FOR DEALER USE ONLY

TOPDRY SYSTEMS

Product Information Guide

PROVEN & DEPENDABLE™

www.grainsystems.com

WARRANTY INFORMATION

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user's sole remedy (and GSI's only obligation) is to repair or replace, at GSI's option and expense, products that in GSI's judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

Warranty Extensions: The Limited Warranty period is extended for the following products:

	Product	Warranty Period
AP Fans and Flooring	Performer Series Direct Drive Fan Motor	3 Years
	All Fiberglass Housings	Lifetime
	All Fiberglass Propellers	Lifetime
AP and Cumberland	Flex-Flo/Pan Feeding System Motors	2 Years
Cumberland Feeding/Watering Systems	Feeder System Pan Assemblies	5 Years **
	Feed Tubes (1.75" & 2.00")	10 Years *
	Centerless Augurs	10 Years *
	Watering Nipples	10 Years *
Grain Systems	Grain Bin Structural Design	5 Years
Grain Systems/Farm Fans/Zimmerman	Portable and Tower Dryers	2 Years
	Portable & Tower Dryer Frames and Internal Infrastructure †	5 Years

* Warranty prorated from list price:
0 to 3 years – no cost to end-user
3 to 5 years – end-user pays 25%
5 to 7 years – end-user pays 50%
7 to 10 years – end user pays 75%

** Warranty prorated from list price:
0 to 3 years – no cost to end-user
3 to 5 years – end-user pays 50%

† Motors, burner components and moving parts not included. Portable Dryer screens included. Tower Dryer screens not included.

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12th) month from the date of purchase and continuing until the sixtieth (60th) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

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Bin dryers are still used in large numbers, but mostly for small farm or specialty grain. As demand grew for higher capacity so have the sales of Portable and Tower Dryers.

Conventional bin dryers all share the same issues.

- **As grain depth increases airflow is reduced and static pressure increases. The high static pressure eliminates the use of the lower speed higher airflow fans so a 3500 rpm high speed Axial or 1750 Centrifugal must be used which requires much higher horsepower.**
- **As the diameter of the bin increases getting the grain level to promote even drying is difficult.**
- **Diameters over 30' make even plenum temperature harder to achieve, particularly with a downstream fan on a Centrifugal fan.**

All of the above make a conventional drying bin larger than 36' difficult and because airflow is directly tied to capacity high capacities cannot be achieved. Drying in Batch's of two rings at a time improves capacity, but increases labor and management to a level few will accept. In bin continuous systems like DMC's GrainFlow improve the capacity to the maximum achievable, but this is still limited at 10 point removal to 400 bu./hr assuming the grain never gets deeper than 8'. It also works best with the use of a Stir-Ator for better airflow and to keep the grain level. To operate like this you need a wet bin and all of the augers and automation that a portable dryer uses and requires 60 hp when a 15 hp fan will give you 450 bph in a portable dryer. A properly set up drying bin works well and is the best choice in many cases for 100 to 300 bu./hr. capacities, but will not meet the greater capacity demands of today.

The TopDry still utilizes a bin but the addition of a peaked drying floor in top of the bin provides more grain in process compared to the same depth with a flat floor. The grain flows into the top and special leveling bands keep the grain in a uniform depth without any need for a leveling device. The grain depth never exceeds 32" of depth in a batch system and with the AutoFlow the grain depth drops to less than half that number. This allows the static pressure to be low enough to use the same high capacity 1750 rpm large diameter axial fans that the Portable and Modular Tower Dryer use. This increases the airflow and capacity several fold.

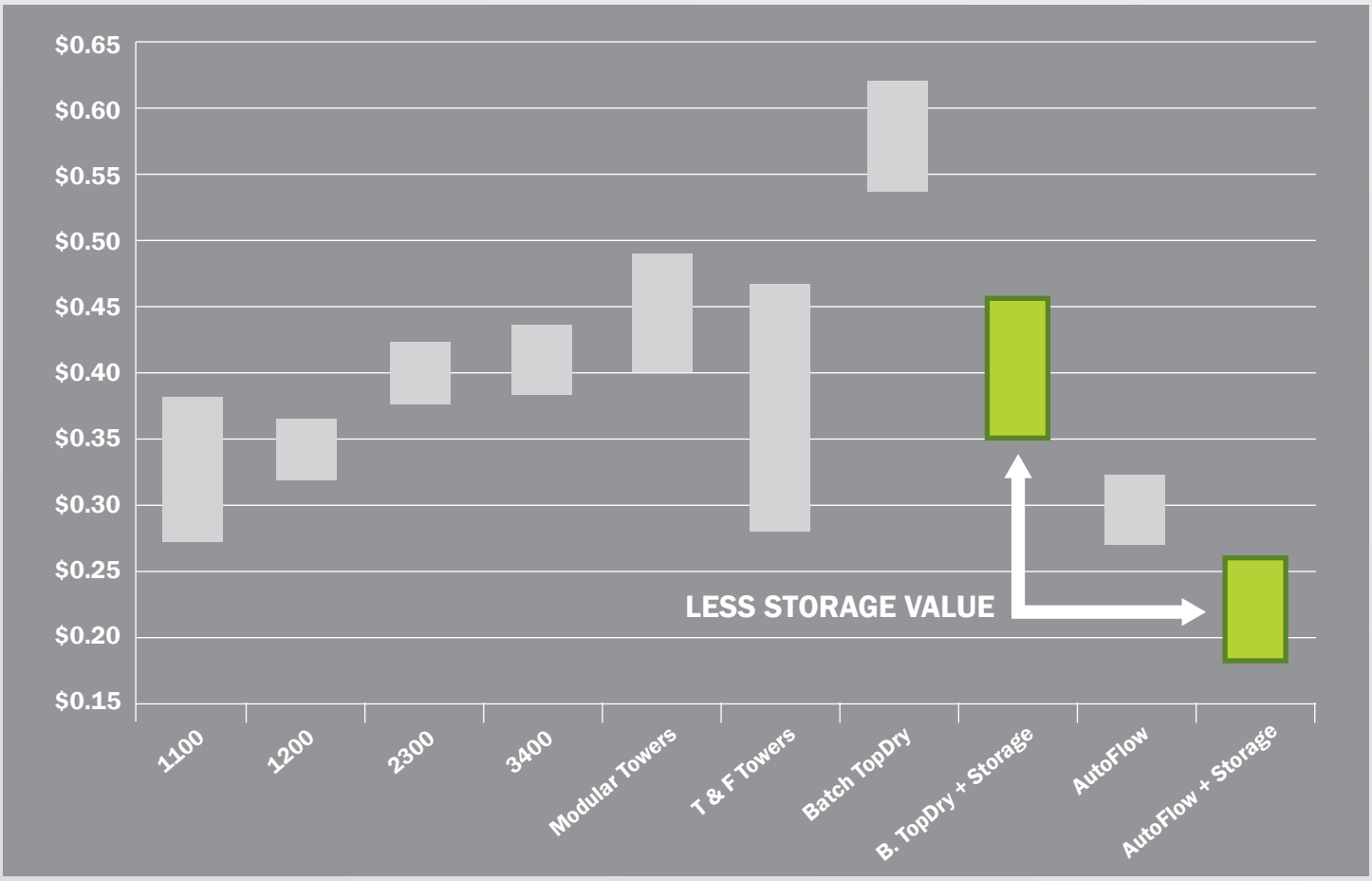
Combine this with a low overall airflow, lower normal plenum temperatures and that the grain cooled in the bottom storage chamber of the TopDry returns all of the heat and its airflow to the capacity and efficiency of the TopDry and you have high capacity, highest efficiency and the best grain quality of any system GSI offers.

Bin Type & Grain Depth	Plenum Temp.	Max HP	Air Flow CFM	Static Pressure	Cap. 10 pts Bu/Hr
36' Stir-Ator 16'	140 degrees	30 HP Cent.	19,900	7.3"	131
36' GrainFlow & Stir-Ator 8'	150 degrees	60 HP Cent.	35,640	9.1"	404
36' AutoFlow	200 degrees	60 HP Axial	81,604	2.7"	1,378

Could using a wet tank with automation, higher plenum temperatures at 180, a 48' dia. bin & 150 hp in multiple Centrifugal fans increase conventional bin capacities? Yes, but it will not hit 1,000 bu./hr., would require never going over 8' of grain depth, perfect management and would be as expensive as the same diameter TopDry . A TopDry is a high capacity drying system with a much lower management requirement. It also cost less than a comparable capacity Portable or Tower Dryer while providing 11,300 bu. (24'), 19,788 bu. (30') or 32,549 bu. (36') bushels of storage.

GSI 2013 Segmentation Data

An AutoFlow TopDry has the lowest cost per yearly delivered bushel drying capacity in the industry.



Initial Installed Retail Purchase Cost per Yearly Bushels Dried

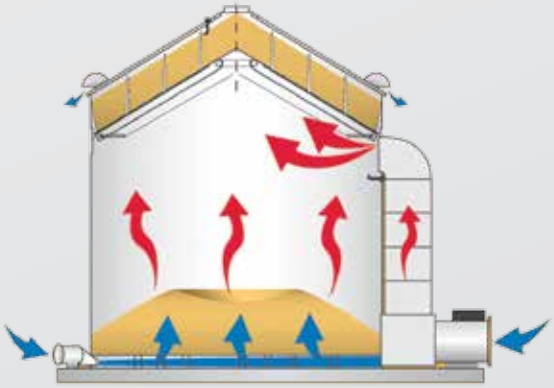
1100 Series A.H.	$0.27 to $0.38/Bu.
1200 Series A.H.	$0.32 to $0.36/Bu.
2300 Series D&C	$0.38 to $0.42/Bu.
3400 Series D&C	$0.39 to $0.44/Bu.
Modular Towers D&C	$0.40 to $0.49/Bu.
T&F Towers D&C	$0.28 to $0.47/Bu.
Batch TopDry D&C	$0.54 to $0.62/Bu.
B. TopDry + Storage	$0.35 to $0.45/Bu.
AutoFlow D&C	$0.27 to $0.32/Bu.
AutoFlow + Storage	$0.19 to $0.26/Bu.

5 pt Rating X 20 hrs/day & 15 days of operation / Retail Installed Cost
TopDry storage valued at $2.00 per bushel

WHAT IS A BATCH TOPDRY

Physical Description

A Batch TopDry is a bin with a peaked floor in the upper ring of the bin. The floor has a series of leveling bands that keep the grain depth at 32". The fan(s) and heater(s) have ductwork that puts the heated air into the top of the storage area underneath the drying floor. The aeration fan under the aeration floor both cools the dried grain and adds air and heat to the drying process. This use of the aeration air and heat from the cooling process helps make the TopDry an efficient system on both electricity and fuel. The control system is a simple straight time control using supplied time charts or is controlled by grain temperature using four electronic temperature sensors. Control can be either time, temperature or a combination of the two.



	24'	30'	36'
Batch Size	1,000 bu.	1,500 bu.	2,160 bu.
Maximum Storage	11,738 bu.	20,443 bu.	32,549 bu. (new 12 ring)

Airflow Range & Max. Daily Bushels at 10 pt removal

Dia.	Low CFM	CFM/Bu.	High CFM	CFM/Bu.	Batches/day	Max. Bu./day at 10 pt. rem.
24'	25,200	25.2	31,400	31.4	7	7,000
30'	28,300	18.9	47,300	31.6	7	10,500
36'	32,200	15.0	74,200	34.4	7	15,120

Basic Operation

The drying chamber is filled with wet grain and the fan(s) & heater(s) are started. If the grain is above 20% the drying chamber is refilled approximately half way through the drying time. The fans stop when the time and/or temperature are met. The Operator then dumps the grain and starts the process over. As long as there is enough truck or wagon storage to fill the drying chamber available no wet bin is required to keep the system running efficiently. Periodically grain must be moved to other storage, but his can be done while the drying process continues.

How Easy Can it Get? Below are the entire startup and shutdown instructions for a Batch TopDry.

Start Up

1. Fill the TopDry Drying Chamber
2. Turn on control power, make sure grain temperature is set to recommended, drying time is set for the chart number at the moisture and plenum temperature. *(Time can be reduced to 1⁄2 for auto temp. control after final moisture is verified)*
3. Start the Fan & Heater.
4. When Fan & Heater stop, turn the winch and unload the batch into the storage chamber. Start process over again.

Shut Down at the end of the year

1. After drying the last batch if you intend to store in the drying chamber Install your fan inlet cover(s) on the drying fan(s) and let the aeration fan cool the grain. After grain is cooled in the upper drying chamber you can dump or leave it in the top chamber to store. If you are not storing in the drying chamber dump the last batch and allow the aeration fan to cool the grain and install the fan inlet cover(s)
2. For long term storage allow the aeration fan to run until the grain kernels are equalized in moisture. This usually takes 10 - 15 days. Grain from any drying bin should be the first that you market.

Physical Description

An AutoFlow TopDry is a bin with a peaked floor in the upper ring of the bin. The floor has a series of leveling bands that provide a declining grain depth as the grain moves to the outside of the bin. The fan(s) and heater(s) have ductwork that puts the heated air into the top of the storage area underneath the drying floor. The aeration fan under the aeration floor both cools the dried grain and adds air and heat to the drying process. This use of the aeration air and heat from the cooling process helps make the TopDry an efficient system on both electricity and fuel. The control system is completely automated with control over the fill system, the fan(s) and heater(s) and dump chutes with complete monitoring and safety equipment in place. It can be controlled by straight time control using the supplied time charts or controlled by grain temperature using four electronic temperature sensors. Control can be either time, temperature or a combination of the two.

