

Single slide and transfer kit: 6284. Used on all single and 30° twin boots.

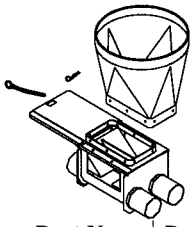
*Model 55 quad boot assembly uses 36093 shut off slide.



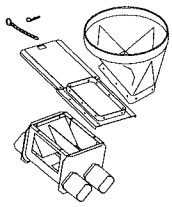
1922-07 4/2007

Twin slide and transfer kit: 36683. Used on Model 75, 90, HMC, and straight out twin boots.

FLEX-AUGER® Boot Assembly



For clear upper boots add a "C" suffix to the Part No.. Example 8465C

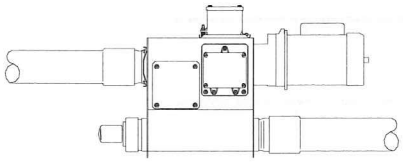


Part No.	Description	MODEL
8465	**Single 30 Degree Boot Assembly**	**55**
4347R	30 Degree Upper Boot Transition	
9313	Single 30 Degree Lower Boot Assembly	
8466	**Twin 30 Degree Boot Assembly**	**55**
4347R	30 Degree Upper Boot Transition	
9314	Twin 30 Degree Lower Boot Assembly	
8467	**Quad 30 Degree Boot Assembly**	**55**
4347R	30 Degree Upper Boot Transition	
9315	Quad 30 Degree Lower Boot Assembly	
6539	**Single 30 Degree Boot Assembly**	**75**
4347R	30 Degree Upper Boot Transition	
36442	Single Lower Boot Assembly	
6540	**Single Straight-Out Boot Assembly**	**75**
6093R	Straight-Out Upper Boot Transition	
36589	Single Straight-Out Lower Boot Assembly	
6873	**Twin 30 Degree Assembly**	**75**
4347R	30 Degree Upper Boot Transition	
36589	Single Straight-Out Lower Boot Assembly	
36801	**Twin Straight-Out Boot Assembly**	**75**
6093R	Straight-Out Upper Boot Transition	
36390	Twin Straight-Out Lower Boot Assembly	
6541	**Single Straight-Through Tandem System**	**75**
6093R	Straight-Out Upper Boot Transition (2 Required)	
36590	Single Straight-Through Lower Boot Package	
35880	**Twin Straight-Through Tandem System**	**75**
6093R	Straight-Out Upper Boot Transition (2 Required)	
36394	Twin Straight-Though Tandem Lower Boot Package	
7881	**Single 30 Degree Two Motor Tandem System**	**75**
3259-51	.50 Hp 60 Hz 348 RPM Power Unit	
4347R	30 Degree Upper Boot Transition	
6093R	Straight-Out Upper Boot Transition	
36589	Single Straight-Out Lower Boot Assembly	
9549	30 Degree Two Motor Tandem Lower Boot Assembly	
6161	**Single 30 Degree Boot Assembly**	**90**
4347R	30 Degree Upper Boot Transition	
9301	Single 30 Degree Lower Boot Assembly	
6187	**Single Straight-Out Boot Assembly**	**90**
6093R	Straight-Out Upper Boot Transition	
36435	Single Straight-Out Lower Boot Assembly	
6874	**Twin 30 Degree Boot Assembly**	**90**
4347R	30 Degree Upper Boot Transition	
36391	Twin 30 Degree Lower Boot Assembly	
6535	**Twin Straight-Through Boot Assembly**	**90**
6093R	Straight-Out Upper Boot Transition	
36398	Twin Straight-Out Lower Boot Assembly	
6281	**Single Straight-Though Tandem System**	**90**
6093R	Straight-Out Upper Boot Transition (2 Required)	
36434	Single Straight-Through Tandem Lower Boot Package	
6538	**Twin Straight-Through Tandem System**	**90**
6093R	Straight-Out Upper Boot Transition (2 Required)	
36388	Twin Straight-Though Tandem Lower BOot Package	
7882-2	**Single 30 Degree Two Motor Tandem System**	**90**
3259-51	.50 Hp 60 Hz 348 RPM Power Unit	
4347R	30 Degree Upper Boot Transition	
6093R	Straight-Out Upper Boot Transition	
36435	Single Straight-Out Lower Boot Assembly	
9548	30 Degree Two Motor Tandem Lower Boot System	

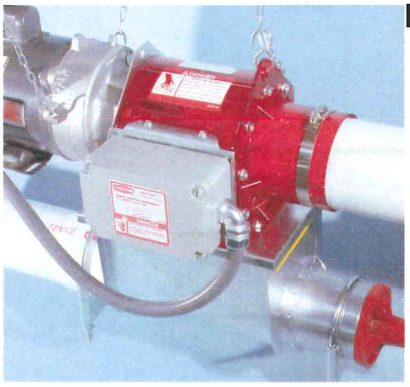
Part No.	Description	MODEL
40082	**Single Straight-Through Tandem System**	**HMC**
6093R	Straight Out Upper Boot Transition (2 Required)	
40081	Single Straight-Through Tandem Lower Boot Package	
7921	**Single 30 Degree Boot Assembly**	**HMC**
4347R	30 Degree Upper Boot Transition	
38507	Single Lower Boot Assembly	
7920	**Twin 30 Degree Boot Assembly**	**HMC**
4347R	30 Degree Upper Boot Transition	
38506	Twin 30 Degree Lower Boot Assembly	
36795	**Twin Straight-Through Tandem System**	**HMC**
6093R	Straight Out Upper Boot Transition	
36796	Twin Straight-Through Tandem Lower Boot Package	
25355	**Single 30 Degree Two Motor Tandem System**	**HMC**
38605	30 Degree Two Motor Tandem Lower Boot Assembly	
3259-51	.50 Hp 60 Hz 348 RPM Power Unit	
4347R	30 Degree Upper Boot Transition	
6093R	Straight Out Upper Boot Transition	
38507	Single Lower Boot Assembly	
34339	**Single 30 Degree Boot Assembly**	**108**
4347R	30 Degree Upper Boot Transition	
34336	Single 30 Degree Lower Boot Assembly	
34340	**Single Straight-Out Boot Assembly**	**108**
6093R	Straight-Out Upper Boot Transition	
34341	Single Straight-Out Lower Boot Assembly	
34333	**Single Straight-Through Tandem System**	**108**
6093R	Straight-Out Upper Boot Transition (2 Required)	
34335	Single Straight-Through Lower Boot Assembly	
34341	Single Straight-Out Lower Boot Assembly	
34632	**Single Two Motor Tandem System (Add .5 HP Power Unit)**	**108**
6093R	Straight-Out Upper Boot Transition (2 Required)	
6500-22	Control Unit	
34631	Single Straight-Through Lower Boot Assembly	
34341	Single Straight-Out Lower Boot (2 Required)	
35625	**Twin 30 Degree Boot Assembly**	**108**
4347R	30 Degree Upper Boot Transition	
35613	Twin 30 Degree Lower Boot Assembly	
35626	**Twin Straight-Out Boot Assembly**	**108**
6093R	Straight-Out Upper Boot Transition	
35612	Twin Straight-Out Lower Boot Assembly	
35616	**Twin Straight-Through Tandem System**	**108**
6093R	Straight-Out Upper Boot Transition (2 Required)	
35612	Twin Straight-Out Lower Boot Assembly	
35611	Twin Straight-Through Lower Boot Assembly	

Extension Hoppers

Model 55, 75, 90, 108



Part No	Description
7944	Model 75 Extension Hopper 1.5 Hp 1PH/3 PH
7869	Model 90 Extension Hopper 1.5 Hp 1 PH/3 PH
40170	Model 55 Extension Hopper 1.5 Hp 1 PH/3 PH
7849	Model HMC Extension Hopper 1.5 Hp 1 PH



Model 108 Extension Boot Kit

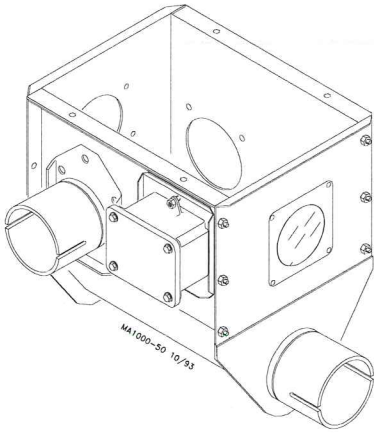
Part No	Description
47862-1	Model 108 Extension Boot Kit 230V 50/60 hz 1 Ph
47862-3	Model 108 Extension Boot Kit 3 Phase

FLAG Extension Boot

FLAG Extension boot must be ordered by components.

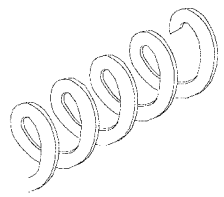
Part No	Description
35727	Single Boot
46800-1	Control Unit
45970	Adapter Plate
34779	Boot Switch

30 Degree Two Motor Tandem Boots



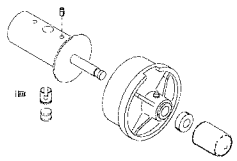
Part No	Description
9549	Model 75 Two Motor Tandem Boot
9548	Model 90 Two Motor Tandem Boot
38605	Model HMC Two Motor Tandem Boot

Auger, Bearing Assemblies, Driver Assemblies



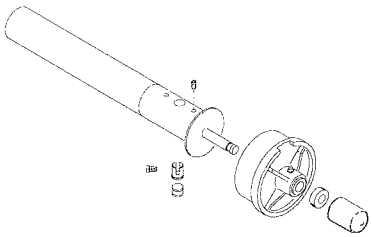
Augers

Part No.	Description
7961	Model 55 Auger (1.52 O.D.)
4744	Model 75 Auger (2.38 O.D.)
6942	Model 90 Auger (2.71 O.D.)
30108	Model 108 Auger (3.56 O.D.)



Non-Restricted Anchor Bearing Assembly

Part No.	Description
37347	Model 75
35345	Model 90
37241	Model HMC
35766	Model 108

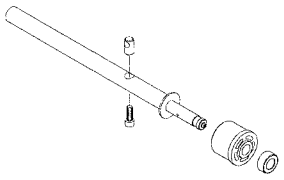


Restricted Anchor Bearing Assembly

Part No.	Description
37346	Model 75
35343	Model 90
35344	Model HMC
35767	Model 108

Cap Assembly

Part No.	Description
35440	Model 75
34830	Model 90
34830	Model HMC
30314	Model 108

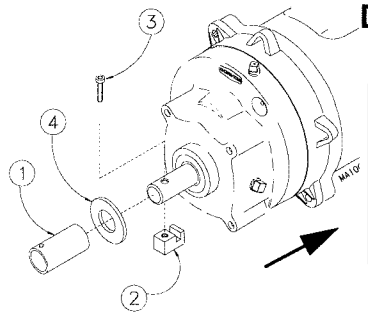


Bearing Assembly

Part No.	Description
39405	Model 55 Boot Bearing
39408	FLAG Anchor Bearing

Bearing Safety Cap

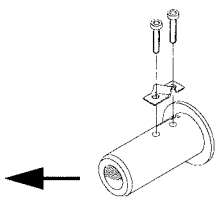
Part No.	Description
29702	Bearing Safety Cap
35410	Bearing Cap Kit (Replaces metal cap Model HMC and 90)
37351	Bearing Cap Kit (Replaces metal cap Model 75)



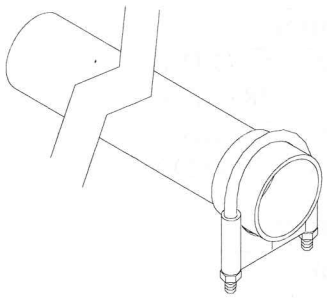
Driver Assembly

Item	Description	Model 55 Part No	FLAG Part No
1	Drive Tube	2920	30932
2	Drive Block	4642	4642
3	Screw	5083-8	5083-4
4	Washer	1484	1484

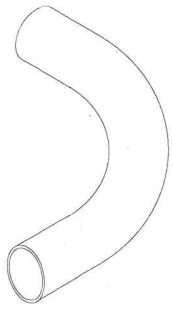
Part No.	Description
6862	Model 75 & HMC
6861	Model 90
30313	Model 108



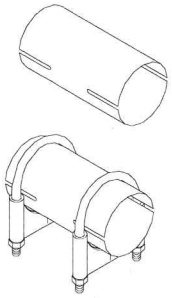
FLEX-AUGER® Tubes and Elbows (Including connectors and clamp kits)



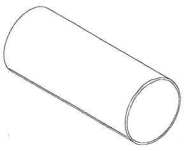
	Steel Tubing
2088	Model 75 10' Tube with belled end
5091	Model 90 10' Tube with belled end
34411	Model 108 10' Tube with belled end
5089	Model 90 32" Tube with belled end
	PVC Tubing
7955	Model 55/MULTIFLO 10' Tube
6516	Model 75 10' Tube
6293	Model 90 & HMC 10' Tube
34547	Model 108 10' Tube