	24’	30’	36’
Batch Size	560 bu.	845 bu.	1,215 bu.
Dump Size	187 bu.	282 bu.	304 bu.
Maximum Storage	11,738 bu.	20,443 bu.	32,549 bu. (new 12 ring)

Airflow Range & Max. Daily Bushels at 10 pt removal

Dia.	Low CFM	CFM/Bu.	High CFM	CFM/Bu.	Max. Bu./hr at 10 pt. rem.*	Max. Bu./day at 10 pt. rem. 20 hrs
24’	27,200	48.6	39,800	71.0	702	14,040
30’	35,500	42.0	62,700	74.2	1,096	21,920
36’	46,000	37.9	84,000	69.1	1,378	27,560

Basic Operation

With wet grain in the wet bin and the switches, timers and temperatures set as the start up page lists you push the start button. When the grain fully covers the low level switch the fan(s) & heater(s) start. After the controls have dumped 5 times reduce the drying time to half and the AutoFlow will run automatically controlling the moisture for as long as there is grain in the wet bin. All functions are monitored and when the wet grain is exhausted the system shuts down cooling the drying chamber for however much time is set on the cool timer. The aeration fans then finish cooling the grain in the storage chamber. The next morning or within 24 hours restarting is as simple as pushing the stop button to reset the system and then pushing start to go back doing what it did the day before. Periodically grain must be moved to other storage, but his can be done while the drying process continues.

**The TopDry literature capacity rating are at the minimum aeration recommendation and is the most conservative rating GSI provides for any dryer.*

How Easy Can it Get? Below are the entire startup and shutdown instructions for an Autoflow TopDry.

Start Up

1. Turn both Control power, and if present 24 volt power on, then when you see the Date press Reset
2. Set aeration fan, load, fan, burner & dump switch to Auto, then press green start switch.
3. Operate using Time & Temperature on the first 5 dumps. After the 5th dump Reset Time to one half the chart setting

Shut Down at the end of the year

1. Shut down the TopDry when the last grain enters the chamber.
2. Set dry time for twice the normal chart settings and push reset. With the Dry & Hold Switch on run until TopDry shuts down.
3. Install fan inlet cover, let the aeration fan cool the grain. After grain is cooled either dump or leave it in the top chamber to store.
4. For long term storage allow the aeration fan to run until the grain kernels are equalized in moisture. This usually takes 10 - 15 days. Grain from any drying bin should be the first that you market.

Usage Recommendations for Batch TopDry

Batch TopDry's are most popular where

- ✓ A very simple, easy to operate, high speed dryer is desired. (Up to 15,120 bu./day)
- ✓ Very good grain quality and the highest efficiency is a priority
- ✓ A minimum of equipment and low total cost is needed. (No wet bin or other equip. req.)
- ✓ Additional storage is a priority
- ✓ A reasonably high capacity is needed now, but as much as three times the daily capacity will be needed later. (Add a fan & convert to AutoFlow)

Avoid using Batch TopDry's where

- ✓ Operations that want 24 hour continuous operation.
- ✓ Where grain cannot easily be moved from the TopDry to other storage.
- ✓ Where grain may be moved before completely cooled to bins which do not have adequate aeration with a full floor.

Usage Recommendations for AutoFlow TopDry

TopDry's AutoFlow's are most popular where

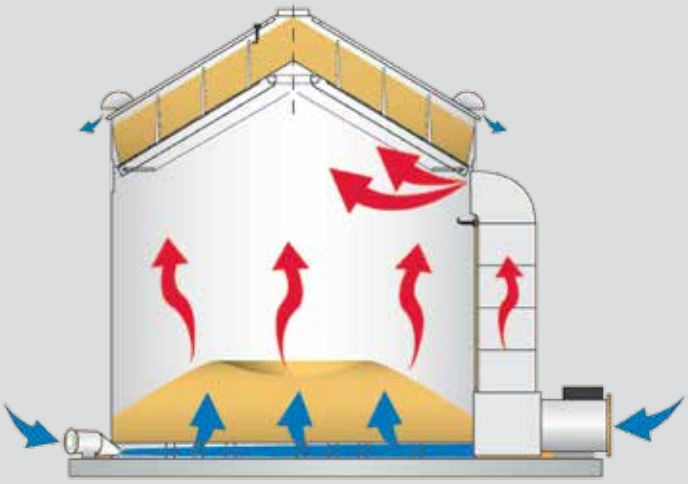
- ✓ A simple, easy to operate, high speed dryer is desired. (Up to 1,378 bph 10 pt. rem.)
- ✓ Very good grain quality, food grade with careful management* and the best efficiency available is a priority.
- ✓ Low electrical demand compared to capacity is desirable.
- ✓ Additional storage is a high priority.

Avoid using AutoFlow TopDry's where

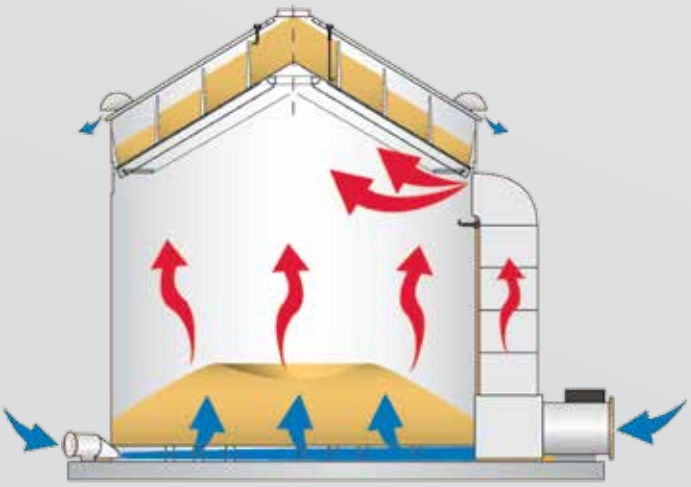
- ✓ Where good grain handling to and from the dryer is not available.
- ✓ Where grain cannot easily be moved from the TopDry to other storage.
- ✓ Where grain may be moved before completely cooled to bins which do not have adequate aeration with a full floor.

** Food grade requires very good knowledge of the food ingredient to be dried including susceptibility to damage and all quality requirements. It requires a high level of management including careful monitoring, immediate testing of output and specific operation changes such as very slow cooling etc. for successful results. In some cases the original variety, stress during growth or moisture level may prevent an acceptable grade. The above must be clearly communicated.*

Batch

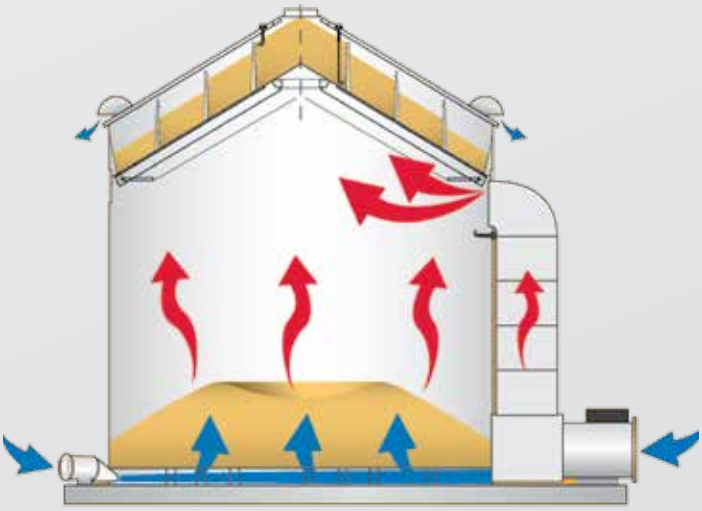


AutoFlow



Operation & Cooling Heat Reclamation

- ✓ The cooling fan forces outside air through the hot dried grain cooling the grain.
- ✓ The heat and air from the cooling process is captured and used to both increase capacity and reduce drying cost.
- ✓ More heat and air is added at much lower static pressure than on a conventional bin dryer.
- ✓ Drying cost and efficiency is about the same as our Tower Dryers.



Fans

- ✓ 36” 15 HP to 42” 40 HP sizes
- ✓ Composite 1750 rpm Blades
- ✓ Vinyl Inlet Cover Standard

Heaters

- ✓ HI-LO or On-Off Operation
- ✓ Series 2000 Computer Control
- ✓ Standalone networked system control for Batch and fully integrated part of the AutoFlow controls
- ✓ Optional Remote Control Station Available for Batch

Heated Air Delivery

✓ **Platform Mounting**

- Available Special Order

✓ **Duct Mounting**

- More Even Plenum Temperature
- Much Easier Maintenance
- Series 2000 Control more convenient at the ground level.

✓ **Air Diffusers**

- Distribute Airflow evenly throughout the drying chamber

Drying Floor

✓ **Full C-Channel Floor Construction**

- Outer C-Channel, doesn't use bin side wall for strength and roundness
- Competition falls short on strength

✓ **Sidewalls**

- Full External Stiffeners, not light add on additions.
- Stiffeners & Sidewall Sheets heavier than standard 4" stiffened tank

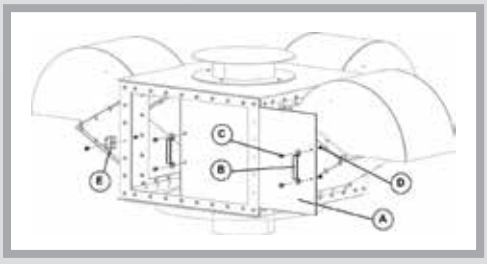
✓ **Perforated Eave Flashing**

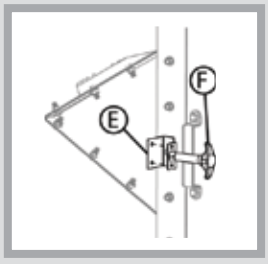
- Additional air flow through Grain at sidewall improving drying and life of sidewall sheets

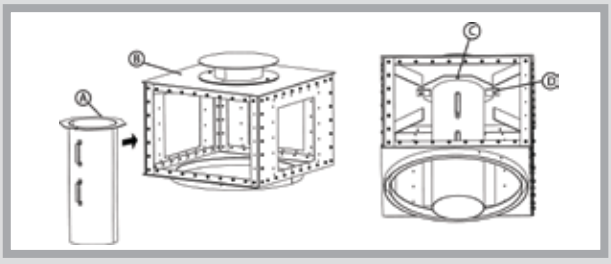
Flatop with sliding access door, removable drop tube

Most of the Flatop size and dimensions did not change but the following changes were made.

- ✓ A removable top cap raises the overall height a few inches which is the only change in dimension. This cap not only makes it easier to cut the correct size entrance hole, but makes the removing of the inside pipe possible.
- ✓ The inside pipe now has handles on it with a flange on top. It slides into flanges on the bottom of the top cover and is then bolted in place with bolts through the bottom of the new removable top cap. This makes it easier to cut off the tube if necessary or add adjustable collars where needed.
- ✓ Previously the door was a simple plate fastened with many self tapping bolts. The new door is a sliding design which does not pull completely out of its top and bottom slides so it is self racking with no concern for the door getting away or falling off the bin. The same rubber fastener as used on the standard bin caps is used to lock the door closed. This makes inspection and access to the inside of the flatop area much easier.

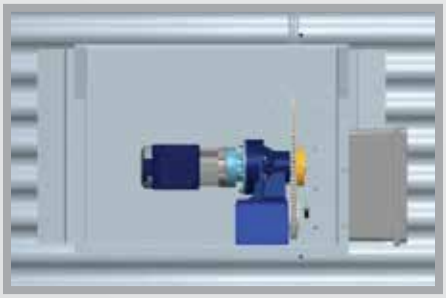


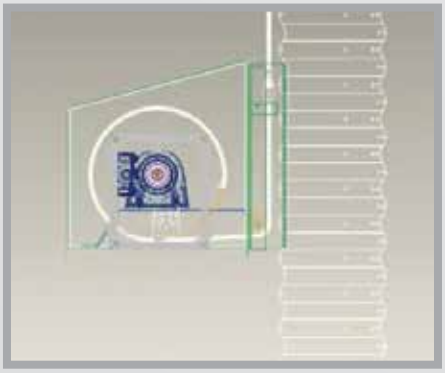


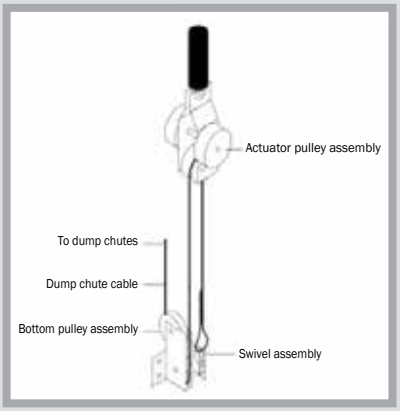


VFD Driven Chute Controller

A new Chute Controller has been designed and is built by GSI rather than supplied by an outside vendor. It uses a large sprocket and chain to eliminate any re-bending of the chute cable which will eliminate the changing of the lower section of the cable now recommended every 10 years. There should be no maintenance required except for yearly gearbox oil changes and oiling of the chain. It is AC powered and has no 24 volt control wiring. GSI has eliminated the feature that closes the dump chutes should a power failure occur. Dealer and Customer surveys all concluded that the dumping of partially dried contents of the drying floor was of much less concern than the issues with DC voltage and batteries. This new Chute Controller will be a direct replacement for the old Chute Actuator with at most the addition of one wire between the control box and controller.







Improved Platforms

New platforms have been designed that fit better to the vertical stiffeners and require less work to install. The platforms mount to two stiffeners and are half the width of a sheet like the new stair sections which will make installation easier when stairs are installed. The Platforms will now install seamlessly with the new stairs.

Ladders

The roll formed ladders that have previously replaced all of GSI's other product ladders have now replaced the old ladders on the TopDry.

Stairs

New stairs are now available for TopDry that make seamless connections to our platforms possible while improving the overall design for better strength and easier assembly. The step rise is now at the preferred height of 8". Each section is exactly one ring tall and half the width of a sidewall sheet and mounts to the stiffeners not the bin sidewall. This will make assembly and determination of where the access door platform and bottom of the stair will be in relation to the man hole entrance at the top of the bin much easier.