	PVC Elbows
34855	Model 55 Elbow 45 degree
7357	Model 90 & HMC Elbow 45 degree
7285	Model 75 Elbow 45 degree
34546	Model 108 Elbow 45 degree
	Hardened Steel Elbows
14324	Model 75 Hardened Steel Elbow 45 degree
6472	Model 90 Hardened Steel Elbow 45 degree
34406	Model 108 Hardened Steel Elbow 45 degree



	Steel Tube Connectors
6512	Model 75 Tube Connector only (Steel Connector/PVC Pipe)
2106	Model 75 Tube Connector only
5088	Model 90 Tube Connector only
30277	Model 108 Tube Connector only
6525	Model 75 Tube Connector w/clamps (Steel Connector/PVC Pipe)
2103	Model 75 Tube Connector w/clamps
6595	Model 90 Tube Connector w/clamps
34419	Model 108 Tube Connector w/clamps



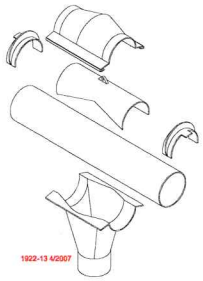
	Coupler PVC
8029	Model 55 MULTIFLO & FLAG Coupler (PVC)
7084	Model 75 Coupler (PVC)
7085	Model 90 & HMC Coupler (PVC)
34557	Model 108 Coupler (PVC)

	Tube Inserts
6524	Model 75 Tube Insert (Steel)
34337	Model 108 Tube Insert (PVC)

	Tube Clamps
29520	Model 55 Tube Clamp (Bearing Clamp)
29515	Model 55 and MULTIFLO Tube Clamp
35726	Model 55 Tube Clamp (FLAG Boot Outlet)
6515	Model 75 Tube Clamp (PVC)
4141	Model 75 Tube Clamp (Steel)
6721	Model 90 and HMC Tube Clamp (PVC or Steel)
14373	Model 108 Tube Clamp 5" (PVC)
34338	Model 108 Tube Clamp 4.25" (Steel)

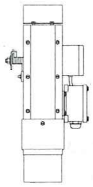
1922-12 4/2007

Outlet Drops and Accessories



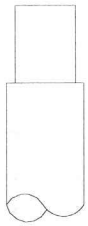
Outlet Drop

Part No	Description	Usage
43455C 43455R	Model 55 Outlet with clamp ring Model 55 Outlet with retainer	Model 55, MULTIFLO
43475C 43475R	Model 75 Outlet with clamp ring Model 75 Outlet with retainer	Model 75
43490C 43490R	Model 90 Outlet with clamp ring Model 90 Outlet with retainer	Model 90
29174	Model 75 Electric outlet drop	Model 75
28417	Model 90 Electric outlet drop	Model 90
5163	Model 75 Single outlet with butterfly shut-off (Steel)	Model 75



Drop Tubes

Part No	Description	Usage
1932	Plastic drop tube (3" x 12')	Model 55, 75, MULTIFLO
6381	Plastic drop tube (3.75" x 12')	Model 90, HMC
9900	Plastic drop tube (5" x 12')	Model 108 control units
14366-1932	Telescoping drop tube (3.568" x 6')	Model 55, 75, MULTIFLO
14366-6381	Telescoping drop tube (4.125" x 6')	Model 90 & HMC
14366-9900	Telescoping drop tube (5.25" x 6')	Model 108
14367	Drop tube support kit	Model 55, 75, 90, 108

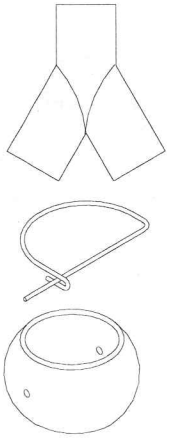


Flex Tube

Part No	Description	Usage
13265-1	SS Flex metal tube (3" x 25')	Model 55, 75, MULTIFLO
13265-2	SS Flex metal tube (3 3/8" x 25')	Model 90, HMC
13265-3	SS Flex metal tube (5" x 25')	Model 108
7497	Galv. Flex metal tube (3" x 50')	Model 55, 75, MULTIFLO
6383	Galv. Flex metal tube (3 1/2" x 50')	Model 90, HMC
1931	Galv. Flex metal tube (3" x 18")	Model 55, 75, MULTIFLO
6382	Galv. Flex metal tube (3 1/2" x 18")	Model 90, HMC

Suspension Kits

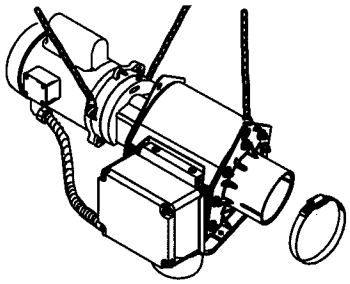
Part No	Description	Usage
5043	Suspension kit	Model 75, 90, HMC, 108
6372	Suspension kit	Model 55, MULTIFLO



Accessories

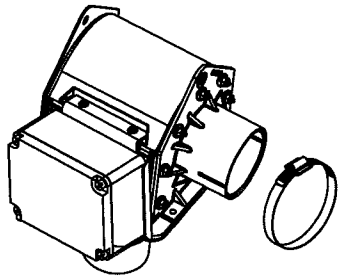
Part No	Description	Usage
39187	WYE Outlet 3 x 3 x 3	Model 55, 75, MULTIFLO
6303	PVC cement (1/2 pint)	All PVC tubing
6303-4	PVC cement (1 quart)	
41657	Lock pin	Model 55, 90
41440	Lock pin	Model 90, 108
41717	Flex joint ring	Model 55, 75
42201	Flex joint ring	Model 90, HMC

Control Units



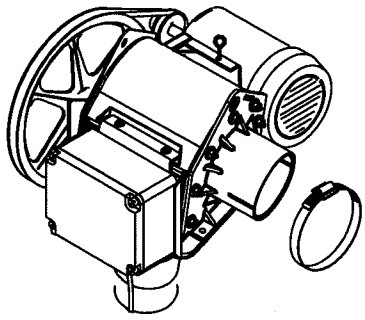
DIRECT DRIVE

46800-1	MODEL 55 CONTROL UNIT	220V-50/60HZ-1 PH
46800-2	MODEL 75 CONTROL UNIT	220V-50/60HZ-1 PH
46800-3	MODEL HMC CONTROL UNIT	220V-50/60HZ-1 PH
46800-4	MODEL 90 CONTROL UNIT	220V-50/60HZ-1 PH
46800-5	MODEL 108 CONTROL UNIT	230V-50/60HZ-1 PH



THREE PHASE

46800-6	MODEL 55 CONTROL UNIT	3 PHASE
46800-7	MODEL 75 CONTROL UNIT	3 PHASE
46800-8	MODEL HMC CONTROL UNIT	3 PHASE
46800-9	MODEL 90 CONTROL UNIT	3 PHASE
46800-10	MODEL 108 CONTROL UNIT	3 PHASE



BELT DRIVE UNITS

46800-11	MODEL 55 BELT DRIVE CONTROL UNIT	220V-50/60HZ-1 PH
46800-12	MODEL 75 BELT DRIVE CONTROL UNIT	220V-50/60HZ-1 PH
46800-13	MODEL HMC BELT DRIVE CONTROL UNIT	220V-50/60HZ-1 PH
46800-14	MODEL 90 BELT DRIVE CONTROL UNIT	220V-50/60HZ-1 PH
46800-15	MODEL 108 BELT DRIVE CONTROL UNIT	220V-50/60HZ-1PH

Bin Fill Cap Kits

Intermediate fill cap kits

The intermediate bin fill cap kit allows direct filling of an intermediate hopper bin. The fill cap lid is removable to allow feed truck filling if desired. The intermediate caps have shut-off slides to allow the intermediate bin to be bypassed when full.

The intermediate fill caps do not have level switches supplied and are manually operated shut-off slides.

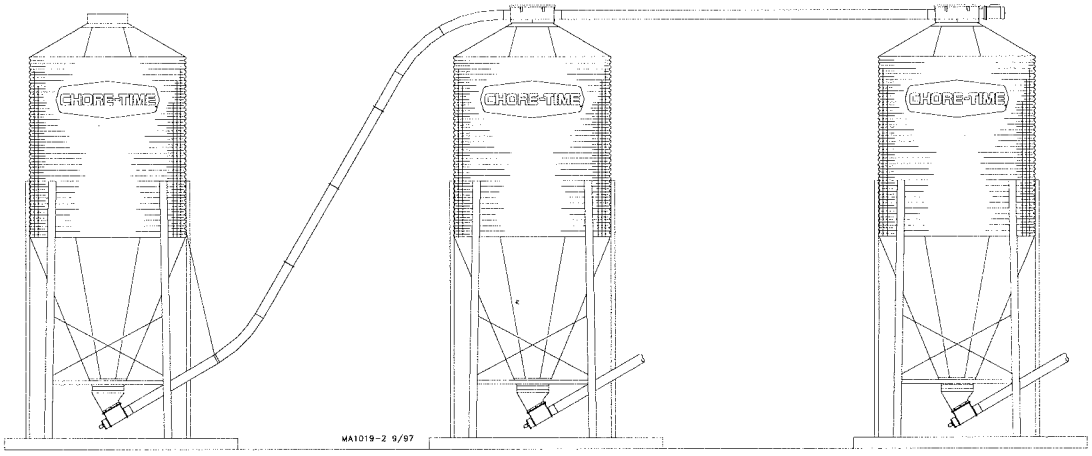
Terminal bin fill cap kits

The terminal bin fill cap kits allow direct filling of a terminal hopper bin with a FLEX-AUGER when desired. The fill cap lid is removable to allow feed truck filling if desired.

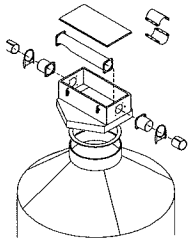
No level switches are supplied with these fill cap kits.

108 Intermediate Bin Fill Cap Kit's

Terminal Fill Cap Kit's for Model 75, 90, 108

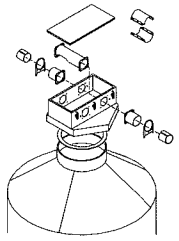


INTERMEDIATE BIN FILL CAP KITS



SINGLE INTERMEDIATE FILL CAP KITS

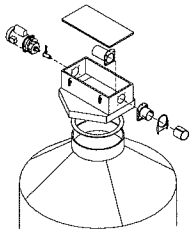
PART NO	DESCRIPTION
40527	MODEL 108 FILL CAP KIT



TWIN INTERMEDIATE FILL CAP KITS

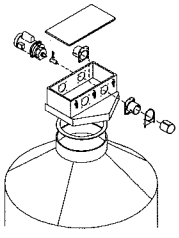
PART NO	DESCRIPTION
40526	MODEL 108 FILL CAP KIT

TERMINAL BIN FILL CAP KITS



SINGLE FILL CAP KITS

PART NO	DESCRIPTION
6563	MODEL 75 FILL CAP KIT
25806	MODEL 90 FILL CAP KIT
34635	MODEL 108 FILL CAP KIT



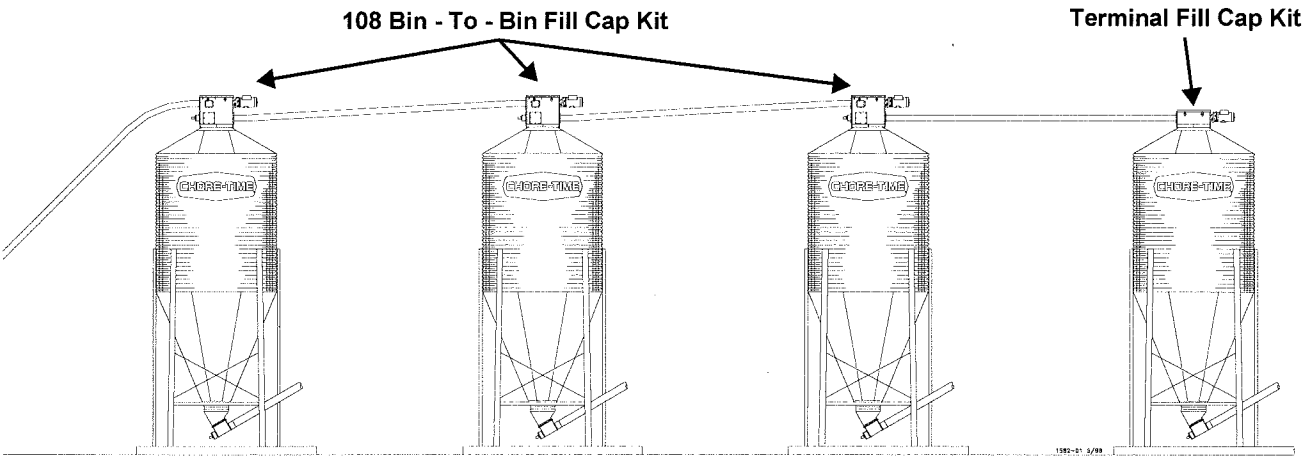
TWIN FILL CAP KITS

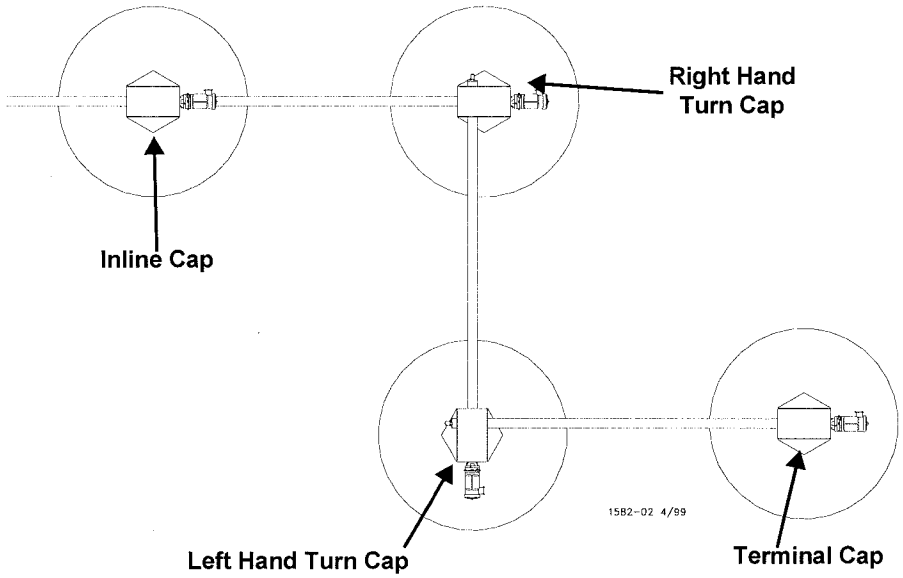
PART NO	DESCRIPTION
27133	MODEL 90 FILL CAP KIT
35008	MODEL 108 FILL CAP KIT

Model 108 Bin-to-Bin fill cap kits

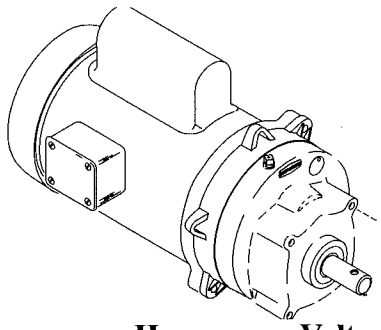
The Model 108 Bin-to-Bin fill cap kit is designed to accommodate filling or bypassing a hopper bin in a multiple bin application. The last bin in a series will use a terminal bin fill cap kit. The Bin-to-Bin fill cap kits replace the existing lid or lids on top of an intermediate bin in a multiple bin fill system. The Bin-to-Bin fill cap kit will allow in line, right had or left hand turns in the fill system layout. The Model 108 Bin-to-Bin fill cap use's an electronic control to determine which bins to bypass and which bins to fill.

No level switches are supplied with these fill cap kits.



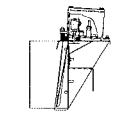


Power Units



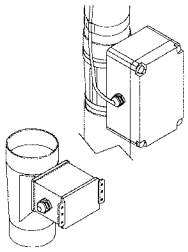
Part No	HP	RPM	Phase	Hz	Voltage	Usage
3259-34	1/3	348	Single	60	230	55, FLAG™
3259-67	1/2	129	Single	60	230	MULTIFLO® Fill
3259-50	1/2	216	Single	60	230	75, 90, HMC, 108
3259-39	1/2	348	Single	60	230	55, FLAG™
3259-51	1/2	348	Single	60	230	75, 90, HMC
3259-77	1/2	425	Single	60	230	75, 90, HMC
3259-134	1/2	348	Three	60	220/380	55
3259-136	3/4	216	Single	60	230	75, 90, HMC, 108
3259-78	3/4	425	Single	60	230	75, 90, HMC
3259-122	3/4	584	Single	60	230	ULTRAFLO® Breeder Fill
3259-119	3/4	348	Three	60	230/460	75, 90, HMC, 108
3259-120	3/4	425	Three	60	230/460	75, 90, HMC
3259-52	3/4	348	Single	60	230	75, 90, HMC, 108
3259-49	1	348	Single	60	230	75, 90, HMC, 108
3259-79	1	425	Single	60	230	75, 90, HMC, 108
3259-123	1	584	Single	60	230	ULTRAFLO® Breeder Fill
3259-135	1	348	Three	60	220/380	75, 90, HMC, 108
3259-117	1	348	Three	60	230/460	75, 90, HMC, 108
3259-118	1	425	Three	60	230/460	108
3259-137	1	584	Three	60	220/380	ULTRAFLO® Breeder Fill
3259-152	1	584	Three	60	220/380	ULTRAPAN® Breeder Fill
3259-66	1 1/2	348	Single	60	230	108
3259-80	1 1/2	425	Single	60	230	108
3259-124	1 1/2	584	Single	60	230	ULTRAFLO® Breeder Fill
3259-139	1 1/2	348	Three	60	230/460	108
3259-139	1 1/2	348	Three	60	230/460	108
3259-140	1 1/2	425	Three	60	230/460	108
3259-121	2	425	Single	60	230	108
3259-90	1 1/2	348	Single	50	220	108
3259-109	1/2	180	Single	50	220	MULTIFLO®
3259-98	1/2	348	Single	50	220	55, FLAG™
3259-102	1/2	180	Three	50	220/380	MULTIFLO® Fill
3259-100	1/2	348	Three	50	220/380	55, FLAG™
3259-88	3/4	348	Single	50	220	75, 90, HMC, 108
3259-104	3/4	348	Three	50	220/380	75, 90, HMC, 108
3259-89	1	348	Single	50	220	75, 90, HMC, 108
3259-148	1	580	Single	50	220	ULTRAPAN® Breeder Fill
3259-105	1	348	Three	50	220/380	75, 90, HMC, 108
3259-150	1	580	Three	50	220-240/340-400	ULTRAPAN® Breeder Fill
3259-149	1 1/2	580	Single	50	220	ULTRAPAN® Breeder Fill
3259-106	1 1/2	348	Three	50	220/380	108
3259-151	1 1/2	580	Three	50	220-240/2380-400	ULTRAPAN® Breeder Fill

Switches and Timers



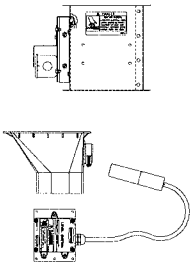
Hopper Level Switches

14550	Hopper Level Control	230V - 50/60 hz 1 Phase
2912	Hopper Level Control	110V - 50/60 hz 1 Phase
27761	Hopper Level Control	230V - 50/60 hz 3 Phase
42613	Hopper Level Switch W/SENSOR PLUS	
46910	Panel Switch W/SENSOR PLUS	



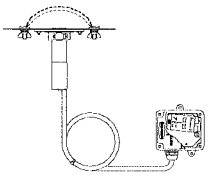
Proximity Drop Tube Switches

49260	Universal Drop Tube Switch W/SENSOR PLUS 230V - 50/60 hz 1 PH
49264	Universal Drop Tube Switch W/SENSOR PLUS and Safety Timer 230V - 50/60 hz 1 PH
46316	Drop Tube Switch W/SENSOR PLUS 230V - 50/60 hz 1 PH
46663	Drop Tube Switch W/SENSOR PLUS & Safety Timer 230V - 50/60 hz 1 PH



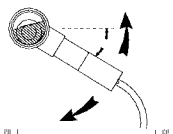
Control Level Switches

47847	C. U. Extension Switch W/Delay	230V - 50/60 hz 1 Phase
47846	C. U. Extension Switch W/O Delay	230V - 50/60 hz 1 Phase
47831	C. U. Level Switch (1 sec - 10 min) W/Relay	230V - 50/60 hz 1 Phase
47832	C. U. Level Switch (1sec - 10 min) W/O Relay	230V - 50/60 hz 1 Phase
47830	C. U. Level Switch (1 sec - 60 min) W/Relay	230V - 50/60 hz 1 Phase



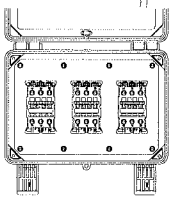
Boot Switches

6143	Boot Switch & Plate Assembly (Single)
6411	Boot Switch & Plate Assembly (Twin)
34780	Boot Switch (Prox Switch Single Boot) W/Cannon Ball Guard
34779	Boot Switch (Prox Switch Twin Boot) W/O Cannon Ball Guard
37553	Upper Boot Switch (Prox Switch)



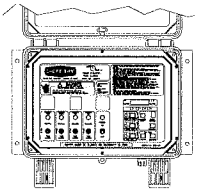
Sleeve Switch MULTIFLO®

40508 MULTIFLO Proximity Sleeve Switch (W/Overide Timer)



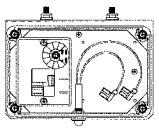
Contactor Box

24392-1	Watertight Contactor Box (1 contactor)	208/240V - 50/60 hz 1 Phase
24392-2	Watertight Contactor Box (2 contactors)	208/240V - 50/60 hz 1 Phase
24392-3	Watertight Contactor Box (3 contactors)	208/240V - 50/60 hz 1 Phase



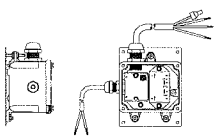
Time Clock

26230	Time Clock and Contactor (Plastic Box)	220V - 50/60 hz 1 Phase
34574	4 Channel Time Clock (AGRI-TIME®)	230V - 50/60 hz 1 Phase
50388	8 Timer Control (AGRI-TIIME®)	



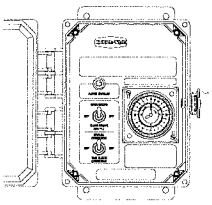
Auger Timer

46662 Auger Safety Timer



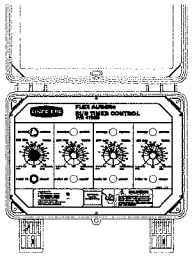
Delay Relays

28702	Delay Relay (for 30370 Drop Feeder Controls)
30953	Delay Relay (for FLAG Fill System Motor)



Drop Feeder Control

28999 Drop Feeder Control (Use with 28990-9, 28990-18) 220V 60 hz 1 Ph

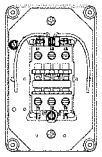


Interval Timer

47805 Run Timer (One Timer)
47805-2 Run Timer (Two Timers)
47805-3 Run Timer (Three Timers)
47805-4 Tun Timer (Four Timers_
47810 Single Timer in 4 x 6" Box

Misc.

1977 Time Clock (24 hour/115 Volt) Metal Box
3710 Time Clock (24 hour/230 Volt) Metal Box



Single Contactors

42549 Single Contactor 230 VAC Coil 50/60 Hz
44853 Single Contactor 110 VAC Coil 50/60 Hz

CHORE-TIME®

FLEX-AUGER® SYSTEMS

MULTIFLO® System

MULTIFLO® System

Information

General Information

The MULTIFLO® feed delivery system will convey dry meal, crumbles, or pellet feeds with particle size up to 3/16" *[5 mm]* in diameter. The MULTIFLO system is not recommended for high-moisture feeds. An electronic control switch is utilized to control the feed recirculation and allow the system to purge itself at each operation.

NOTE: MAXIMUM OF 2 HOURS OPERATING TIME PER DAY.

The Fill System

Each MULTIFLO system loop is charged with a FLEX-AUGER® fill system. Appropriate Flex-Augers for this purpose would be a Model 55 with standard power unit or Model 75 and HMC FLEX-AUGER with 129 rpm power units. The high speed MULTIFLO is filled with a Model 75 FLEX-AUGER with a standard power unit. These Flex-Augers are ordered from the Flex-Auger price list.

The MULTIFLO® Boot

The MULTIFLO boots are supplied with adapter plates to make a connection between FLEX-AUGER and control units or an outlet and the boot. Terminal boots are utilized under control units and intermediate boots are utilized under outlet assemblies.

Tube and Elbows

Determine the amount of 90 or 180 degree elbows and tube required for the installation. NOTE: MAXIMUM OF FOUR 90° OR TWO 180° ELBOWS PER SYSTEM.

Power Unit(s)

Order the appropriate number of power units based on the **effective length of 400' *[122 m]* per power unit.** The power unit requirement is determined by the **effective length** of the system (not actual length). **Effective Length=** Total length of the straight line system + 30'*[9 m]* for each 90 degree elbow or + 60' *[18 m]* for each 180° degree elbow.

MAXIMUM 1200'*[366 M]* EFFECTIVE LENGTH SYSTEMS - Example: Three power units with 1080'*[329 m]* straight line length and four 90° elbows.

Control Switch

The proximity sleeve switch is used on the MULTIFLO circulating feed system as the control to allow operation and shut-off without unnecessary recirculation. The proximity sleeve switch is designed to allow the circuit to dispense feed until it is filled. The proximity sleeve switch controls the MULTIFLO circuit motor(s). The fill system motor incorporates an override timer to allow the system to purge itself at the next operation time. One proximity sleeve switch is required for each loop or circuit.