Ductwork 2nd Access Door

✓ **Burner Access doors on both sides of Ductwork**

A second Access Door has been added to each Ductwork. The past Ductwork bottom sections had an access door on only one side. The fan and heaters can now be placed in 3 positions, straight out, to the right and to the left. Previously the access door was only usable in the straight out and to the left positions.

Dump Chute Cable Pulleys

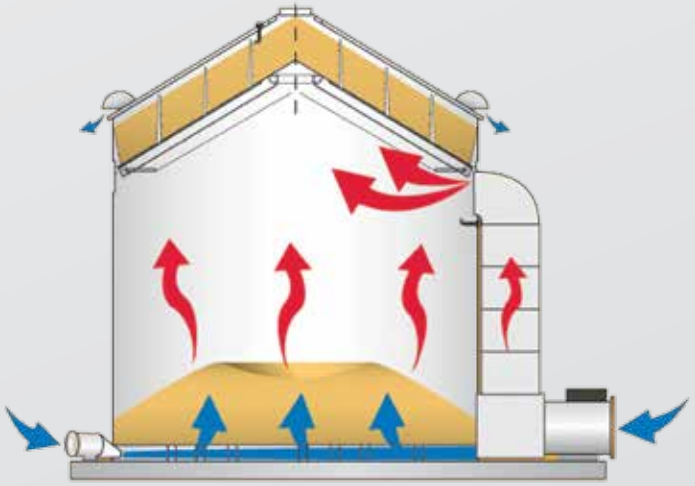
✓ **Larger diameter cable pulleys to extend cable life**

The diameter of the cable pulleys at the sidewall and under the center of the drying floor have been increased. Previously we recommended changing out the upper portion of the chute cable every 10 years to prevent a failure due to re-bending of the cable. The new diameter will extend the likely life of the cable to 20 years or longer.

TopDry Modes of Operation

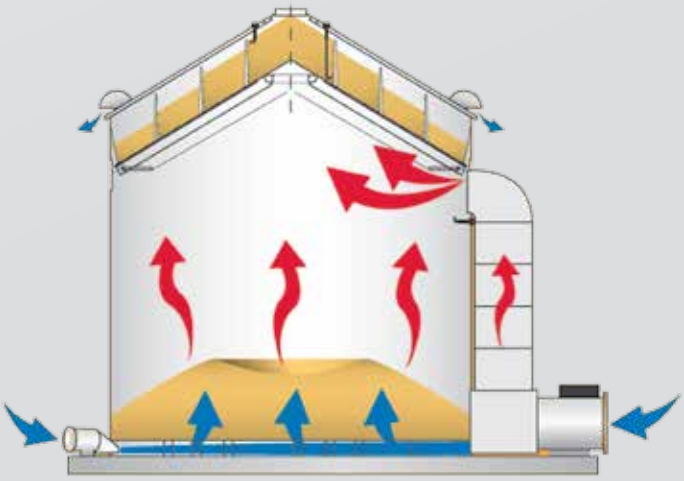
Batch

- ✓ Drying capacities up to 18,320 bu./day @ 5 pt removal (8 batches)
- ✓ Maximum Storage 32,549 bushels.
- ✓ Entire Drying Chamber Dried, Dumped then refilled manually
- ✓ 32”grain depth through entire Drying Chamber
- ✓ Series 2000 Control built into Fans with 4 grain temperature sensors for moisture control



AutoFlow (Staged Batch or Auto Batch)

- ✓ Capacities up to 2,176 bu./hr. 5 pt removal, wet bushels or 52,224 bu./day
- ✓ Maximum Storage 31,605 bushels.
- ✓ Each drying floor ring out from the middle gets shallower in depth
- ✓ The driest 1⁄3 of the grain is Dumped on the 24’ & 30’ models and 1⁄4 on the 36’ model
- ✓ The AutoFlow is automated exactly like a portable dryer
- ✓ Higher Drying rates from shallower grain depth. 32” in top drying band & 18” in the outer band



Network AutoFlow System

- ✓ More consistent moisture removal
- ✓ Fully Automatic Network controls
- ✓ Controls Multiple Augers emptying the main wet auger each cycle
- ✓ Adjustable Staged Starting of Fans & Heaters
- ✓ Four Grain Temperature Sensors for Moisture Control
- ✓ Memory Recall for Troubleshooting
- ✓ Controls are easy to locate remotely

OVER DRYING: THE ENEMY OF EFFICIENCY

All grain dryer engineers strive to maximize efficiency. They work with airflows and know that not using too much air improves efficiency. It has been known for a long time that the higher the drying temperature, the less fuel will be used in drying grains. The problem is the higher the drying temperature, the more potential damage is done to the grain from heat. It's a balancing act that if done right can give better overall efficiency and quality.

There is a third component that has to do with quality and efficiency and isn't directly a part of either airflow or drying temperature. That would be over-drying part of the mass of grain and then blending the highly variable moisture kernels to the final desired moisture. Ideally, every kernel would be dried down to the 15% storage moisture and not go further. Going further means degradation, through its becoming brittle, stress cracking the kernel. Then through the moving of the grain actual breaking up of the kernel occurs, which becomes part of FM damage. The cracking and then breaking up of the kernel lets dry matter escape. This means reduced test weight and allows fungus and mold to get a start, seriously reducing the quality and storage life of the grain.

Grain quality through a dryer can be summed up by individual kernel temperature. As a kernel of grain dries, giving up moisture, it is protected early in the process by evaporative cooling. In other words, just as evaporative coolers at sporting events or other hot summer gatherings cool down the human crowds, the evaporating of the moisture from the kernel stalls off increases in temperature. As the kernel nears final storage moisture, however, the kernel temperature starts increasing rapidly. Here is what we know about what kernel temperature does to its quality.

KERNAL TEMPERATURE	RESULTS
Stay under 100 degrees	Kernel remains a seed and suffers nearly no damage.
101 to 120 degrees	Maintains palatability and considered Human Food Grade.
121 - 140 degrees	Maintains food energy and considered Animal Food Grade
141 - 160 degrees	Degradation escalates with 160 showing damage

Over-drying greatly increases individual kernel temperature and can lead to serious quality degradation on a kernel basis. Get enough severely damaged kernels, and there is a problem, even if all the rest of the grain is in great shape.

Over-drying also means a reduction in efficiency due to its taking more BTUs per lb of water removed as the grain dries down. Perhaps the best comparison that can be made is wringing out a wet towel. The first water comes out very easily. As the towel gets dry, however, it gets more and more difficult to get that last water out. Grain is the same way, and it takes more BTUs/lb of water to go from 15 to 14% than it takes to go from 25 to 24%. Drying from 25 to 14% doesn't take 10% more gas than drying from 25 to 15%, as many expect. Efficiency and the quality of the grain including test weight will also take a hit. Field experience suggests more of a hit than the book numbers probably due to the H20 being tightly bound at 15%.

Look at the kernel moisture itself as it comes in out of the field. Studies have shown that the individual kernel moisture will vary 10% or more from the butt of the ear to the tip. Ear average moisture also varies from one part of a field to the next, often 10% as well. All the kernels do not start at the same moisture as most people assume. So 20% grain may very well have some 13% kernels in it as well as 27% kernels, all then averaging 20%. The 15% kernels will heat up very quickly, though all the moisture evaporating around them will help some.

As grain is dried in any conventional dryer, whether it is a bin dryer, portable thin column dryer or any other, the tendency is to dry the grain that is closest to the plenum first. This grain closest to the plenum will always get over-dried compared to the grain farthest away from the plenum and then get blended to a final average moisture. This will happen whether exposed to high temp high airflow in a high speed dryer or exposed to 120 degree air at 1 cfm/bu in a Stir-Ator bin for the many more hours that it takes to dry the grain. Over-drying is over-drying, and all the quality and efficiency issues pertain to every type of dryer. Kernels vary in moisture individually depending on where they were on the ear and in the drying process. This variation in kernel-to-kernel moisture is why it is so important with freshly dried grain from any dryer to aerate it in the final storage bin for seven to 10 days or more to allow all the kernels to equalize out to the final storage moisture at the individual kernel level.

This is the case in a Stir-Ator bin where the grain closest to the plenum (6 to 18") is never stirred and can become severely over-dried during the drying process. That is why most operators using Stir-Ator bin dryers never go over 120° F. They find if they do the quality suffers and FM increases in the part of the bin that gets the most heat and air and is never stirred. Of course a bin with a Stir-Ator is tremendously better than one without, as most of the grain does get stirred. Stir-Ators were one of the first devices

designed to reduce the over-drying that takes place closer to the plenum, even if they do not eliminate it completely. DMC GrainFlow Bin Dryers and other similar systems reduce this issue by pulling grain from the bottom of the bin, which allows a higher plenum temperature, possibly as high as 160° F before a great deal of damage appears. The GrainFlow has shallower depth and more airflow, but there is still a significant amount of time before the grain is removed so relative over-drying and blending still occurs.

Even a TopDry AutoFlow suffers from this issue, but it gets minimized by combining the deep depths at the top at over 3', where grain is allowed to warm up in moderate temperature air that is saturated then moving to intermediate depths (one or two stages depending on diameter) and finally to fairly thin depths (18"). The biggest gain for a TopDry comes with the slow cooling in the bottom, which emulates an all heat high- speed dryer. The slow cooling allows the kernels to equalize in moisture before the final hit of outside air occurs, reducing the amount of cracking and damage. All heat operation was the first big gain in the quality and efficiency efforts on high speed thin column grain dryers of every kind.

GSI eliminated the inside to outside variation in high speed thin column grain dryers with the patented grain column grain inverter. Turning a high- speed dryer's column around to dry the other way is a huge improvement to both quality and efficiency as very few of the kernels go above 140°F. Unfortunately it also means the hottest grain is to the outside of the column where all that heat could be blown out into the environment. At least one of the high speed column dryer manufacturers does just that, improving gain quality, but at a cost of much lower efficiency. GSI's Grain Inverter, in a patented approach, leaves the outside 2" of wet grain at the outside of the column to be dried by the heat that would normally escape. The ratio of the amount of water to be removed in that outer 2" and how much heat is delivered is constant due to the varying speed of the column movement. The result is that little if any of the grain is over- dried or taken above 140° F. GSI's Inverter is used in all of our Tower Dryers as well as our stack dry & cool and all heat Dryers and our single module single fan all heat models used for very high quality applications.

GSI has several models of drying equipment that take the next step in quality and efficiency by reducing or removing the over-drying and over-heating of a part of the grain being dried and then mixing the results. GSI's Grain Inverter is the biggest improvement in reducing over-drying of a portion of the column in portable, stack & tower dryers yet produced.

CALCULATING GRAIN SHRINKAGE

The subject of grain shrinkage or “shrink” comes up often. The best description we have seen is, “Shrink, which is the weight lost by drying, is expressed as a percentage of the original weight of the wet grain after the grain has been dried to the desired final moisture.”

The calculation is as follows.

Initial weight (lbs) x (100-initial % moisture) / (100-final % moisture) = Final weight (lbs)

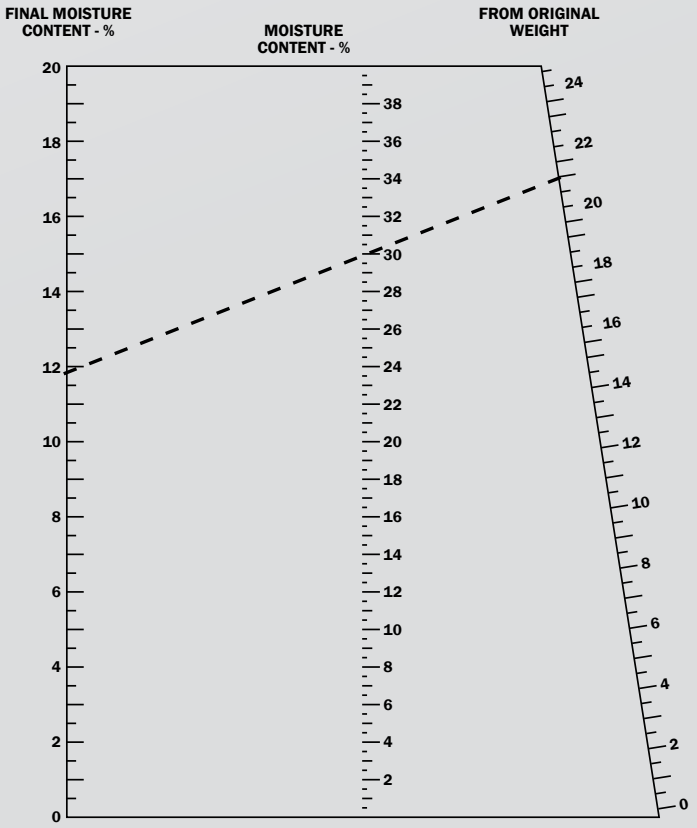
The following table gives an idea what over-drying can cost in dry weight to be sold

FINAL MOISTURE CONTENT IN %							
Initial Moisture %	**15-1/2**	**15**	**14**	**13**	**12**	**11**	**10**
Multiplier for Final Weight							
30	.828	.824	.814	.804	.796	.787	.778
25	.888	.882	.872	.864	.852	.843	.833
20	.946	.941	.930	.919	.910	.899	.890
17	.982	.976	.965	.954	.943	.933	.922

The above is the calculated water loss. In addition there is always a small amount of dry matter loss called “invisible shrink,” or more accurately handling loss, caused by the loss of oils, damage from broken kernels, foreign material or respiration of the seed itself. This is the reason there is a difference between the calculated loss and the actual dock that a commercial elevator may apply. In very high-quality grain this number is extremely small, but the elevator must cover the average not the best in their rates. On average, this handling loss has been reported as 0.82% for farm and 0.88% for commercial drying and handling.