Component Parts

Order the service section, bridge clamp, suspension kits, and PVC cement based on system length from component parts listing.

Accessories

Order the appropriate outlet and control accessories according to the system's intended usage.

Planning the MULTIFLO® System

Planning for the MULTIFLO® installation should be coordinated with planning for the FLEX-AUGER® feed delivery system installation so the advantages of each system can be used effectively. See the FLEX-AUGER operator's manual for information regarding the FLEX-AUGER feed delivery system.

Chains, "S" Hooks, and screw hooks are provided to suspend the system at least every 5' (1.5 m). The elbows should be supported in at least 2 places.

Important: Keep the system as straight and level as possible.

MULTIFLO® Boot Placement

The MULTIFLO Side Draw Boot placement is determined by were the FLEX-AUGER feed delivery system is terminated. Installation of the FLEX-AUGER feed delivery system should be planned with this in mind. The MULTIFLO Side Draw Boot is directional.

Important: It is not recommended to place the MULTIFLO Boot directly adjoining an elbow. Try to locate the boot a few feet prior to/or after an elbow in the system.

Determine Where to Install Power Units

Note placement of the power units See "Examples of MULTIFLO® System Layout" on page 35..

See "MULTIFLO® Effective Length Calculation" on page 38. to determine the Effective Length of the system.

The "Effective Length" between Power Units must not exceed 400' (122 m) regardless of the number or position of elbows

Power Units should be placed evenly around the system keeping:

- Single Power Units opposite the boot
- Boot approximately centered between two power units in multiple power unit systems (See "Examples of MULTIFLO® System Layout" on page 35. **Examples 2-4**)
- The "Effective Length" per power unit should be kept as equal (even) as possible.

If possible, install the Power Units in a straight section of tube and not adjacent to an elbow. See Example 1 on page 35.

Outlet Drop Size and Placement

A 1-1/2" (38 mm) hole is required at each outlet drop or drop feeder location. The last drop feeder before the control unit should not be more than 3' (1 m) from the control unit.

DO NOT install outlet drops on elbows, feed is required to cushion the auger here. The maximum angle of the outlet drop is 30 degrees.

Examples of MULTIFLO® System Layout

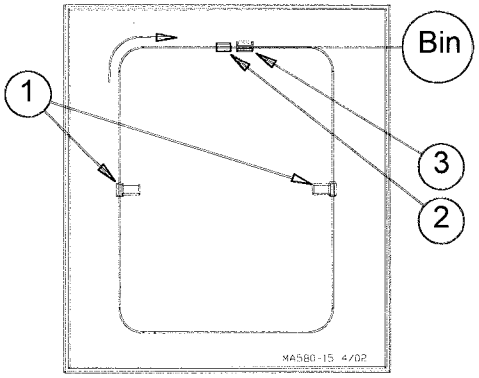
Example 1 shows a typical MULTIFLO® installation. Feed is bought into the building with a FLEX-AUGER® Delivery System to the MULTIFLO boot. Notice how the motor is spaced opposite the boot around the MULTIFLO system.

Example 2 shows a FLEX-AUGER system suppling four different MULTIFLO loops. This system could be used to feed rooms in a sow farrowing operation. Notice the use of 180 degree elbows to accommodate the narrow isles in a farrowing room. Also notice the Intermediate Boots are located under the Outlet Assemblies in the first three rooms.

Example 3 shows a FLEX-AUGER Feed Delivery System with a twin boot supplying two similar sized MULTIFLO loops. As with all FLEX-AUGER to MULTIFLO systems adapter plates were installed on the FLEX-AUGER control units to attach the control units to the MULTIFLO boots. The Adapter Plates are supplied with the MULTIFLO boots.

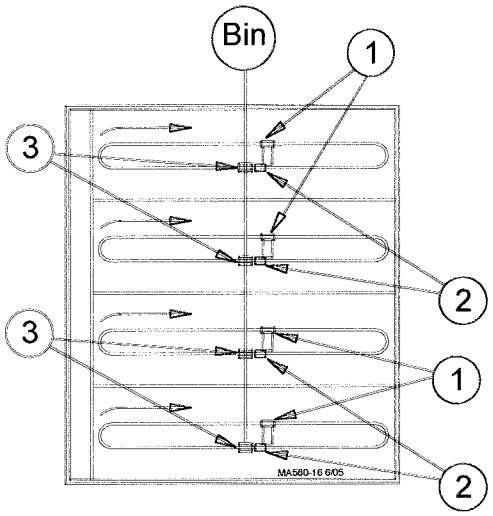
Example 4 shows a FLEX-AUGER Feed Delivery System filling multiple MULTIFLO loops. This configuration requires outlet assemblies on the fill system to fill loops 1 and 2 and the fill system control unit would be over loop 3.

Example 1

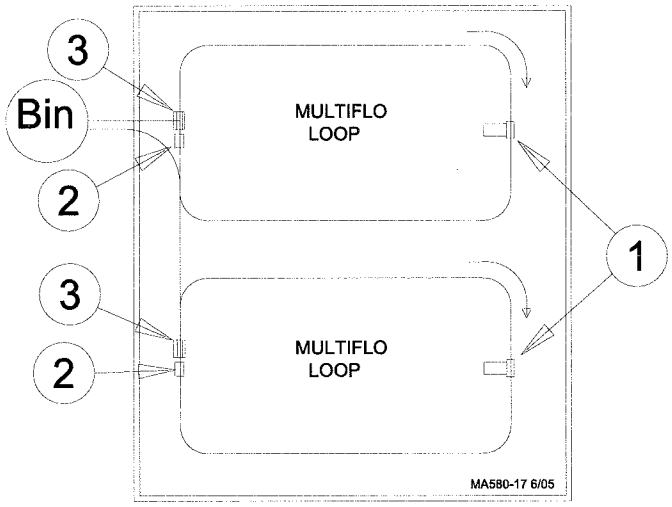


Item	Description
1	Power Unit
2	Level Switch
3	MULTIFLO Boot

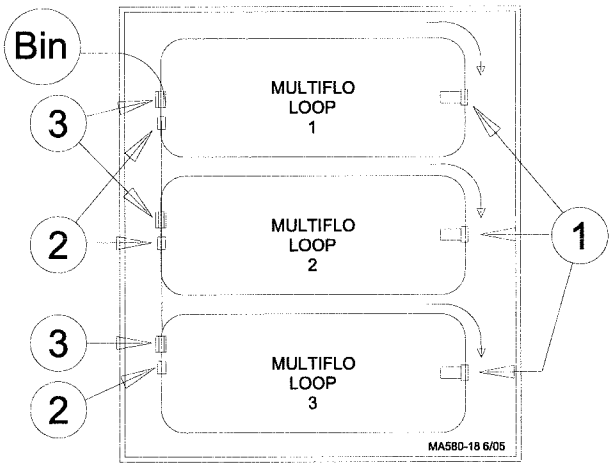
Example 2



Example 3

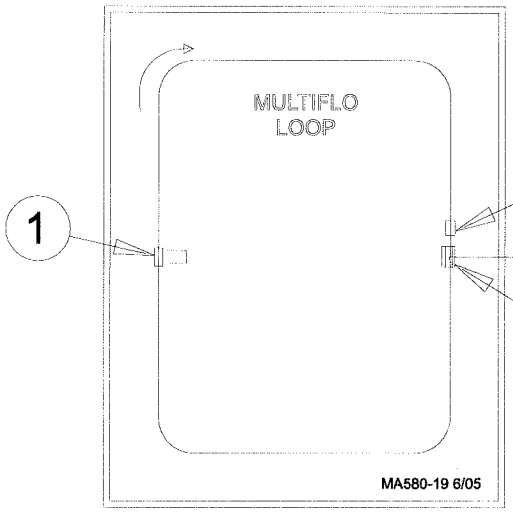


Example 4

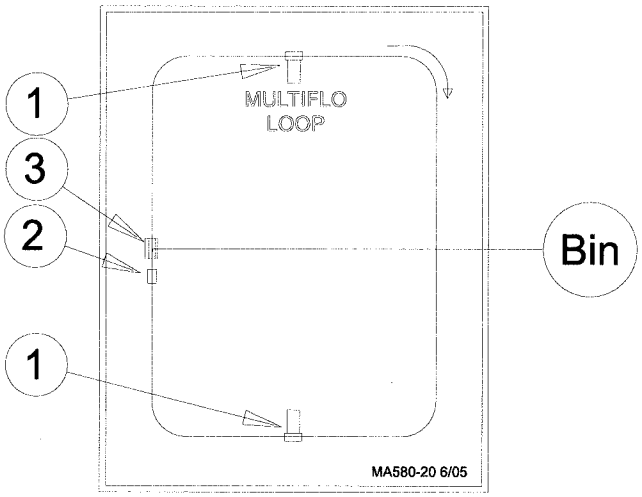


Diagrams below show possible power unit locations in relation to the FLEX-AUGER fill system.

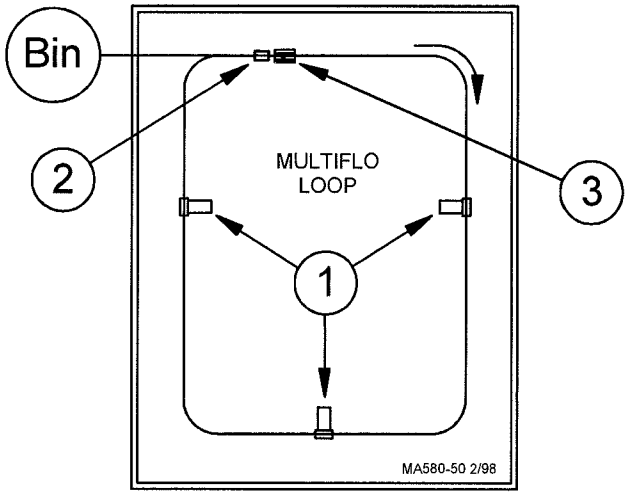
Example 5 One Motor System



Example 6 Two Motor System



Example 7 Three Motor System



Item	Description
1	Power Unit
2	Level Switch
3	MULTIFLO Boot

Remember, these are examples only. The MULTIFLO System's versatility will provide almost unlimited combinations of delivery system designs. **Follow these guidelines for placement of components.**

MULTIFLO® SPECIFICATIONS

The MULTIFLO® Feed Delivery System is a closed "loop" system which pulls the auger through the tube. The system is used primarily in nurseries, gestation, and dairy houses. **It is recommended for systems with running times of less than 2 hours per day and no high moisture corn.**

Read all instructions carefully and familiarize yourself with the components before beginning to install the MULTIFLO® system. Determine approximate layout of the system where each component will be placed, how much space it will require, how it will be suspended, and so forth. be careful to plan the system so it does not interfere with ventilation, watering systems, or other equipment in the building. "Examples of MULTIFLO® System Layout" on page 35 shows some possible MULTIFLO® "layouts". These are to be used as examples only.

Auger Information

7961MF Auger is specifically designed for use in MULTIFLO® Systems. It differs from standard 7961 Auger used with Model 55 Feeding Systems, the 7961MF Auger contains no factory brazes. MULTIFLO® Auger should be connected using an Auger Connector when it is necessary to join sections of the 7961MF Auger. However, the welding or brazing technique is acceptable. Remember, brazing MULTIFLO® auger is considerable different than for other Chore-Time auger systems (see MULTIFLO manual).

Auger Specifications

Auger Tube: 55 mm PVC Tube

Elbows: 90 degree, 2" (51 mm) I.D. two piece nylon elbow w/24" (610 mm) center line radius. **The maximum number of 90 degree elbows allowed for each MULTIFLO® loop is 4.**

180 degree, 2.12" (54 mm) O.D. x 2" I.D. Hardened Steel Elbow w/39" (990 mm) center to center turn. **The maximum number of 180 degree elbows allowed for each MULTIFLO® loop is 2.**

Auger: 7961MF for systems 400' (122 m) of shorter, auger should be one piece. Maximum length auger for shipment is 400' (122 m). It is important to specify length of the system when ordering auger. Auger for longer systems will be sent in most desirable section lengths. Example: for a 450' (137 m) MULTIFLO® System, it would be better to use two 225' (69 m) sections of auger than one 400' (122 m) section and one 50' (15 m) section. Specify system length and Chore-Time will supply the best available combination of auger. Handle auger carefully. Store flat if it is to be stored for a period of time prior to installation.

Auger Drive: Helical Gear.

Power Unit: Standard 1/2 HP, 62 RPM Direct Drive, 230 V, 60 Hz; 220 V, 50 Hz, Single Phase; 380 V, 50 Hz, 3 Phase

Hi-Speed 3/4 HP, 95 RPM Direct Drive, 230 V, 60 Hz, Single Phase

Power Unit Capacity: 400' (122 m) Effective Length. Effective Length is based on feed with 40 lb/cu.ft (64 kg/cu. meter) density.

System Capacity: 1200' (366 m) Effective Length (with three Power Units-maximum)

Delivery Capacity:

Standard: 15 lb/min (6.8 kg/min) with Model 55 FLEX AUGER® Fill System

Standard: 18 lb/min (8.1 kg/min) with Model 75 or HMC FLEX AUGER® Fill System @ 129 RPM

Hi-Speed: 50 lb/min (22.6 kg/min) with Model 75 or HMC FLEX AUGER® Fill System @ 348 RPM

Feed Types: Ground feeds, crumbles, and pellets up to/including 3/16" dia. x 1/2" long (4.7 x 12.7 mm), not to exceed 18% moisture. **The MULTIFLO® system is not recommended for high moisture feed.**

MULTIFLO® Effective Length Calculation

The Effective Length if a MULTIFLO System is calculated an shown. Before beginning to install the system, determine the Effective Length of the system.

Important: You must know the Effective Length before placing the power units, service section area, and other system components.

Effective Length = Total Feet (meters) of Straight Lengths

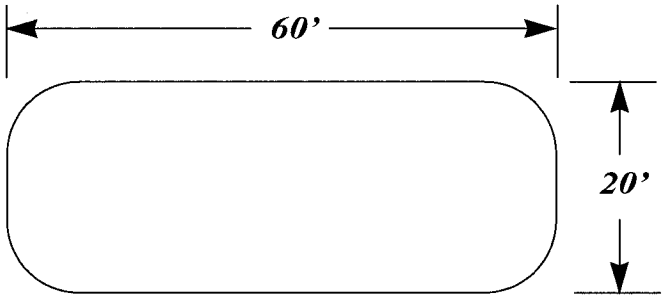
PLUS

Number of 90° Elbows x 30' (9.1 m)

or

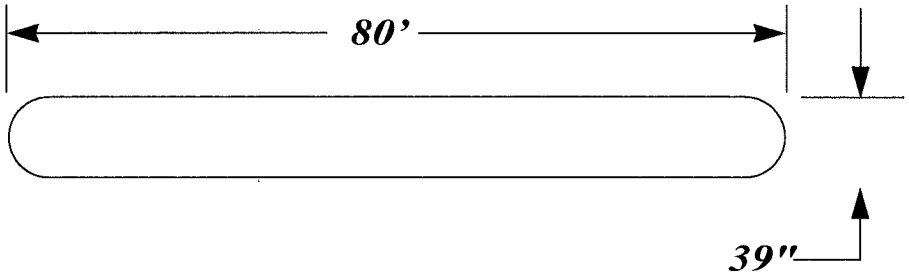
Number of 180° Elbows x 60' 18.2 m)

Example with 90° Elbow:



60' x 2 = 120', 20' x 2 = 40': given straight line length of 160'
4 (90 degree elbows) x 30' = 120': given elbow length of 120
Straight line length (160') + elbow length (120') = Effective Length (280')

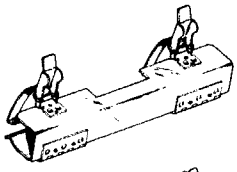
Example with 180° Elbow:



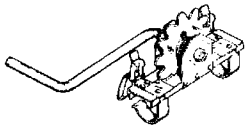
80' x 2 = 160': given straight line length of 160'
2 (180 degree elbows) x 60' = 120': given elbow length of 120'

Straight line length (160') + elbow length (120') = Effective Length (280')

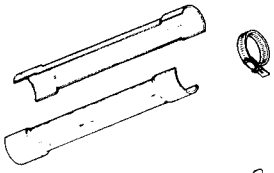
MULTIFLO® Components



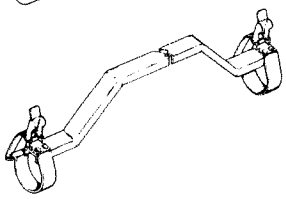
8264 MULTIFLO Auger Brazing Fixture



8697 MULTIFLO Hand Crank Assembly
9349 MULTIFLO Installation Kit (Includes: 8697 qty 3, 8264 qty 1)

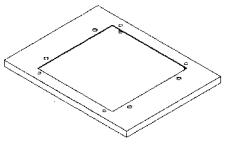


8710 MULTIFLO Service Section (1 per curcuit)

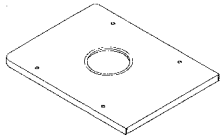


8227 MULTIFLO Bridge Clamp

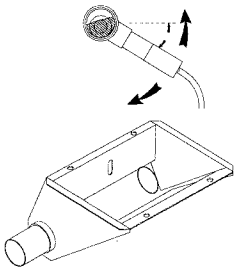
MULTIFLO Auger Connector (2 per bag)



45970 Adapter Plate Assembly

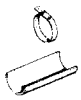


29872 Transfer Cover Plate

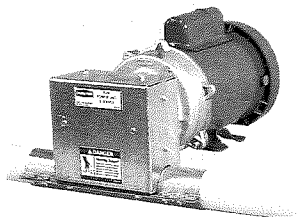


40508 MULTIFLO Proximity Sleeve Switch W/Overide Timer

14411 MULTIFLO Terminal Boot
47581 MULTIFLO Intermediate Boot
46325 MULTIFLO Hi Speed Terminal Boot
47582 MULTIFLO Hi Speed Intermediate Boot



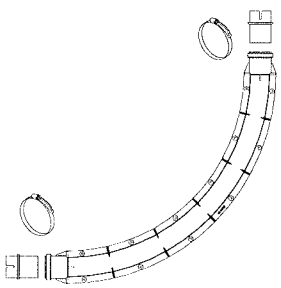
8719 Closure Kit (Includes: 8718 Closure qty 1, 8643 Clamp qty 2)



Drive Units

41013 1/2 Hp - 62 RPM Power Unit & Driver Assembly 230V-60hz - 1 Ph
41014 .4 Hp - 62 RPM Power Unit & Driver Assembly 220V-50hz - 1 Ph
28830 1/2 Hp - 62 RPM Power Unit & Driver Assembly 220/380V-50hz - 3 Ph
46311 3/4 Hp - 95 RPM Power Unit & Driver Assembly 230V-60hz - 1 Ph

MULTIFLO® Elbows

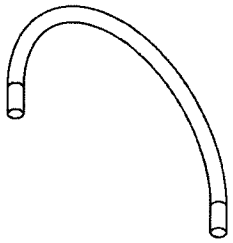


47950 MULTIFLO Elbow Kit

46779 Elbow Half

46778 MULTIFLO Adapter

47947 MULTIFLO Elbow Hardware Kit

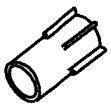


46720 MULTIFLO 180 Degree Elbow Kit

46719 MULTIFLO Elbow 180 Degree

40507 MULTIFLO 90 Degree Elbow (Includes: (1) 39204 Elbow, (2) 39200 Elbow Couplers, (2) 8643 Band Clamps)

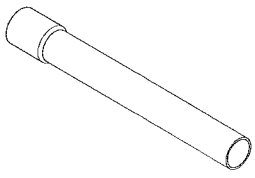
39204 Hardened Steel 90 Degree Elbow



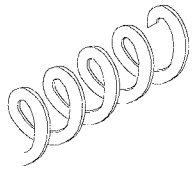
39200 Elbow Connector (used with 39204)

8643 Band Clamp (used with 39204 and 39200)

MULTIFLO® PVC Tubing and Auger



7955 Model 55, MULTIFLO Tube 10' *[3 m]*



7961MF MULTIFLO Auger

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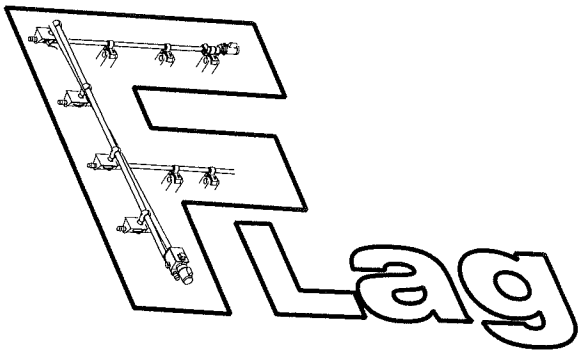
CHORE-TIME®

FLEX-AUGER® SYSTEMS



FLEX AUGER®

FLAG™ System

System information

General information

The FLAG™ System is designed for applications that require several distribution lines form one source location. The FLAG system consists of multiple FLAG feeder lines that are supplied by a Model 75 or Model 90 FLEX-AUGER® fill system. The FLAG system application is recommenced for low capacity delivery requirements such as Drop Feeding.

Specifications

The FLAG™ System is designed to convey dry meal, crumbles, or pellet feeds with particle size up to 1/8"*[4 mm]* in diameter and is not recommended for high-moisture feeds. The feed delivery rate of an individual line is 20 lbs/min *[9 kg/min]*. Maximum line length is 400'*[122 m]*.

The Fill System

The FLAG™ System is supplied with feed from a Model 75 or Model 90 FLEX-AUGER® Fill System. Depending on the application, there are options for the type of fill system layout that can be used including dead end, return, circulating, and return-to-bin. The appropriate FLEX-AUGER size for this purpose depends on the number of FLAG lines to be supplied. **See "Fill System Power Unit Selection Guide" on page 11** for determining the proper size to provide sufficient feed, without over-charging the system.

Part No. 30953 Delay/relay kit is recommended for use with the FLAG Fill System to avoid potential short cycling.

Transfer boot and switch

The transfer boots for the FLAG™ System are available in a single and twin configuration. When using a dead end fill system, Part No. 45970 adaptor plate will be needed to connect the control unit to the last transfer boot. It is advisable to use the Part No. 34779 proximity boot switch for all FLAG lines that may operate more than 10 minutes without feed. The boot switch will prevent excessive empty auger operation time.

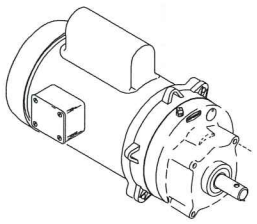
Auger

The FLAG™ System can be used in straight line applications only. The Part No. 25058F auger can be ordered in lengths from 50'*[15 m]* to 400' *[122 m]*.

Controls

The selection of available controls to operate the FLAG™ System will be based on the type of application. For a manual dumped Drop Feeding system, use the Part No. 47805-0 series interval timer(s) or the Part No. 46662 run/safety timer. For an automatic Drop Feeding system, use the Part No. 28999 control panel.