This chart has been in use for many years.

Guide for estimating percent weight lost in grain drying. To use chart, place straight edge at final and original moisture content and read off the percentage loss (does not include handling losses).
EXAMPLE: Grain dried from 30 to 12% = 20.4% loss from original weight.



Though both the Batch and AutoFlow TopDry's deliver a cooled product like a tower dryer or portable dryer running dry & cool it actually operates more like a dryer running all heat. A tower or portable dryer cool the grain in the lower third of their columns in half the time it took to dry it. This is standard operation for all high speed dryers. It is very fast, takes up very little room and requires no management, but is not as gentle on the grain.

All heat operation is accomplished by bringing the grain in drying columns up to a temperature that will result in the desired storage moisture after the grain is cooled in a separate bin at 1/3 to 1 cfm/bu. which takes several hours. This cooling does not take as much time as passing a cooling front through the grain as given by AirPik. Since the aeration is running immediately constantly cooling, initially with much more air than when full instead of having a bin full of 140 degree corn, it doesn't take as long. It does however take long enough to remove the last 1⁄4 to 1⁄2 point of physical moisture. It's the slow cooling which improves grain quality over fast cooling and the extra moisture removal that improves the efficiency using the all heat process.

The TopDry has a significant advantage because of its operational design. The grain in a TopDry is not 140 degrees when it enters the storage chamber. It is at 120 degrees or less so it cools quicker than grain dried through a column dryer. A TopDry does deliver the same airflow and gains the quality and efficiency that the all heat process produces. All Batch TopDry's and most AutoFlows shut down early enough over night to finish out the cooling process before grain is moved in the morning. But today many Owners are pushing TopDry's to daily drying capacities that don't allow for enough time overnight to fully cool or any time in the morning to move corn before the dryer is re-started for the day.

Transferring Grain - How & When

Generally most TopDry's operate moving grain in the morning. However grain can be moved at any time if properly managed taking advantage of TopDry's design. The TopDry design has two things which are unique and help with how well it cools the grain, particularly when it is still in operation and grain is transferred out of the storage chamber. All TopDrys dump the grain into the storage chamber from the chutes at the outer perimeter of the bin. This results in a donut shaped pile half way from the wall to the center with the shallowest area in the bin being directly in the center. It also means the fines in the corn are more uniformly distributed and there are no fines in the center of the bin. So, the fastest cooling area of the bin is the center and that is where most of the grain that is removed from the bin when grain is moved while the TopDry is still drying. As you draw grain out of the bin the coolest grain is mixed with grain below so the first grain being moved is cool. Also as the grain leaves the bin it moves down the natural V at the top of the grain mass to the center so it takes some time to move from the top of the donut where the grain is the hottest to the center where the airflow is the highest and then out of the bin. This results with the grain being cooler than most would expect. This works particularly well if the grain is moved before the storage chamber is completely full and is stopped before the center is all the way down to the center well. Taking advantage of these differences, if one third to one half of the storage chamber is moved while the TopDry is still drying very little high temperature grain leaves the storage chamber. If managed the grain leaving the storage chamber into other bins will be 90 degree F or lower allowing for more drying hours in the day and a great deal more flexibility in when grain can be transferred.

AutoFlow Daily Capacity Consideration

TopDry AutoFlows are very much like any high capacity column dryer in that they seldom operate continuously for 24 hours no matter how good their management. They run out of grain in the early morning, time is lost due to the storage chamber inadvertently getting full or other transfer issues. Normally you should only consider 20 hours of daily operation for any continuous flow drying system and the AutoFlow is no different.

What is different about batch capacity ratings?

The AutoFlow capacity ratings are like a portable dryer. But, with the Batch TopDry it is different. Since it's a manual dump system and it is always unknown how fast the Customers system can refill the drying chamber or how on time someone will be on site to dump and restart the system the capacity rating is only during the drying period. It also does not consider the 2 to 5 minutes of dump time or the reloading time. So to determine daily Batch capacity you need to use the drying time given for each plenum temperature and moisture by model and add the specific dump and refill time for the Customers installation for the total batch cycle time. You need to figure out how many batches can be dried in 16 daylight hours with one batch that will dry overnight to get the total possible batches per day. You then multiply the number of batches times the batch holding capacity to get the effective daily capacity.

It is very important that this process be followed so that the Customer will be able to dry the number of bushels the TopDry is able to deliver and not a theoretical number. You do have to show how long it will take to dry a batch and no two operations will have the same fill rate or number of hours of operation a day, but it can lead to dissatisfaction if not calculated and presented properly.

BATCH SERIES - SHELLED CORN (US MEASUREMENTS)

Batch Series			24' Dia. 1-Fan		30' Dia. 1-Fan		30' Dia. 2-Fan		36' Dia. 1-Fan		36' Dia. 2-Fan	
Fan & Heater Unit(s)	Plenum Temperature	Moisture Content Wet Basis	BPH	Batch Time Hours	BPH	Batch Time Hours	BPH	Batch Time Hours	BPH	Batch Time Hours	BPH	Batch Time Hours
15 H.P. 36" Fan 3.5 million BTU	140° F	20%	398	2.5	461	3.3	728	1.9	521	3.1	841	2.0
		25%	252	3.8	292	5.1	461	3.3	330	4.9	533	3.0
		30%	157	6.1	182	8.2	288	5.2	206	7.8	333	4.9
	160° F	20%	474	2.0	550	2.8	869	1.8	622	2.6	1004	1.6
		25%	300	3.2	348	4.4	550	2.7	394	4.1	636	2.6
		30%	178	5.2	218	6.8	344	4.4	246	6.5	397	4.1
	180° F	20%	607	1.6	677*	2.4*	1112	1.4	694*	2.6*	1284	1.2
		25%	384	2.6	429*	3.7*	704	2.1	440*	3.9*	814	2.0
		30%	240	4.0	268*	6.0*	440	3.4	274*	6.2*	508	3.2
15 H.P. 40" Fan 6.25 million BTU	140° F	20%	486	2.0	562	2.7			650	2.5	1022	1.6
		25%	308	3.1	356	4.2			411	3.9	647	2.5
		30%	192	4.9	222	6.7			257	6.3	404	4.0
	160° F	20%	580	1.6	670	2.2			775	2.1	1219	1.4
		25%	367	2.6	425	3.5			491	3.3	772	2.1
		30%	230	4.2	265	5.6			306	5.3	482	3.4
	180° F	20%	742	1.3	858	1.8			890*	2.0*	1560	1.1
		25%	470	2.0	543	2.7			564*	3.1*	988	1.7
		30%	294	3.3	339	4.4			352*	4.9*	617	2.6
30 H.P. 42" Fan 10.25 million BTU	140° F	20%			638	2.4			717	2.2	1142	1.4
		25%			405	3.6			454	3.5	723	2.2
		30%			253	5.9			284	5.6	452	3.5
	160° F	20%			762	2.0			856	1.9	1363	1.1
		25%			482	3.1			542	3.0	863	1.9
		30%			302	4.9			338	4.8	539	3.0
	180° F	20%			975	1.5			1095	1.5	1744	1.0
		25%			618	2.4			694	2.3	1105	1.5
		30%			386	3.9			433	3.7	690	2.4
40 H.P. 42" Fan 10.25 million BTU	140° F	20%			726	2.1			810	2.0		
		25%			460	3.3			513	3.2		
		30%			287	5.2			320	5.0		
	160° F	20%			867	1.8			966	1.7		
		25%			549	2.7			612	2.6		
		30%			343	4.4			382	4.2		
	180° F	20%			1110	1.4			1236	1.4		
		25%			702	2.1			783	2.0		
		30%			439	3.4			489	3.3		

DRYER CAPACITY CONVERSION CHART




Conversions are to be used against the literature 5 and 10 point capacity estimates or the manuals' point-by-point 1 to 20 point estimates.

The following are approximate starting points. Set and run the dryer for 1 to 2 hours, and then adjust speed according to desired output moisture.



Crop to be Dried (Common)	Plenum Temp. Setting Drying Rates Calculated Based on Plenum Temp. Setting	Conversion Formula (bu) Corn Production Rate Conversion to New Crop Production Rate	Conversion to Metric Tons Conversion of Crop Production Rate from Bushels/Hr to Metric Tons/Hr
Canola*†	160° F	(corn dryer capacity) x .63	1 Metric Ton (@ 56 lb/bu) = 39/bu
Corn	210° F	rated capacity given in specs	1 Metric Ton (@ 56 lb/bu) = 39/bu
Milo/Sorghum*	160° F	(corn dryer capacity) x .63	1 Metric Ton (@ 56 lb/bu) = 39/bu
Soybeans*	150° F	(corn dryer capacity) x .65	1 Metric Ton (@ 60 lb/bu) = 36.75/bu
Sunflowers*	140° F	(corn dryer capacity) x 1.33	1 Metric Ton (@ 32 lb/bu) = 68.9/bu
Wheat*	160° F	(corn dryer capacity) x .63	1 Metric Ton (@ 60 lb/bu) = 36.75/bu
Rice*°	130° F	(dryer column holding capacity x 2.5 per 2 points of removal	1 Metric Ton (@ 45 lb/bu) = 49/bu

** Only corn can be dried on all heat. Cooling hot grain in a bin is not recommended for any other commodity.*
† Canola should be dried in a batch mode only.
° GSI recommends that no more than 2 points of moisture be removed from rice per pass through the dryer.

Example 1:
Wheat capacity calculation for 1220 dryer with 5 point removal in dry & cool mode:
560 bu/hr x 0.63 = 352.8 bu/hr

Example 2:
Wheat capacity metric tons for 1220 dryer:
352.8 bu/hr ÷ 36.75 = 9.6 MT/hr

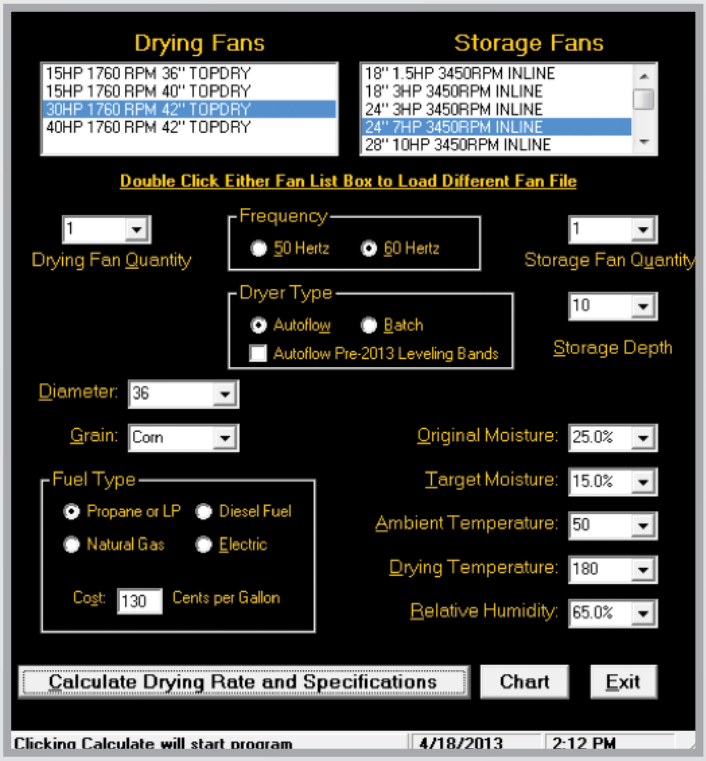
Example 3:
Rice capacity calculation for 1220 dryer:
470 column holding capacity x 2.5 = 1,175 bu/hr removing 2 points of moisture.

Example 4:
Rice capacity metric tons for 1220 dryer:
1,175 bu/hr ÷ 49 = 23.98 MT/hr

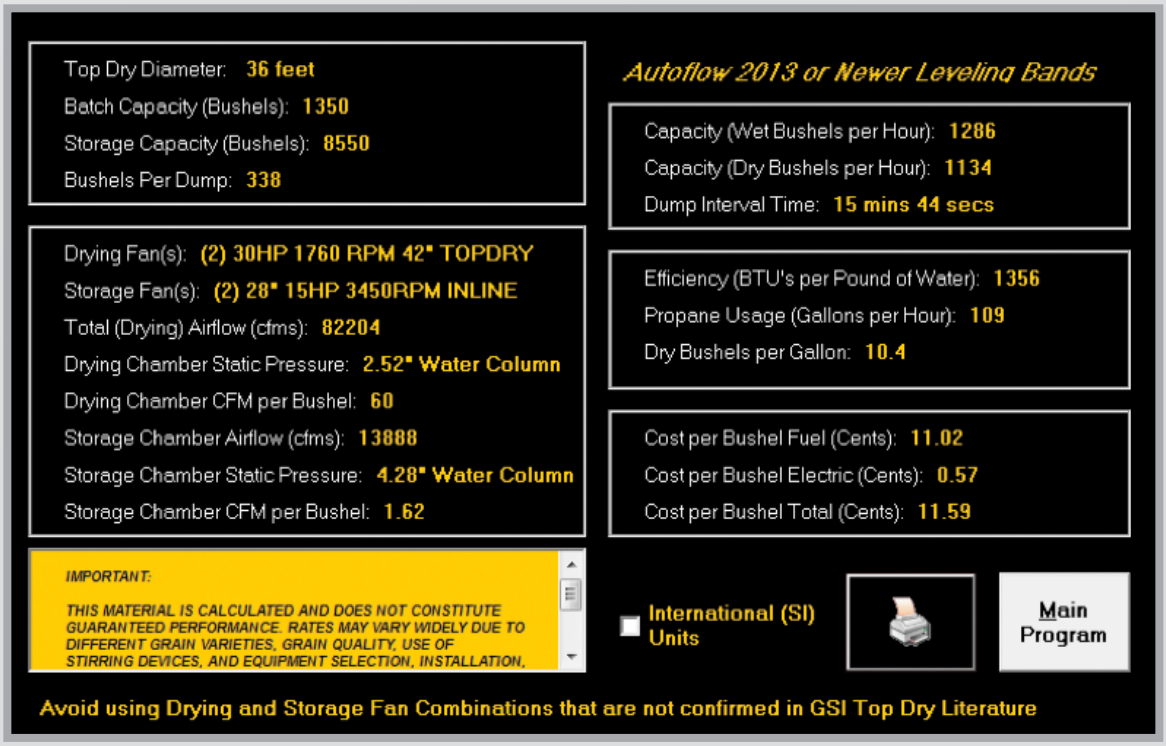
Network AutoFlow Simulator

New TopDry Simulator

- ✓ Randy Sheley has provided TopDry Simulators for many years for capacity and performance determination
- ✓ In April 2013 a new version was provided that shows performance as before, but also shows both old and new leveling band positions



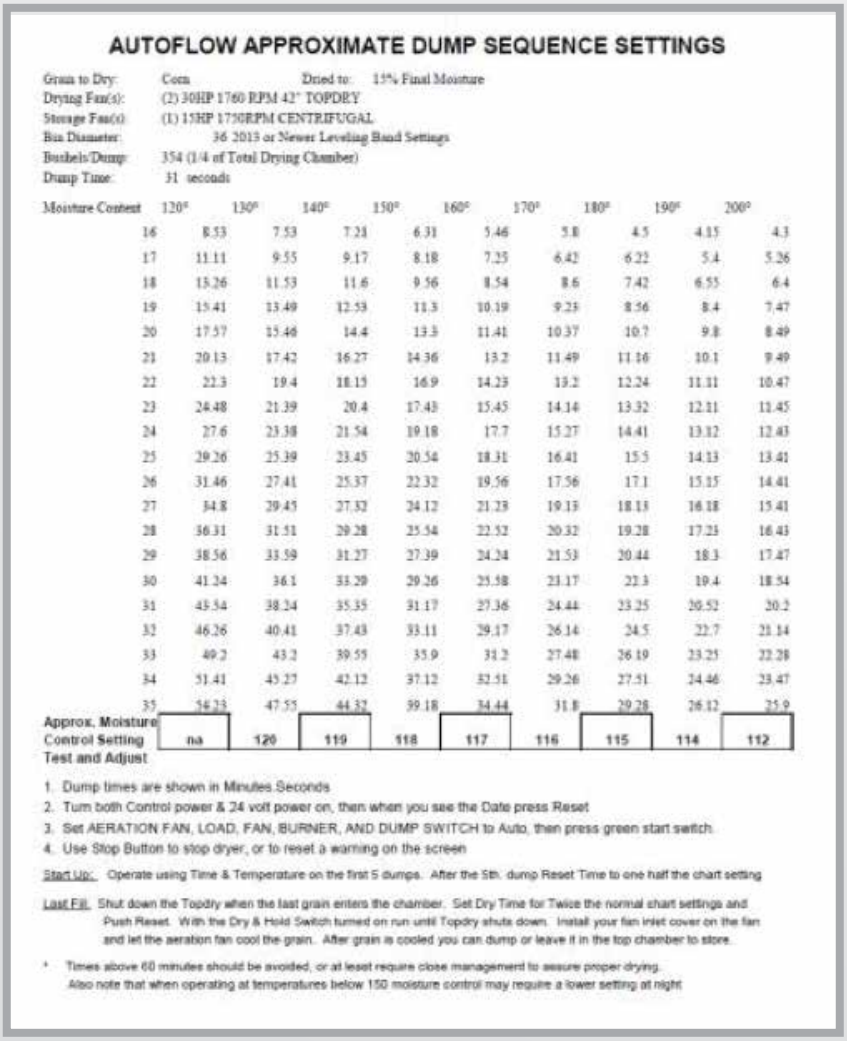
- ✓ The output is the same with Leveling Band type designated



Network AutoFlow Simulator

- ✓ You can produce a Drying Chart for any specific TopDry using the Chart Option
- ✓ A TopDry Simulation Program .CSV file is saved to your desktop and then you paste the output into the template provided in Simulations root directory

C:\Program Files(x86)\The GSI Group\TopDry



AUTOFLOW APPROXIMATE DUMP SEQUENCE SETTINGS

Grain to Dry: Corn Dried to: 15% Final Moisture
Drying Fan(s): (2) 30HP 1760 RPM 42" TOPDRY
Storage Fan(s): (1) 15HP 1750RPM CENTRIFUGAL
Bin Diameter: 36 2013 or Newer Leveling Band Settings
Bushels/Dump: 354 (1/4 of Total Drying Chamber)
Dump Time: 31 seconds

Moisture Content	120°	130°	140°	150°	160°	170°	180°	190°	200°
16	8.53	7.53	7.21	6.31	5.46	5.8	4.5	4.15	4.3
17	11.11	9.55	9.17	8.18	7.25	6.42	6.22	5.4	5.26
18	13.26	11.53	11.6	9.56	8.54	8.6	7.42	6.55	6.4
19	15.41	13.49	12.53	11.3	10.19	9.23	8.56	8.4	7.47
20	17.57	15.46	14.4	13.3	11.41	10.37	10.7	9.8	8.49
21	20.13	17.42	16.27	14.36	13.2	11.49	11.16	10.1	9.49
22	22.3	19.4	18.15	16.9	14.23	13.2	12.24	11.11	10.47
23	24.48	21.39	20.4	17.43	15.45	14.14	13.32	12.11	11.45
24	27.6	23.38	21.54	19.18	17.7	15.27	14.41	13.12	12.43
25	29.26	25.39	23.45	20.54	18.31	16.41	15.5	14.13	13.41
26	31.46	27.41	25.37	22.32	19.56	17.56	17.1	15.15	14.41
27	34.8	29.45	27.32	24.12	21.23	19.13	18.13	16.18	15.41
28	36.31	31.51	29.28	25.54	22.52	20.32	19.28	17.23	16.43
29	38.56	33.59	31.27	27.39	24.24	21.53	20.44	18.3	17.47
30	41.24	36.1	33.29	29.26	25.58	23.17	22.3	19.4	18.54
31	43.54	38.24	35.35	31.17	27.36	24.44	23.25	20.52	20.2
32	46.26	40.41	37.43	33.11	29.17	26.14	24.5	22.7	21.14
33	49.2	43.2	39.55	35.9	31.2	27.48	26.19	23.25	22.28
34	51.41	45.27	42.12	37.12	32.51	29.26	27.51	24.46	23.47
35	54.23	47.55	44.32	39.18	34.44	31.8	29.28	26.12	25.9
Approx. Moisture Control Setting Test and Adjust	na	120	119	118	117	116	115	114	112

1. Dump times are shown in Minutes.Seconds
2. Turn both Control power & 24 volt power on, then when you see the Date press Reset
3. Set AERATION FAN, LOAD, FAN, BURNER, AND DUMP SWITCH to Auto, then press green start switch
4. Use Stop Button to stop dryer, or to reset a warning on the screen

Start Up: Operate using Time & Temperature on the first 5 dumps. After the 5th. dump Reset Time to one half the chart setting

Last Fill: Shut down the Topdry when the last grain enters the chamber. Set Dry Time for Twice the normal chart settings and Push Reset. With the Dry & Hold Switch turned on run until Topdry shuts down. Install your fan inlet cover on the fan and let the aeration fan cool the grain. After grain is cooled you can dump or leave it in the top chamber to store.

* Times above 60 minutes should be avoided, or at least require close management to assure proper drying. Also note that when operating at temperatures below 150 moisture control may require a lower setting at night

TopDry Simulation Software & Creating an Operating Chart

The latest Version of the TopDry Simulation Software version 1.0.0.2 has added features to the earlier versions. The additions from the last several updates include:

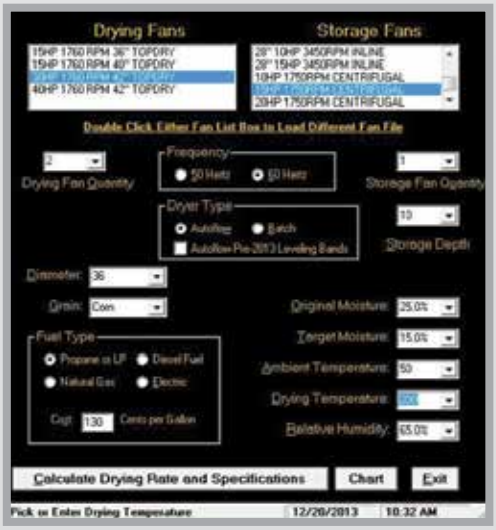
- ✓ Additional Storage/Aeration Fans but only those that apply to TopDry use.
- ✓ Option to use the new Leveling Band locations or to choose the Pre 2013 band positions. This changes the dump duration time as well as showing the increased airflow.
- ✓ Ability to create a Operational Chart for any TopDry configuration.

The TopDry Simulation Program allows one to simulate any TopDry component combination giving a complete rundown on capacity, efficiency and whether a particular setup is feasible. If the software gives a warning about a particular setup contact the plant before attempting to order that combination.

Here is a primer on how to create an Operational Chart yourself based on the exact setup your Customer has on his farm.

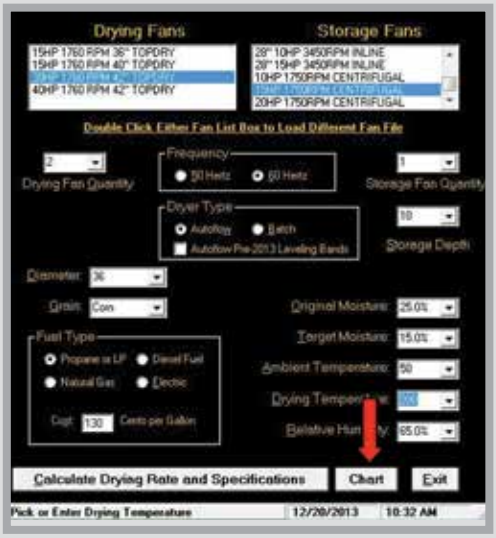
Step One

Run the Simulation and put in all the components, weather conditions and operational inputs. You can at this time do a Simulation and read or print out a simulation report showing capacity, efficiency and most of the other information that is needed when considering any setup.



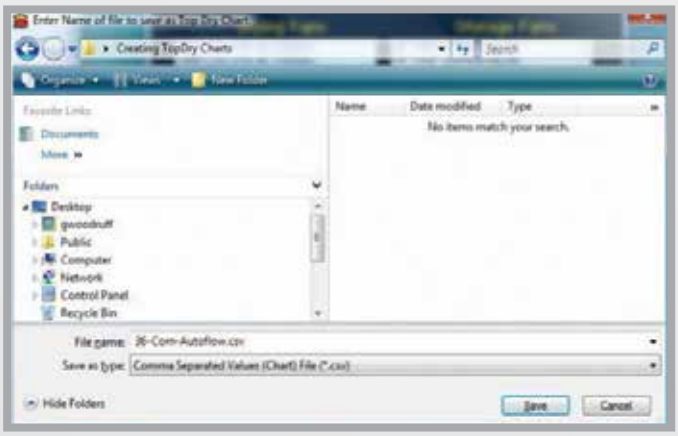
Step Two

After making sure all the components and inputs are correct click on the Chart Button.



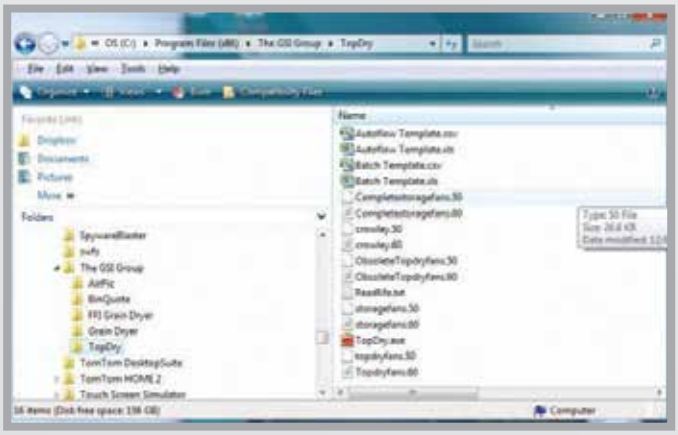
Step Three

In the Save Screen that automatically opens select a location where you can save the .CSV file which holds the data to create the Chart. The file name will include the Diameter-Grain Type-Auto or Batch with an example being 36-Corn-Autoflow.CSV.



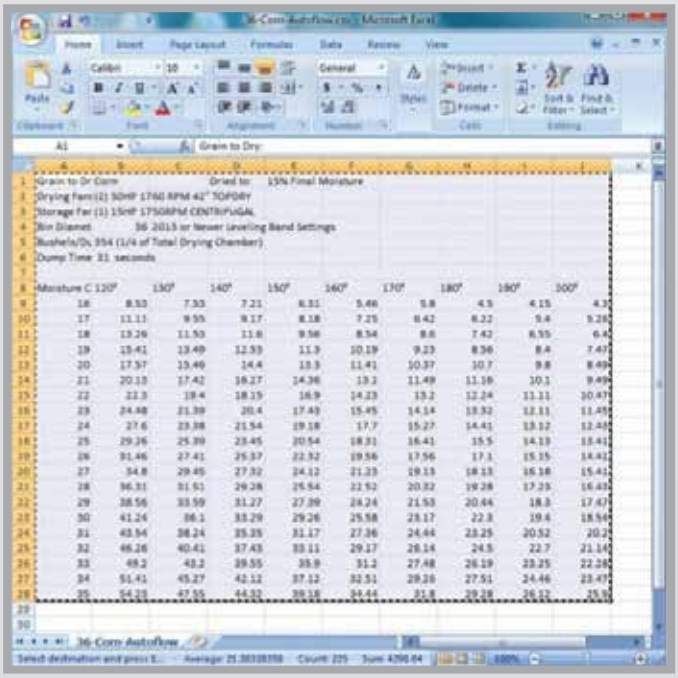
Step Four

Open Microsoft Excel and then open the AutoFlow or Batch .XLS Template depending on which type of TopDry you are working with. They are located in the folder that the TopDry program is started from C:\Program Files (x86)\The GSI Group\TopDry. You can do the same thing with any other Spreadsheet program just use the .CSV Templates.