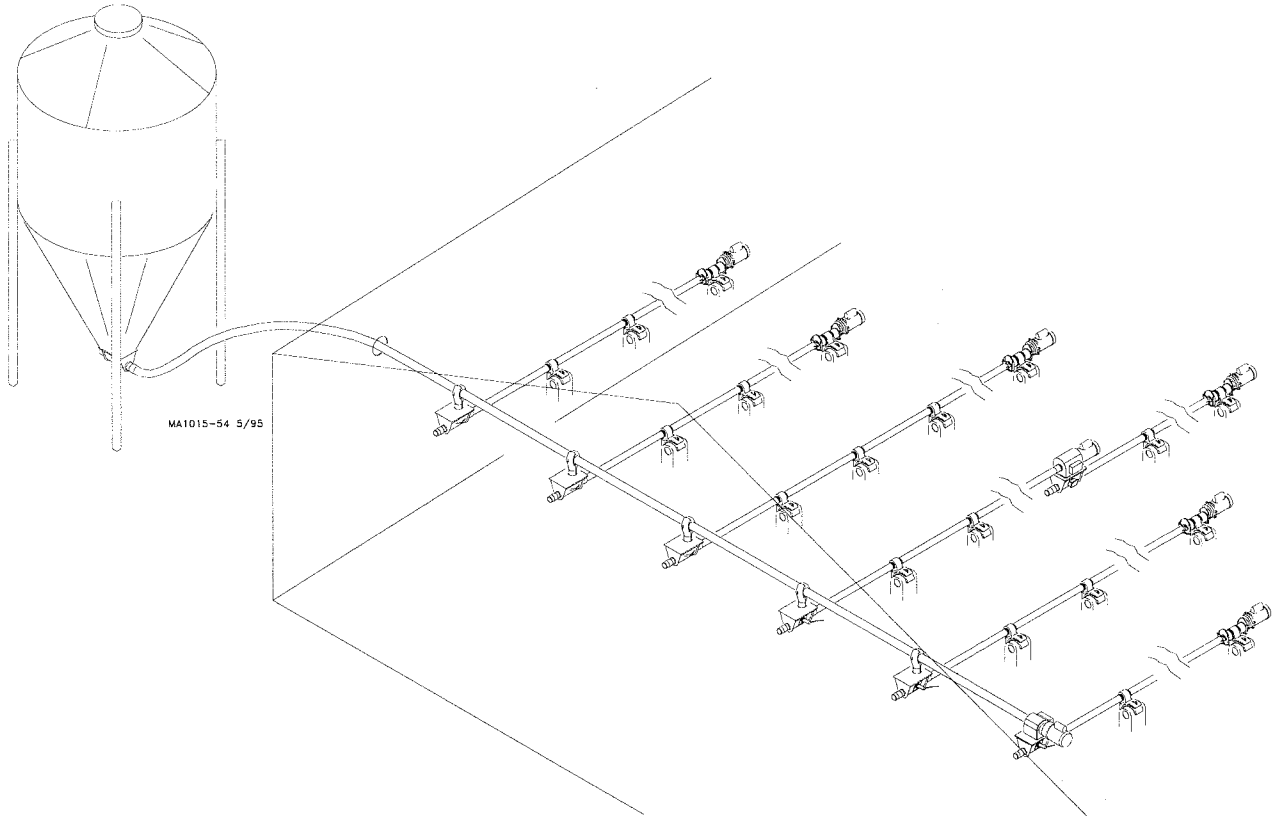
FLAG™ line power unit selection guide



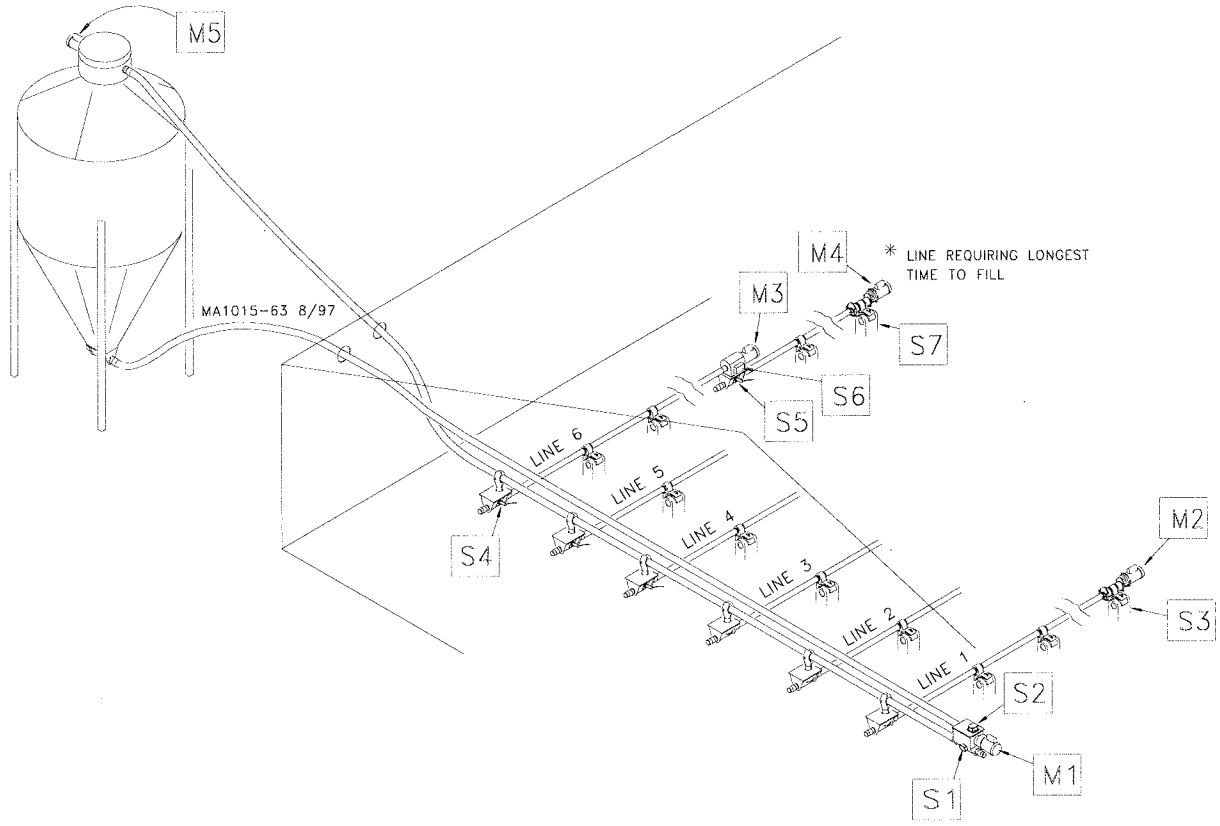
230 Volt 60 Hz 1 Phase	
Up to 200'*[61 m]* 3259-34	200'*[61 m]* to 400'*[122 m]* 3259-39
220 Volt 50 Hz 1 Phase	
Up to 400'*[122 m]* 3259-98	
220/380 Volt 50 Hz 3 Phase	
Up to 400'*[122 m]* 3259-100	

FLAG™ System Layouts

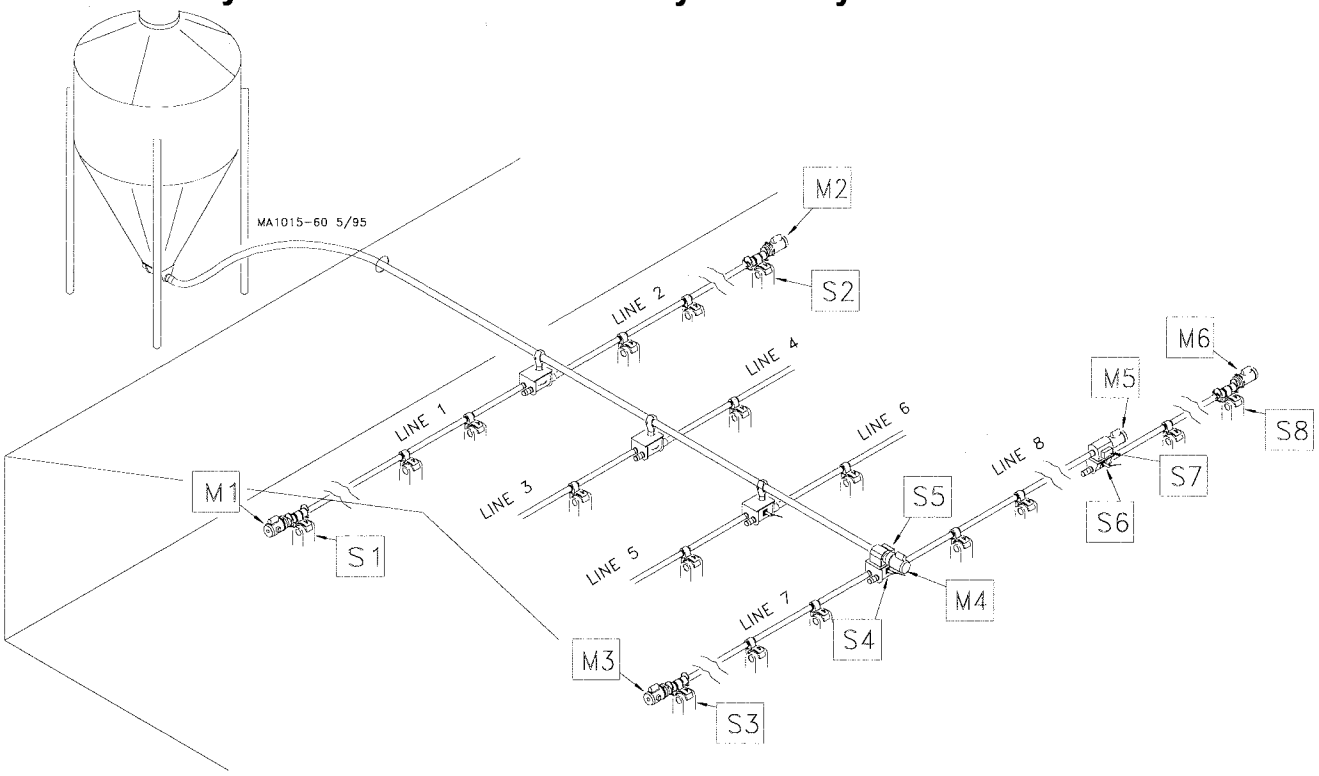
Standard FLAG™ System Layout



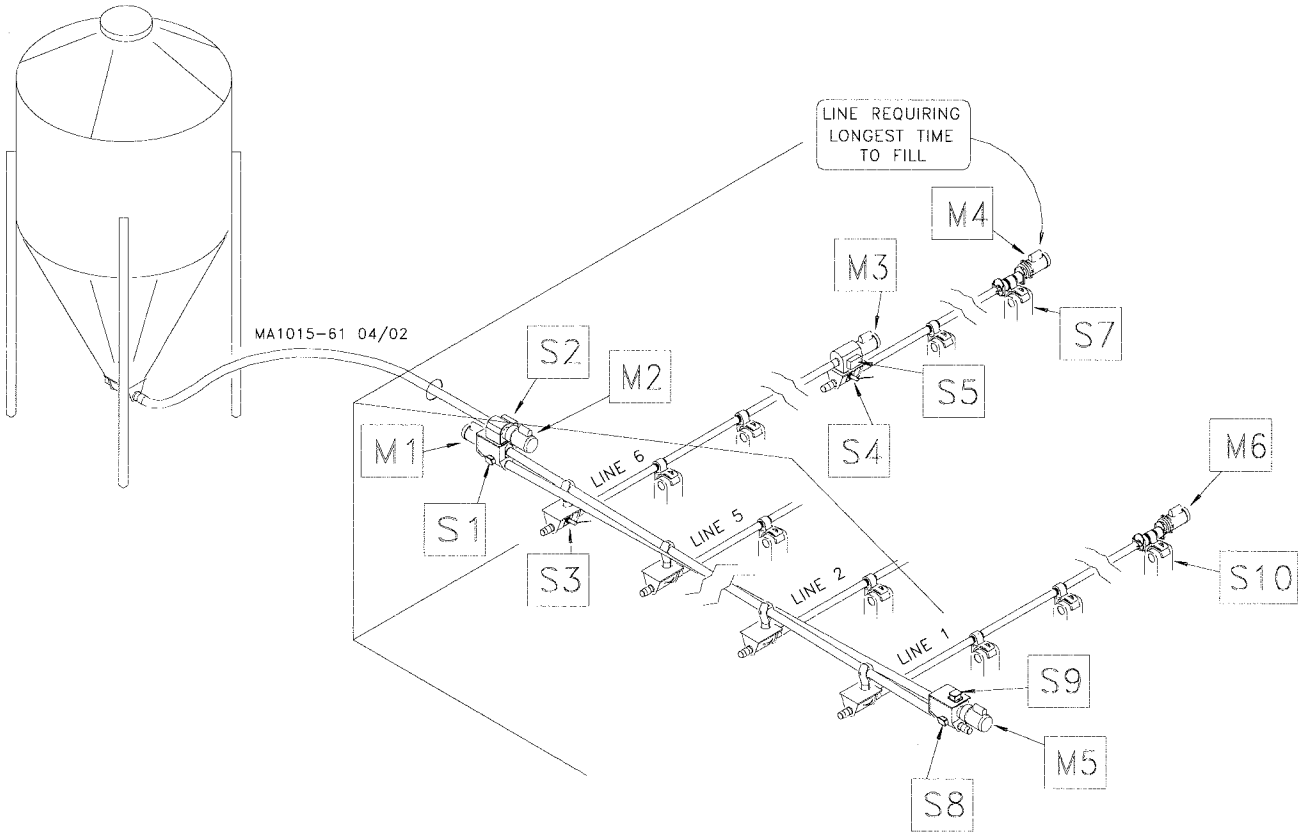
Alternate Layout FLAG™ Return Fill System Layout



Alternate Layout Twin Boot FLAG™ System Layout



Alternate Layout FLAG™ Circulating Fill System Layout



FLAG™ System Boot Options

Terminal Boot

The terminal boot is used on the last FLAG™ Line to fill on a dead end fill system. This line acts as the control line to shut off the fill system.

The delay relay kit will minimize short cycling of the fill system motor.

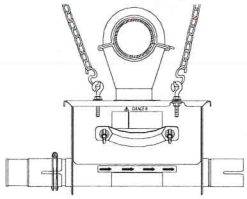
35727 Single Transfer Boot Assembly

45970 Adapter Plate

34779 Boot Switch (if required)

30953 Delay Relay Kit

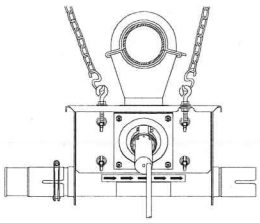
Transfer Boot



The transfer boot is the standard FLAG line boot. To be filled through outlet assemblies on the fill system.

35727 Single Transfer Boot Assembly

Transfer Boot with Proximity Switch

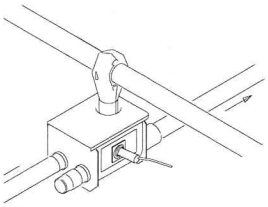


The proximity boot switch allows the FLAG line only to run when there is feed present. The boot switch should be used on any FLAG lines that might run empty longer than 10 minutes.