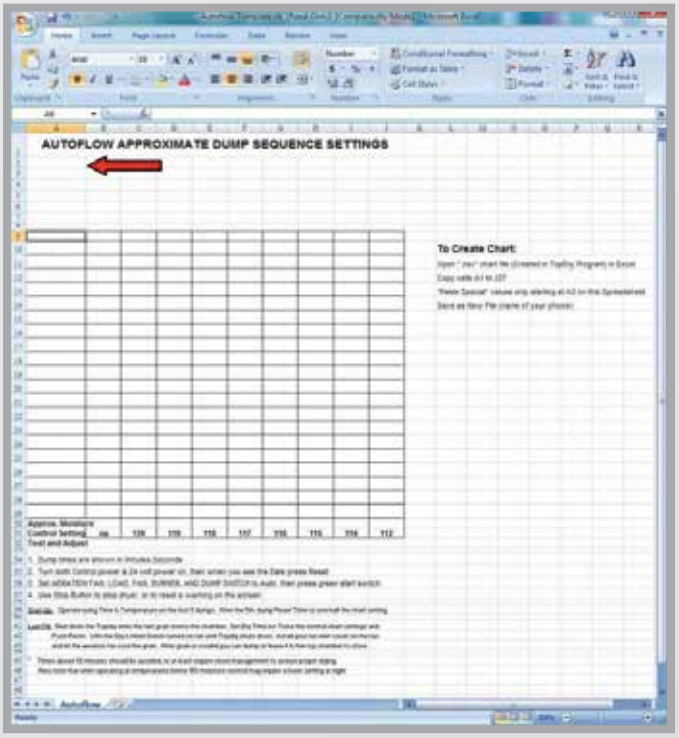
Step Five

Open the .CSV file (example 36-Corn-Autoflow.CSV) that you created and saved after clicking on Chart in the TopDry simulation program. It will look like the screen to the right Highlight and Copy the cells as also shown here.



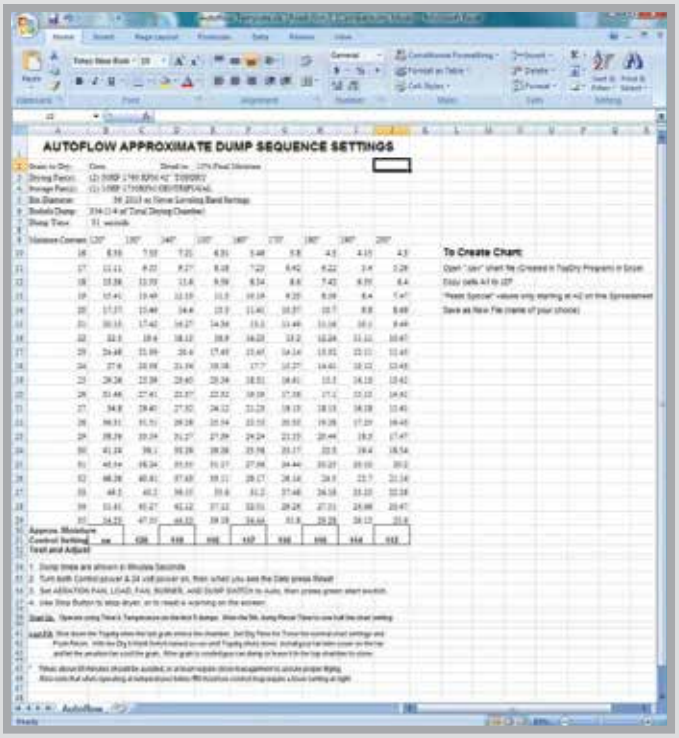
Step Six

Reopen the TopDry Chart Template and paste the just copied cells from the saved .CSV file into the Template in the first empty cell below the AUTOFLOW... headline as indicated by the red arrow to the right.



Step Seven

The result will look like the example to the right.



Step Eight

You can now delete the Instructions to the right of the Chart area, save the final chart and print it for use operating any TopDry of the type and specifications as created.

Auxiliary Equipment

A. Capacity

Always verify the capacity of the loading and unloading equipment. Compare the auxiliary equipment capacities to the maximum values for the dryer. The auxiliary equipment must be able to handle the input and output requirements of the dryer.

B. Electrical

Always verify the type of phase, voltage, amperage, and horsepower of the auxiliary equipment. If the dryer is to control the operation of the auxiliary equipment, values for the electrical requirements of this equipment must be taken into account when ordering the components of the dryer control system.

Horsepower required for 6", 8" & 10" wet load augers:

✓ Three-phase motors:

6"	3 HP/10' of length
8"	4 HP/10' of length
10"	5 HP/10' of length

✓ One-phase motors:

6"	2 HP/10' of length
8"	3 HP/10' of length
10"	4 HP/10' of length

Example is for a 1226 running in all-heat mode:
Sample calculations: 25% shelled corn dried to 15% moisture content. Use the average drying energy of 1651 BTU/pound of water removed.

BTU required per bushel:
To find the BTU required per bushel, multiply the amount of water to be removed for a given point differential by the drying energy used in the dryer for each pound of water removed.

$$\text{10 point removal} \quad \frac{7.42 \text{ lb } H_2O}{\text{bushel}} \times \frac{1{,}651 \text{ BTU}}{\text{lb } H_2O} = \frac{12{,}250 \text{ BTU}}{\text{bushel}}$$

Fuel units required per bushel:
To find the fuel units required per bushel, divide the amount of BTU required per bushel at a given point removal by the heating value per unit of the fuel to be used.

The reciprocal of these values is the number of bushels that can be dried per gallon of LP.

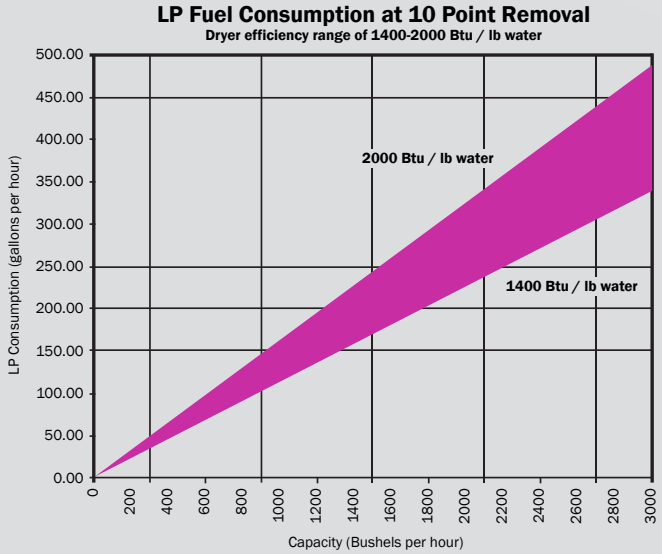
$$\text{10 point removal} \quad \frac{12{,}250 \text{ BTU}}{\text{bushel}} \div \frac{91{,}500}{\text{gallon LP}} = \frac{0.134 \text{ gallon LP}}{\text{bushel}}$$

Fuel consumption (units per hour):
Multiply the number of fuel units required by the bushel capacity of the dryer in question at the moisture removal desired. A 126 dryer has a capacity of 715 BPH for 10 point removal. How many gallons of LP are used?

$$\frac{715 \text{ bushels}}{\text{hour}} \times \frac{.0134 \text{ gal LP}}{\text{bushel}} = \frac{95.81 \text{ gal LP}}{\text{hour}}$$

Drying costs (cost per bushel):
Multiply the cost of fuel per unit by the fuel unit per bushel rate. LP costs estimated at $1.50 per gallon.

$$\frac{\$1.50}{\text{gallon LP}} \times \frac{.0134 \text{ gal LP}}{\text{bushel}} = \frac{\$0.201}{\text{bushel}}$$



Drying Energy Constants for Corn

The following information should be used for estimates only.

7.42 lbs of water (H20) are removed per bushel at 10 point removal.

3.48 lbs of water (H20) are removed per bushel at 5 point removal.

1,044 BTUs are required to evaporate 1 lb of free water at 100% efficiency. Approximately 1,400 to 2,000 BTUs are required to remove 1 lb of water from 25% moisture corn when drying it down to 15% moisture content.

Requirements will vary with the type of dryer, method of operation, grain density, grain quality and outside conditions. The shaded area in the graph represents the range of values for fuel consumption that can occur for each capacity and between the drying energies of 1,400 and 2,000 BTU/lb of water removed.

TopDry vs. Dryer & Storage

✓ **36’ 11 Ring Top Dry**

- Autoflow Drying Capacity = 1,524 BPH*
- 28,489 bu. of Storage
- Total Selling Price = $184,400

✓ **3426 Dryer (No Stainless Screens with Inverters)**

- Dry & Cool Drying Capacity = 1,520 BPH
- Selling Price = $259,996

✓ **Equal Cost for Storage in the TopDry**

- 28,489 bu. of Storage
- @ $2.00/bu. = $56,978
- Total 2326 & Bin = $316,974

The difference = $132,574

TopDry Operation Cost Comparison
Capacities Sized at 5 point average removal

TopDry 36’ AutoFlow

- $1.50 per gallon LP
- 540,000 bu./yr. x $0.0807 (fuel cost)/bu. = $43,578 per year

3426 Stack Dryer

- $1.50 per gallon LP
- 540,000 bu./yr. x $0.1153 (fuel cost)/bu. = $62,262 per year

$62,262 per year - $43,578 per year = $ Annual Fuel Savings
$18,684 per year x 5 years = $93,420

$132,574 + $93,420 = $225,994 Savings over 5 years

There are three other roof dryer manufacturers, MFS/Stormor, Sukup in the U.S. & Lambton in Canada. None of these manufacture the entire product. GSI is the only company that builds 100% of the components of our TopDry product.

Ezee Dry Bin by MFS/Stormor

MFS states a Design Criteria for this product at 48 lbs/cu. ft. not the 52 lbs/cu.ft that GSI used for the TopDry designs and they do not recommend storing grain on the drying floor. They are similar to GSI's drying floor design with C channels, rafters and roof like drying floor panels with dump chutes and outer eave flashing on the smaller diameters, but the 36' model uses a conventional truss instead of C channels with only a single rafter half way from the wall to the peak. When viewed on farms full this design shows significant sagging in the upper and lower half. There is a large non perforated area at the peak of the 36' drying floor design. With our experience in this area it seems very doubtful even grain flow could be delivered for proper staged auto operation with the pronounced sagging. They offer only a 32 deg. roof but do not allow for extra clearance at the roof eave so water siphoning down into the inside of the bin is possible. This is an altered design from the original that failed and caused Stormor to discontinue business. MFS later purchased the design and made changes in the design. The roof is their old 2,000 peak load design 30' and under 36' unknown and the number of dump chutes are 4 per sidewall not 3 like GSI so on a 48' there are 48 chutes around the walls and more intermediate when operated in Batch or Auto Batch. On a 36' model this means one winch is used to lift the outer and a 2nd for the intermediate chutes. This design depends on a single heavy ring at the drying floor level to keep the bin round. The first time the bin and floor are filled a great deal of stress may be put on the floor as the components adjust from the weight and become round. Their website, literature and manuals do not show ductwork as being available. Their staged auto actuator is the same old hydraulic unit used since the 1970's. MFS/Stormor builds Batch, AutoBatch & Staged Auto models in 18', 21', 24', 27', 30' & 36' diameters up to 11 1⁄2 2.66 rings for 30' and smaller and 11 2.66" rings for the 36' model. They build the bin components including a hinged lower roof panel for venting as well as conventional gooseneck vents and the drying floor, but the Dealer must purchase the fans & heaters and controls, usually Kahler brand from another manufacturer.

Sukup "TopDryer"

There is little known about Sukup's roof dryers due to no mention of it on their web site or in any literature or manuals . In field visits it is essentially a copy of the Ezee Dry designs including the 36' trussed floor design with all of the same issues. The roof appeared to be Sukup's standard offering in 30 deg. which does not allow for extra clearance at the roof eave so water siphoning down in the inside of the bin is possible. The floors are installed in a 4" stiffened bin and continue to rely on a single heavy ring to be round and the stairs are 12" not 8" step height. The first time the bin and floor are filled a great deal of stress may be put on the floor as the components adjust from the weight and become round. On the site visit the same sagging in the top and lower half of the 36' model drying floor was observed. With our experience in this area it seems very doubtful even grain flow could be delivered for proper staged auto operation with the pronounced sagging. Sukup builds the bin components, the drying floor and the fans & heaters, but the Dealer must purchase the controls, usually Kahler brand from another manufacturer. It is unknown if they match all the diameter size offerings, but they do build a 36' 12 ring 4.00" model in Batch and AutoFlow.

Ultra Dry by Lambton

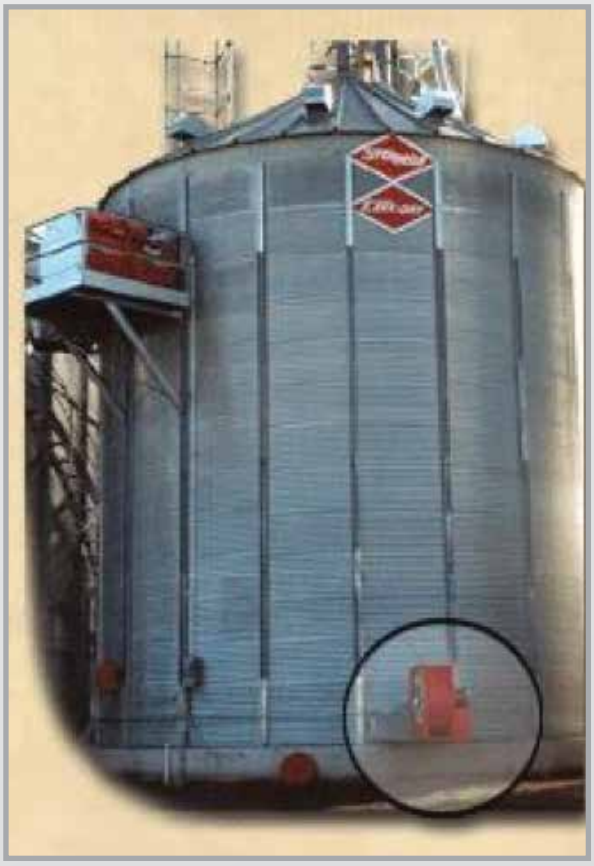
Originally designed by Brock this product was later turned over to Lambton and they switched the Flex Auger unload to conventional dump chutes. This design is similar to GSI with the same number of dump chutes and outer eave flashing. They offer both a 30 or 35 deg. roof but do not allow for extra clearance at the roof eave so water siphoning down into the inside of the bin is possible. It depends on a single heavy ring at the drying floor level to keep the bin round and the stairs are 12" not 8" step height. The first time the bin and floor are filled a great deal of stress may be put on the floor as the components adjust from the weight and become round. Their website, literature and manuals do not show ductwork as being available. Lambton builds Batch & AutoBatch only 21', 24', 30', or 36' up to 11 4" rings tall. They build the bin components including conventional goose neck vents, the drying floor and their Automatic Farm Dryer (AFD) controls but the Dealer must purchase the fans & heaters from another manufacture.

Sukup "TopDryer"

Kahler Automation Control

Lambton Automatic Farm Dryer Control

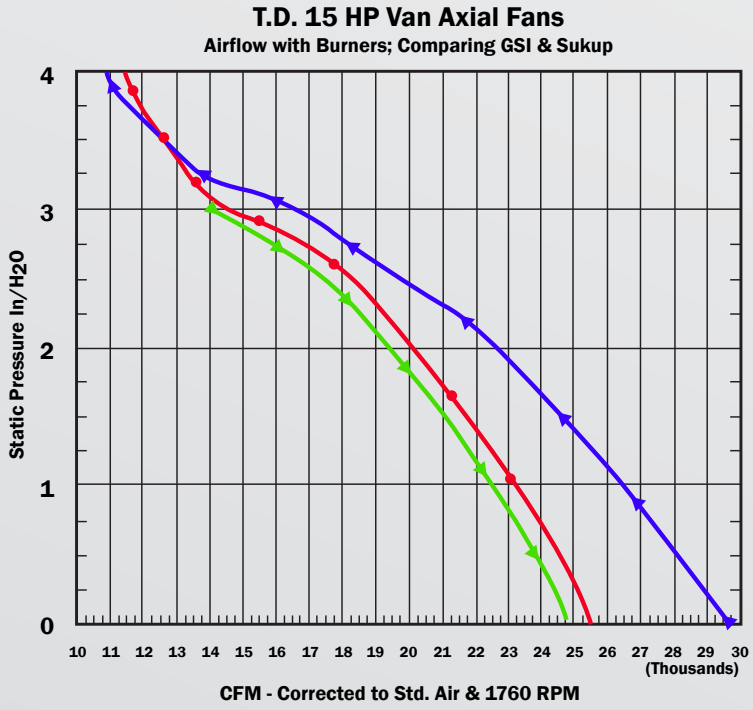
MFS/Stormor Ezee Dry



Sukup 36' Trusses same as Ezee Dry

Lambton Ultra Dry

GSI 15 HP 36” & 40” Fan Blades compared to Sukup’s 38”



GSI 40”	9 blade 15 hp
GSI 36”	12 blade 15 hp
Sukup 38”	9 blade 15 hp

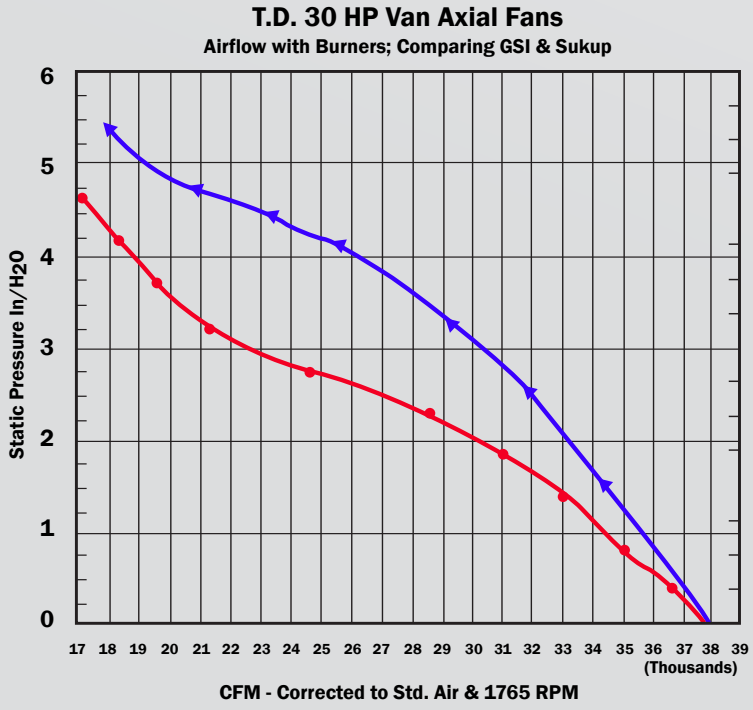
✓ GSI Blades are fiberglass reinforced Poly

✓ Sukup’s Blade is nylon

As tested in GSI’s R&D Department
Performance in CFM

Fan	2”	2.5”
GSI 36”	19,500 - 4%	17,300 - 5%
Sukup 38”	20,200	18,200
GSI 40”	22,800 +13%	19,800 +9%

GSI 30 HP 42.5” Fan Blade compared to Sukup’s 44”



GSI 42.5”	16 blade 30 hp
Sukup 44”	12 blade 30 hp

✓ GSI Blades are fiberglass reinforced Poly

✓ Sukup’s Blade is nylon

As tested in GSI’s R&D Department
Performance in CFM

Fan	2”	2.5”
GSI 42.5”	33,300 +10%	32,000 +17%
Sukup 44”	30,400	27,300

Sukup 22,500 - GSI 30,400 @ 3” +35%

NEW TOPDRY AUTOFLOW LEVELING BAND EXPLANATION

By 2008 it had become obvious that some grain being dried had changed. At first only a few TopDry AutoFlows were affected but each year the number increased. More fines content due to wetter grain, higher test weights, different density and kernel makeup was changing how the grain dried. The operational changes were the grain temperature settings were getting lower and there was less difference in temperature between the first few minutes after a dump and at the end when the next dump was tripped. In addition in some cases the grain temperatures would start climbing and the grain would progressively be wetter. It was determined that the grain on the floor was not moving the way it had previously. Over a 4 year period new leveling band positions were trialed for each diameter of TopDry and during the 4th year a large number of TopDry's both affected and unaffected were operated with the new leveling band positions to make sure they would work across the board no matter the type of grain.

The changes involved the shallowing out of most of the grain depths in each of the outer rings of all sizes of AutoFlows. The location of the 4 grain temperature sensors were lowered 2" to keep them in the proper relative location in the grain. This increased the airflow per bushel and improved drying capacity. Also the lowest leveling band of the outer set of bands was removed. This allowed the grain that was not moving on the floor to move correctly with the rest of the grain. The smaller number of bushels in the outer ring meant the dump times needed to be reduced a few seconds so the amount of grain dumped would match that in the outer ring.

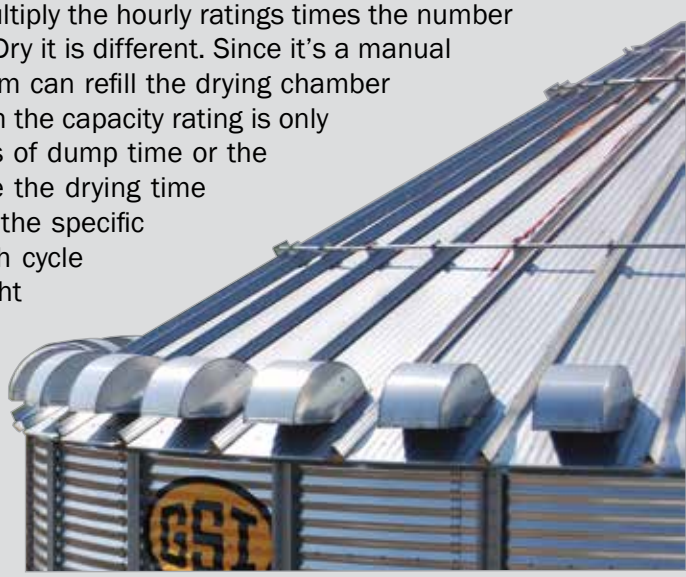
With the changes the grain temperature at the point the grain needed to be dumped rose from 93 to 98 degrees to on average about 105 which is back where it used to be. The dryers dump a little less grain, but dump more often. The operational problems were resolved and the capacity returned to normal as well. Some AutoFlow's have now been operating with the new leveling band positions for 6 years and all built since June 2012 have used the new positions.

The changes did change the holding, but it was discovered that the earlier numbers were higher than what was actually present and the old numbers are still in the average range of what will be in the AutoFlow drying chamber. This does change how the TopDry Simulation program works and a new option to use old or new leveling band positions for the simulation was added. The default is the new positions, but if you have an older AutoFlow you can set the program to both predict the capacities and efficiencies correctly but also produce an operational drying time chart for the old or new positions. In the event that you have an AutoFlow exhibiting the symptoms above the leveling band and other changes should be done in the field to bring it back into correct operation.

MODEL CONFIGURATION FAQ'S

What is different about batch capacity ratings?

The AutoFlow capacity ratings are like a portable dryer and you can multiply the hourly ratings times the number of hours of operation to get the daily capacity. But, with the Batch TopDry it is different. Since it's a manual dump system and it is always unknown how fast the Customers system can refill the drying chamber or how on time someone will be on site to dump and restart the system the capacity rating is only during the drying period. It also does not consider the 2 to 5 minutes of dump time or the reloading time. So to determine daily Batch capacity you need to use the drying time given for each plenum temperature and moisture by model and add the specific dump and refill time for the Customers installation for the total batch cycle time. You need to figure out how many batches can be dried in 16 daylight hours with one batch that will dry overnight to get the total possible batches per day. You then multiply the number of batches times the batch holding capacity to get the effective daily capacity.



What about single phase capacity & motors?

Due to TopDry's low static pressures and their using the air from aeration to add to the total drying air, higher capacities are possible from the horse power used compared to other dryers. This allows higher capacities on single phase power. For instance a 36' AutoFlow with 2 15hp fans and a 15hp Centrifugal aeration fan with a total of 45 single phase hp produces the same dry & cool capacity as a 3422 3 stack Portable dryer with 90hp total. When 2 fans are used both enter the same plenum. For that reason all single phase TopDry main fans have non reversing motor bearings to prevent the second fan from starting backwards when the first fan pressurizes the plenum. Other than the higher maintenance required by single phase motors there are no negatives to using single phase.

Why are the fan & heater number and sizes limited?

All burners are built to work within a range of air velocity through the burner. If the static pressure is too high the velocity will be too low and result in yellow flame, bad heat mix and poor drying performance. In addition the drying process itself requires a minimum level of airflow for proper operation. So through both simulation and field experience only fan combinations that will work acceptably are allowed for each diameter TopDry. Those acceptable combinations can be found in the literature and the Product Information Guide.

AUTOFLOW SERIES - SHELLED CORN (US MEASUREMENTS)

Batch Series			24' Dia. 1-Fan		30' Dia. 1-Fan		30' Dia. 2-Fan		36' Dia. 1-Fan		36' Dia. 2-Fan	
Fan & Heater Unit(s)	Plenum Temperature	Moisture Content Wet Basis	BPH	Dump Interval Min	BPH	Dump Interval Min	BPH	Dump Interval Min	BPH	Dump Interval Min	BPH	Dump Interval Min
15 H.P. 36" Fan 3.5 million BTU	160° F	20%	528	21.6	557	31.9	939	18.9			993	19.4
		25%	334	34.1	353	50.4	595	29.9			629	30.6
		30%	209	54.6	220	80.8	371	47.9			393	49.0
	180° F	20%	675*	16.8*	713*	24.9*	1202	14.8			1271	15.1
		25%	428*	26.6*	451*	39.4*	761	23.4			805	23.9
		30%	267*	42.6*	282*	63.1*	475	37.4			503	38.3
	200° F	20%	791*	14.4*	835*	21.3*	1407*	12.6*			1488*	12.9*
		25%	501*	22.7*	529*	33.6*	891*	19.9*			943*	20.4*
		30%	313*	36.4*	330*	53.9*	557*	32.0*			589*	32.7*
15 H.P. 40" Fan 6.25 million BTU	160° F	20%	648	17.5	711	25.0	1154	15.4			1269	15.2
		25%	411	27.7	450	39.5	731	24.3			803	24.0
		30%	256	44.4	281	63.3	457	39.0			502	38.4
	180° F	20%	830*	13.7*	909*	19.5*	1477	12.0			1623	11.9
		25%	525*	21.6*	576*	30.9*	936	19.0			1028	18.7
		30%	328*	34.7*	360*	49.5*	584	30.4			642	30.0
	200° F	20%	971*	11.7*	1065*	16.7*	1730*	10.2*			1901	10.1*
		25%	615*	18.5*	674*	26.4*	1096*	16.2*			1204	16.0*
		30%	384*	29.6*	421*	42.2*	684*	26.0*			752	25.6*
30 H.P. 42" Fan 10.25 million BTU	160° F	20%	740	15.4	806	22.0			819	23.5	1452	13.2
		25%	469	24.3	511	34.8			519	37.1	920	20.9
		30%	293	38.9	319	55.8			324	59.4	574	33.5
	180° F	20%	947	12.0	1032	17.2			1048	18.3	1858	10.4
		25%	600	19.0	653	27.2			664	29	1177	16.3
		30%	375	30.4	408	43.6			415	46.4	735	26.1
	200° F	20%	1109	10.2	1208	14.7			1227	15.6	2176	8.8
		25%	702	16.2	765	23.2			777	24.7	1378	14.0
		30%	439	25.9	478	37.2			486	39.6	861	22.4
40 H.P. 42" Fan 10.25 million BTU	160° F	20%			920	19.3			950	20.2		
		25%			583	30.5			602	32		
		30%			364	48.9			376	51.2		
	180° F	20%			1178	15.1			1216	15.8		
		25%			746	23.8			770	25		
		30%			466	38.2			481	40		
	200° F	20%			1379	12.9			1424	13.5		
		25%			873	20.3			902	21.3		
		30%			545	32.6			563	34.2		

MODEL CONFIGURATION FAQ'S

Why are the aeration fan type and sizes limited?