35727 Single Transfer Boot Assembly

34779 Boot Switch

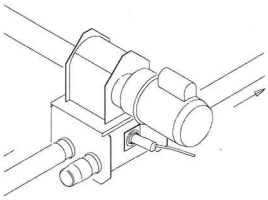
Center Twin Transfer Boot



35942 Twin Transfer Boot

34779 Boot Switch (if required) 2 required

Center Twin Terminal Boot



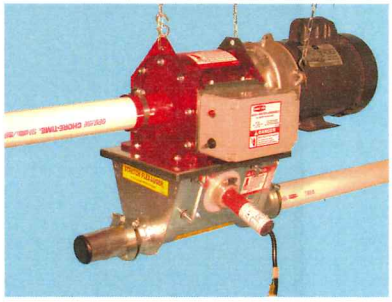
35942 Twin Transfer Boot

45970 Adapter Plate

34779 Boot Switch (if required) 2 required

30953 Delay Relay Kit

Extension Boot



The extension boot option allows extending the FLAG line/lines longer than 400' *[121.9 m]*.

35727 Single Transfer Boot

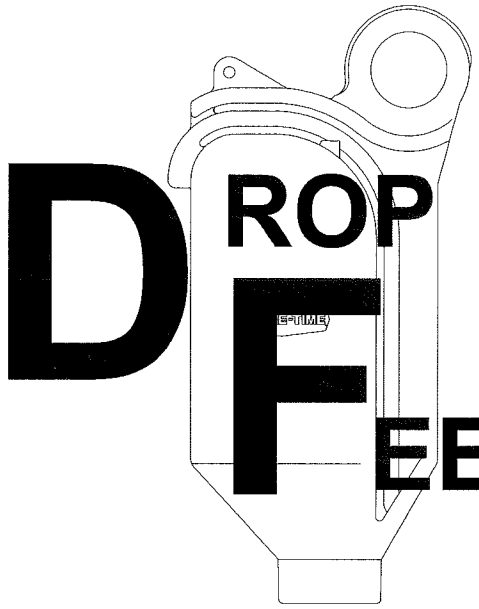
45970 Adapter Plate

34779 Boot Switch

46800-1 Control Unit

CHORE-TIME®

FLEX-AUGER® SYSTEMS



DROP FEEDING

Drop Feeding System

System Information

The Feed Delivery System

Determine the required FLEX-AUGER® System for the application. The Drop Feeding System can be used with the FLEX-AUGER Models 55, 75, and HMC, plus the MULTIFLO® and FLAG™ Systems. The FLEX-Auger control unit and hopper switch are not required for a Drop Feeding application.

Drop Feeders and Drop Feeder Control Units

Order the required number of drop feeders fro the system. Note: Each drop feeder control unit also functions as a drop feeder. One Drop Feeder control unit is required fro each FLEX-AUGER® or FLAG™ line. Drop Feeder control units are available with mechanical or electronic switches.

When the Part No. series 30370-0 mechanical control units are used with a manual trip system, a Part No. 28702 delay relay will be needed for each line unless a run timer or interval timer(s) are utilized. The Part No. series 34800-0 electronic Drop Feeder controls have built-in delays.

Feeding Control Options

The Drop Feeding system may be dumped manually or automatically depending on the application. For manual dumped systems; the Part No. 6306 manual trip lever (for up to 40 feeders) or the Part No. 29428 drum winch (for up to 200 feeders) can be used.

For automatic dumped systems use the Part No. 28990-9 linear actuator (for up to 120 feeders) or the 28990-18 linear actuator (for up to 240 feeders). The linear actuator(s) are used with the Part No. 28999 Drop Feeder control panel. One Part No. 28999 Drop Feeder control panel will operate up to four actuators. A contactor is required for the Drop Feeder control to operate the fill systems. An additional contactor is required if more than one actuator is used.

Drop Tubes

Order, as needed, the appropriate drop tube and drop tube clamps (see listing).

Cable

For manually activated systems, order enough cable for the length of each feeding system line. For automatically activated systems, order enough 1/8" *[3.2 mm]* cable for each line plus order 3/16" *[4.8 mm]* master cable to be used from the linear actuator to the feeder line cables.

Note: HMC Drop Feeding systems are not to be used for feeds above 27% moisture.

Drop Feeding System Layouts

Linear Actuator Installations

Note: The linear actuator is optional and must be ordered separately. Information included in this manual is for planning and reference purposes only. The linear actuator instruction manual includes comprehensive planning, installation, parts listing, switch adjustment information, and wiring diagrams. The linear actuator installation manual is shipped with the linear actuator.

The Part No. 28990-9 linear actuator has the capability of operating up to 120 Drop Feeders.

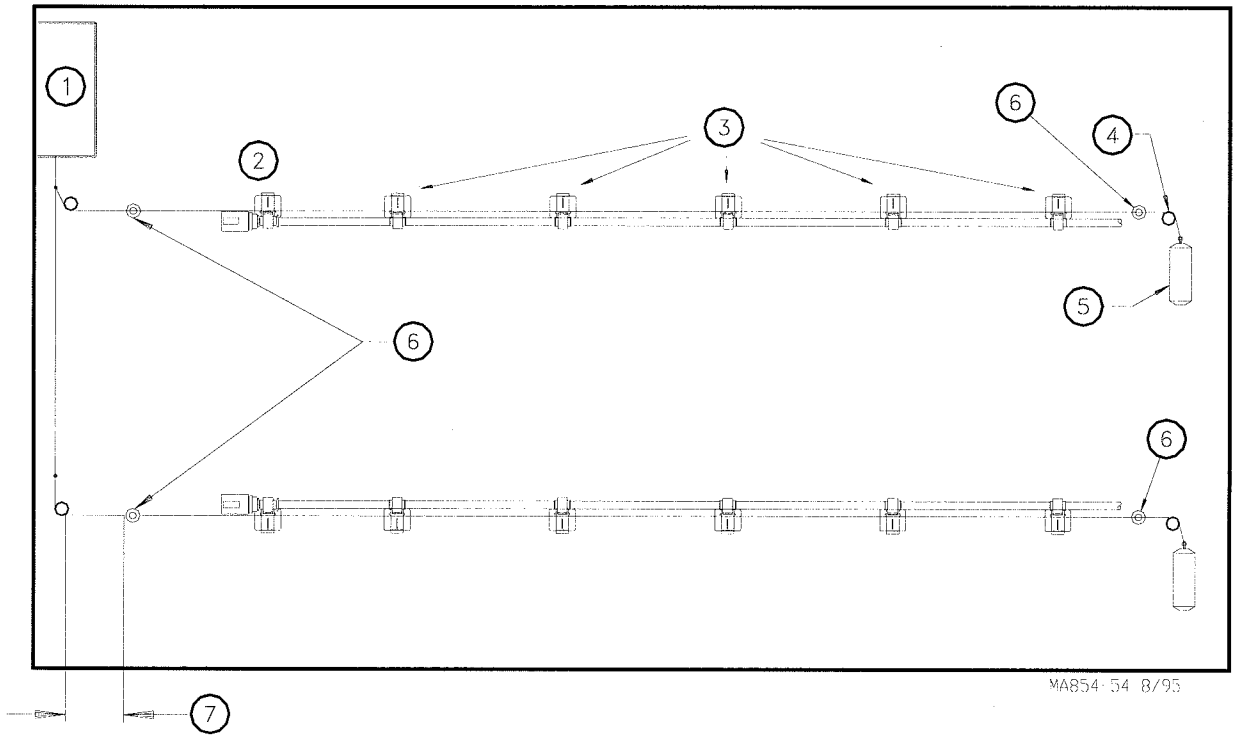
The Part No. 28990-18 linear actuator has the capability of operating up to 240 Drop Feeders.

When installing a linear actuator, allow room at the end of the system for the weight kit to move freely.

The linear actuator uses a 3/16" *[4.8 mm]* stainless steel master cable and a 1/8" *[3.2 mm]* stainless steel cable for the balance of the system. The maximum length of 1/8" *[3.2 mm]* stainless steel cable allowed per line is 200' *[61 m]*. If installing a 28990-18 linear actuator, allow enough room to install the double-back cable hook-up, as specified in the linear actuator installation manual. One anti-cable wrap ball should be installed on each horizontal length of 1/8" *[3.2 mm]* that runs between two pulleys.

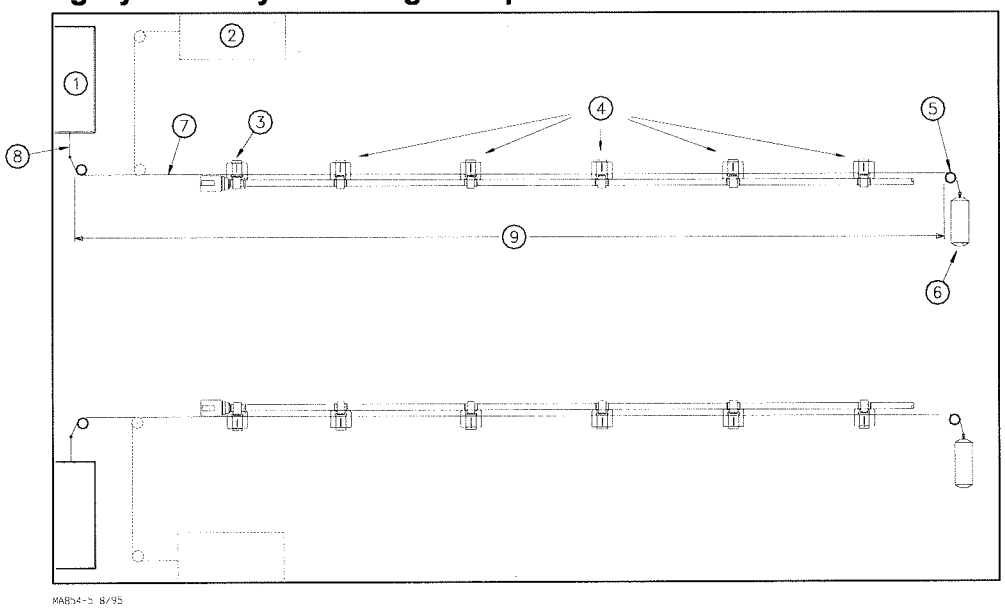
Note: On long cable runs, it may be necessary to install two anti-cable wrap balls to prevent cable from twisting.

Drop Feeding system layout



Item	Description
1	Linear Actuator
2	Drop Feeder Control Unit
3	Drop Feeder
4	Pulley
5	Weight
6	Anti-Cable Wrap Ball
7	This distance must be greater than cable travel
8	3/16" Master Cable
9	1/8" Cable

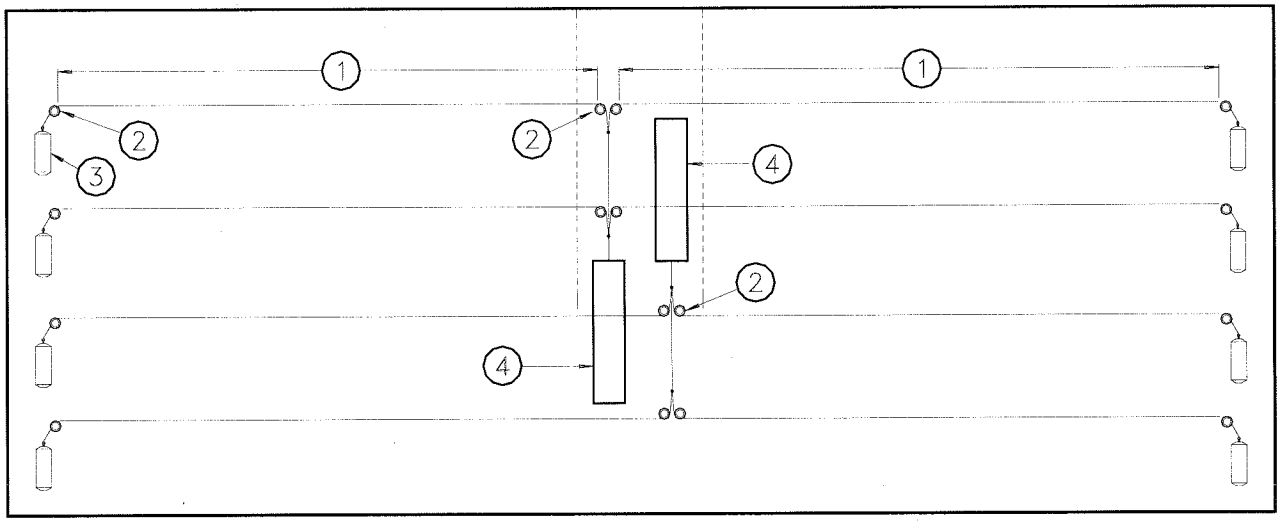
Drop Feeding System Layout Using Multiple Linear Actuators



MA854-5 8/95

Item	Description
1	Linear Actuator
2	Linear Actuator (optional location)
3	Drop Feeder Control Unit
4	Drop Feeder
5	Pulley
6	Weight
7	1/8" *[3.1 mm]* Stainless Steel Cable
8	3/16" *[4.7 mm]* Stainless Steel Cable
9	200' *[61 m]* Maximum

Drop Feeding System Layout Using Multiple Linear Actuators

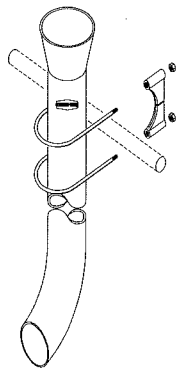


MA854-6 8/95

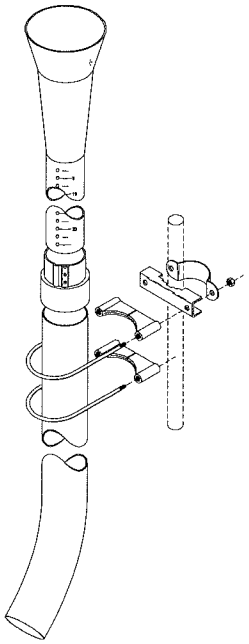
Item	Description
1	200' *[61 m]* Maximum
2	Pulley
3	Weight
4	Linear Actuator
5	3/16" *[4.7 mm]* Master Cable
6	1/8" *[3.1 mm]* Cable

Drop Feeding System Components

Drop Tube and Mount Kits



PART NO 8532-48	PVC DROP TUBE 48 INCH LENGTH (121.92 cm) Not for swine application	
PART NO 8532-58	PVC DROP TUBE 58 INCH LENGTH (147.32 cm) Not for swine application	
PART NO 6477	1/4-20 "U" BOLT	PARTS OF HORIZONTAL MOUNT KIT
PART NO 4135	CLAMP	
PART NO 751	1/4-20 HEX NUT	
PART NO 6508	HORIZONTAL MOUNT KIT	



PART NO 38724	TWO PIECE DROP TUBE 58" (147.32cm) combined length	
PART NO 34408	ADJUSTABLE DROP TUBE	
PART NO 38629	METAL DROP TUBE	
PART NO 6477	1/4-20 "U" BOLT	PARTS OF THE VERTICAL MOUNT KIT
PART NO 4139	TUBE CLAMP WELDMENT	
PART NO 7821	CLAMP BRACKET	
PART NO 6630	TOP CLAMP	
PART NO 751	1/4-20 HEX NUT	
PART NO 7566	VERTICAL MOUNT KIT	

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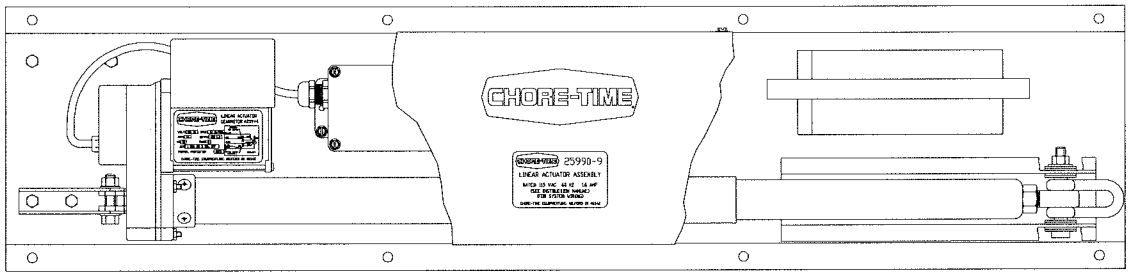
Drop Feeder Actuator

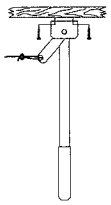


LINEAR ACTUATOR

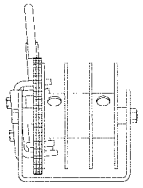
PART NO 28990-9 LINEAR ACTUATOR 220V-60HZ-1PH
120 MAX DROP FEEDER

PART NO 28990-18 LINEAR ACTUATOR 220V-60HZ-1PH
240 MAX DROP FEEDER

ACTUATOR MISC.

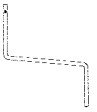


PART NO 6306 MANUAL TRIP LEVER
OPERATES 30-40 FEEDERS

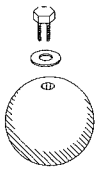


PART NO 29428 DOUBLE DRUM WINCH
OPERATES UP TO 200 FEEDERS

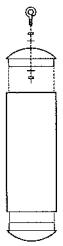
PART NO 2884-1 DRIVE TUBE (USE WITH 29428)



PART NO 2885 DRIVE HANDLE (USE WITH 2884-1)



PART NO 9720 ANTI-CABLE WRAP KIT



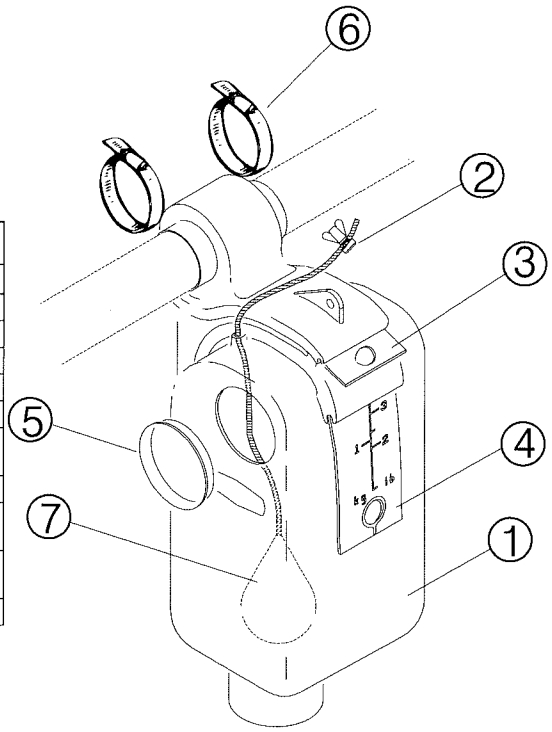
PART NO 26051 WEIGHT KIT
THIS KIT IS USED TO PROVIDE
TENSION FOR THE MAIN CABLE
THAT OPENS THE OUTLET

DROPACC,CDR

Drop Feeders

Drop Feeder	
Part No.	**Description**
30361-1	MODEL 55 Drop Feeder
30361-2	MODEL 75 Drop Feeder
30361-3	MODEL HMC Drop Feeder

Drop Feeder Components		
Item	**Part No.**	**Description**
1	30373-1	MODEL 55 Drop Feeder Body
	30373-2	MODEL 75 Drop Feeder Body
	30373-3	MODEL HMC Drop Feeder Body
2	13057	Cable Clamp (Used to connect dump ball assembly to main cable)
3	26138	Shut-off Slide (Used to keep a feeder from filling)
4	33884	Adjustment Slide (Used to set the amount of feed to be dispensed from each feeder)
5	9965	Hole Plug (Used to cover access hole)
6	8643	Hose Clamp (Used to secure the drop feeder to the tube Model 55)
	6183	Hose Clamp (Used to secure the drop breeder to the tube Model 75 and HMC)
7	6296	Dump Ball Assy (Used with all Drop Feeders)

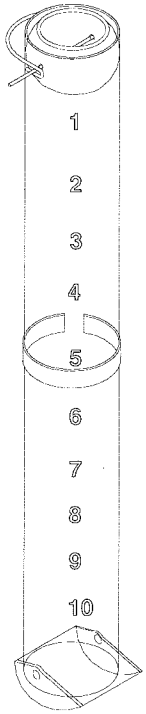


Electrical Parts for Drop Feeder Control Units	
Part No.	**Description**
28702	Delay Kit (Delays motor start-up to allow manual trip lever to function on mechanical control units)
28904	240 Volt Relay (For proximity switch application)
34255	Proximity Switch
23779	1/2" Liquid Tight Connector
7114	Actuator Switch (For 30370 Control Units)

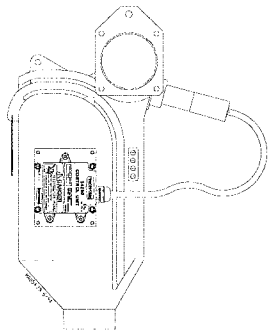
Farrowing Drop

Farrowing Drop	
Part No.	**Description**
44058	11 lb. Farrowing Drop Feeder Kit

Manually operated Drop Feeder
For: Model 55 or Model 75 Outlet Assembly



Drop Feeder Control Units



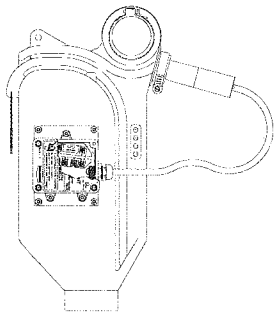
DEAD END (TERMINAL) DROP FEEDER CONTROL UNITS

PART NO 34800-10 220V-50/60HZ-1PH
MODEL 55 DROP FEEDER CONTROL UNIT (COMPLETE)

PART NO 34800-11 220V-50/60HZ-1PH
MODEL 75 DROP FEEDER CONTROL UNIT (COMPLETE)

PART NO 34800-12 220V-50/60HZ-1PH
MODEL HMC DROP FEEDER CONTROL UNIT(COMPLETE)

DROP FEEDER CONTROLS AND INTERMEDIATE CONTROLS WITH PROXIMITY SWITCHES



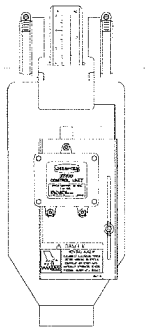
THE DROP FEED CONTROL UNIT CONTROLS THE DELIVERY AUGER MOTOR,

PART NO 34800-7 220V-50/60HZ-1PH
MODEL 55 INTERMEDIATE DROP FEEDER CONTROL UNIT (COMPLETE) / MULTIFLO CONTROL UNIT

PART NO 34800-8 220V-50/60HZ-1PH
MODEL 75 INTERMEDIATE DROP FEEDER CONTROL UNIT (COMPLETE)

PART NO 34800-9 220V-50/60HZ-1PH
MODEL HMC INTERMEDIATE DROP FEEDER CONTROL UNIT (COMPLETE)

MECHANICAL DROP FEEDER END CONTROL UNITS



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PART NO 30370-1 220V-50/60HZ-1PH
MULTIFLO DROP FEEDER CONTROL UNIT (COMPLETE)

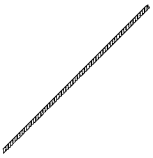
PART NO 30370-2 220V-50/60HZ-1PH
MODEL 55 DROP FEEDER CONTROL UNIT (COMPLETE)

PART NO 30370-3 220V-50/60HZ-1PH
MODEL 75 DROP FEEDER CONTROL UNIT (COMPLETE)

PART NO 30370-4 220V-50/60HZ-1PH
MODEL HMC DROP FEEDER CONTROL UNIT

Suspension Components

CABLES



PART NO 4973 3/32 INCH 7X7 GALV CABLE BREAK STRENGTH 920#

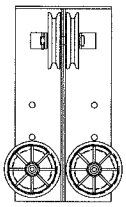
PART NO 7130 3/32" 7 X 7 STAINLESS STEEL CABLE BREAK STRENGTH 910#

PART NO 8580 1/8" 7 X 7 STAINLESS STEEL CABLE BREAK STRENGTH 1,700#

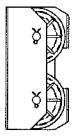
PART NO 27975 1/8 INCH 7X7 GALV CABLE BREAK STRENGTH 1,799#

PART NO 1213 3/16 INCH 7X7 GALV. CABLE BREAK STRENGTH 3,700#

PART NO 13976 3/16 INCH 7 X 19 GALV CABLE BREAK STRENGTH 4,200#



PART NO 27111 TWO-WAY PULLEY KIT 90 DEGREE



PART NO 27302 DOUBLE PULLEY

PART NO 7886 PULLEY ASSEMBLY

CEILING SUPPORT

PART NO 1214 STANDARD SCREW HOOK WORKING LOAD 200 #

PART NO 2041 LARGE SCREW HOOK WORKING LOAD 200 #

DROPSUSP.CDR

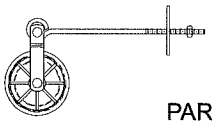
CABLE CLAMPS

PART NO 732 CABLE CLAMP FOR 3/16 INCH CABLE

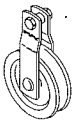
PART NO 14898 CABLE CLAMP FOR 1/8 INCH CABLE

PART NO 13057 PLASTIC CABLE CLAMP FOR 1/8 INCH CABLE AND ROPE

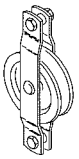
PART NO 6478 SPLIT BOLT FOR 3/32 INCH CABLE



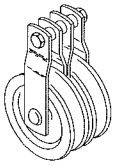
PART NO 2617 MASTER PULLEY



PART NO 2500 LARGE PULLEY WORKING LOAD 1,000#

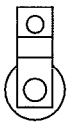


PART NO 2501 DOUBLE EYE PULLET WORKING LOAD 1,000 #



PART NO 2502 DOUBLE PULLEY

PART NO 3004 SMALL PULLEY WORKING LOAD 200 #



PART NO 28649 SPLIT PULLEY WORKING LOAD 200#

PART NO 723 "S" HOOK SMALL MAX WORKING LOAD 52 #

PART NO 2805 "S" HOOK 9 GA. MAX WORKING LOAD 96 #