All fans have a static pressure limit. TopDry's use relatively high aeration rates. The storage grain depths can be as deep as 36' 8" with the newly released 36' 12 ring model. When you add the 1.5" to 2.7" of static supplied by the drying fans to the static from high aeration rates you get static's that no axial can overcome. In some cases the smaller 1750 Centrifugals also will stall out. Only Inline Centrifugals work in every situation, but they do not produce as much air as a 1750 Centrifugal. Where possible a 1750 Centrifugal will be offered, but it is important to only use the recommended aeration fan or fans for each diameter TopDry which can be found in our literature and the Product Information Guide.

TopDry	Minimum Fan(s)	Recommended Fan(s)	Maximum Fan(s)
	1/4 cfm	1/3 cfm	1/2 cfm
24' 10 ring	3 hp 18" inline	3 hp 24" inline	15 hp 28" Inline
30' 11 ring	10 hp 28 inline	15 hp 28" inline	(2) 15 hp 28" inlines
		10 hp 1750 Cent.	
36' 11 ring	15 hp 28" inline	(2) 10 hp 28" inlines	(2) 15 hp 28" inlines
		15 hp 1750 Cent.	20 hp 1750 Cent.

What is the right fill capacity?

With Batch TopDry's the faster you fill the drying chamber the faster you are back drying. In some cases faster fill may mean another 1 or even 2 batches a day.

On an AutoFlow it is important that the fill speed is such that the peak does not become exposed and at the end of the year when capacities are very high the TopDry can be filled faster than it is drying. In general it is best to have at least 1.5 times the maximum drying capacity expected. This is often a 10" auger on a 24', a 12" auger on a 30' and a 13" auger on a 36' or a leg that can deliver the needed capacity. The TopDry Simulation Program is good to run low moisture scenarios to determine the minimum load capacity. *Note: If a downspout larger than 10" is used it is important to install a plate with an 10" centered opening at the top of the TopDry or if possible a removable angle iron "hogs back" to keep grain from being forced under the top leveling bands seriously affecting operation and possibly causing the overfilling of the drying chamber.*

How important is discharge capacity?

If the grain cannot be readily moved to other final storage it may be better to consider one of our other types of dryers. This is usually easy to do on a new installation, but may be more difficult in an existing system. Many systems use a 10" power sweep and then parallel a second 10" standard unload auger next to it to fully load a 7K leg. The Power Sweep U- trough's can deliver the same type of volume. No matter how it is done it is important to be able to move grain quickly and efficiently.

What about future expansion?

When possible, starting out with a Batch TopDry allows for a doubling of capacity simply by upgrading it to an AutoFlow. When choosing an AutoFlow's diameter and fan combinations consider potential future capacity expansions. When the desired capacity requires the maximum allowed fan or fans consider the next larger diameter. It will give more capacity with the same fan(s) and may allow for a larger fan(s) or a second fan for a future capacity upgrade. It is a good idea when a second added fan is possible that the 2nd entrance with metal cover be installed during the initial install to make its later addition easier. If a second fan is expected many Dealers increase the vent number to match. None of the diameters allow two 40hp fans so consider when using a single 40hp fan that it will have to be traded in to go to two 15hp 40" fans on a 30' or two 30hp fans on a 36'.

How many roof vents: recommended or more?

Roof vents are very important because if too few are used it will choke the airflow delivered by the fans. The recommended number of vents conforms to the ASABE standard of 1,200 cfm/ft2 of opening. It does depend on the peak cap and man hole being open along with the extra wide eave opening to meet that standard. Though this is the standard the more vent opening the better the performance. Some Dealers even populate every available roof sheet. (2 at manhole & 1 for load auger if used are not available) If too many vents causes the vents to bang open and shut heaving the roof screw shut one at a time until the other vents stay open. If the peak opening will be sealed the TopDry Flatop should be used to replace that opening or 5 high mount roof vents should be installed as peak venting is important.

Why are AutoVents used?

The unique patented AutoVents have less restriction to passing air than any wire or grilled vent and that is a good thing for high airflow situation like a TopDry. TopDry's need as much opening as possible, so AutoVents are the only vents allowed for use. AutoVents do require high air velocity to work correctly so do not substitute them on grain bins for conventional aeration.

Why are the floor support numbers not less because the top 2 rings store no grain?

The standard number of supports are for the full height of the TopDry due to the very high discharge rate all TopDry's have with the chutes. It can create additional load on the floor and the extra supports are necessary

Where do the platforms go for proper operation and service?

If ladders are ordered a platform for the Storage Chamber upper Entrance and one for the eave are provided by the Configurator by default. It is important to locate the Storage Chamber entrance and platform just to the right of the furthest right ductwork with the ladder to its right so that the mechanical high limit, plenum temperature sensor (which must be immediately to the right of the furthest right duct), Storage Chamber Rotary Limit Switch (which needs to be relatively close to the ducts) and grain temperature sensor junction box can all be serviced from them. If this position cannot be accomplished an optional platform and ladder will need to be ordered to access those items or a lift platform will be necessary for service.

2nd Added Large Platform

Optional Extra Service Platform and Ladder

Service Ladder Only

If a stairs system is ordered two platforms are standard with enough stair sections to put the top platform at the eave of the bin. In addition ladder is included for access from the platform to the eave if that is preferred. If the new stairs are intended to go all the way to the eave careful location of the Storage Chamber Entrance will be necessary an optional platform and ladder will need to be ordered to service the controls mentioned in the previous Ladder section.

Old Style Stairs and Large Platform

New Style Stairs to Eave

Can a Grain Flow be added to a TopDry to improve capacity and automation?

This addition was first made in the earlier 1990's. Though it does work it takes a great deal of management to make it work successfully and there will continue to be issues that make its addition highly questionable. Here is the list of the GrainFlows limits and then the issues that have occurred regularly to the point that GSI does not recommend its use in a TopDry.

Grain Flow Recommendations:

- ✓ Double the floor supports are necessary in the middle 14 ft. of the bin when using a Grain Flow due to greatly increased pressures. The Dura-Lok floor would be the best choice.
- ✓ It is recommend to use the 18 ga. Cor-Lok or Dura-Lok round perforation floors with a Grain Flow to minimize fines accumulation under the floor.
- ✓ Maximum grain depth of grain with a Grain Flow is 16 ft. to prevent gear box failure.

Issues:

- ✓ A Grain Flow has a maximum unload speed of 700 bu./hr.
- ✓ The cooling rates of today's TopDry's are slower than the drying rate. Within a few hours the removed grain temperature starts to rise and continues until a great deal of the efficiency gain from the reuse of the aeration air is lost.
- ✓ Gear Box failures have occurred when the maximum 16' of grain depth has been exceeded.
- ✓ Floor failures after 4 to 6 years of use have occurred even with increased floor support numbers due to the TopDry's heavy loads from high speed dumping combined with the increased loads from the Grain Flow.
- ✓ Sidewall re-corrugation in the lower two rings has occurred due to greatly increased loads from bottom removal of the grain along with grain depths over 16'.

Sensor Location Issues

Use the layout diagram on page 46 for important sensor location information. The Plenum Temperature Sensor, Grain Temperature Sensor Junction Box & Storage Chamber Rotary Switch all need to be located where they can be service from one of the platforms or an extra platform & ladder will need to be ordered. The Plenum Temperature Sensor MUST be just to the right of the furthest right fan ductwork. The best location is at the middle between the 1st and 2nd stiffener to the right of the fan ductwork. Do not go further than the middle of the bay between the 3rd and 4th stiffener.

Few of these installations have made it past the 4th or 5th year of use. A few have worked acceptably to the Owners, but they have mostly been 6 ring TopDrys with a greatly increased number of floor supports on 18 gauge Cor-Lok floors. There are some in use that the Owners are happy now, but they have only been in use a few years and have not yet seen the fines under the floor, floor failure or sidewall re-corrugation issues. When a TopDry without a GrainFlow installed is managed correctly removing grain periodically with the drying fans in operation the results have been good. As the TopDry unloads airflow increases in the center V and the hot grain has to flow down the V allowing better cooling and efficiency compared to the use of a GrainFlow. There are not enough advantages compared to the probable issues for GSI to recommend the use of a GrainFlow in a TopDry. If one is used the Dealer and Owner are on their own and there will be no warranty coverage on the floor, supports or sidewall of the TopDry.

Aeration Fan Location?

The aeration fan should be at least 1/4 of the bin circumference away from a drying fan. When TopDry's shut down their drying operations steam will often come out of the drying fan inlet. If the aeration fan is too close this steam may be re-circulated into the stored dry grain which can rewet the grain causing storage problems. This can be mitigated on an AutoFlow by setting a long enough time on the cooling clock so as to cool the hot grain at the top of the storage and drying chambers enough to prevent this, but in general it is never good to have the aeration fan too close to a drying fan.

Why should the aeration fan be perpendicular (90 degrees) from the direction the aeration floor is laid?

TopDry's may have as much as 1/2 cfm/bu. of aeration air. The fans that it takes to deliver this much air creates a tremendous velocity and force of air immediately in front of the fan outlet. Even with GSI Grandstand supports with their locking tabs being subjected for the two or more hours before the entire floor is covered could move the supports causing floor issues. Installing the fan perpendicular greatly reduces the chances of this happening.

What is a Choke Fill load system?

This is where the main dump and grain leg delivers the grain directly to the TopDry any time it is not full and grain is being dumped bypassing the wet bin. Usually a overflow valve is installed in the leg pipe to the TopDry with a second pipe to the wet bin to allow this to happen. This reduces the amount of grain that has to be handled twice while wet, reduces the amount of load equipment required usually eliminating one Leg and makes it easy to deliver the grain to the TopDry very quickly keeping it full when grain is being received. Operating this way may require shortening the Flatop fill pipe and the addition of an adjustable collar at the bottom to control how much grain enters the AutoFlow. The Over Flow Rotary Switch either needs to be jumped or not installed as the bottom of the fill tube will control the grain depth. It will take some time to make sure this works correctly the first time the AutoFlow is operated. Also when there is no grain being received the TopDry will fill normally from the wet bin usually at a slower rate so the adjustable High Level Rotary Switch still needs to be operating and set for its highest position. It is important to set the Load Delay Timer for enough time that when filling from the wet bin that the top of the AutoFlow and the fill pipe is filled putting a small amount of grain back into the wet bin. This insures that the AutoFlow behaves the same no matter where the grain comes from. If a downspout larger than 10" is used it is important to install a plate with an 10" centered opening at the top of the TopDry or if possible a removable angle iron "hogs back" to keep grain from being forced under the top leveling bands seriously affecting operation and possibly causing the overfilling of the drying chamber.

What do I charge for labor on my first TopDry?

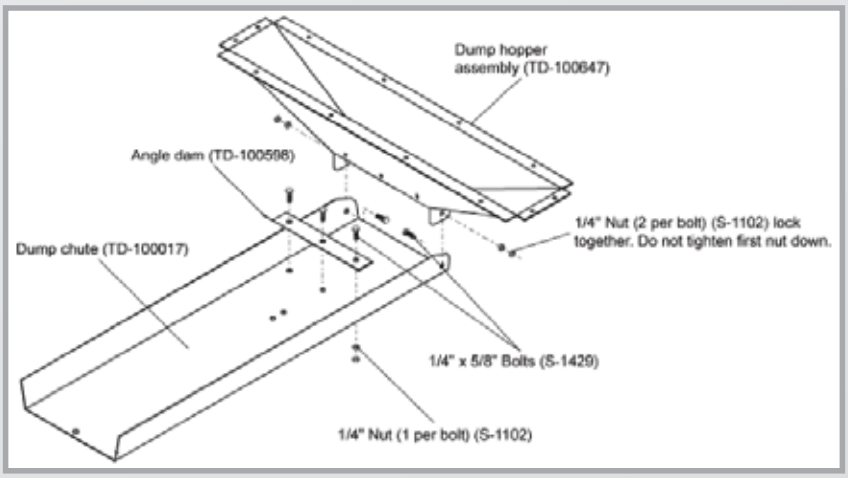
By the time you have built several TopDry's you will have your own way of accurately quoting labor. The first one will take longer than later builds and it is always a good idea to contact an existing TopDry Dealer to see if you can volunteer one or more of you building crew for 2 to 3 days helping on a build to educate yourself or employees on the best practices during the build. Meanwhile most add about 20% to their normal bin erection charges per lb for a TopDry. Another "Rule of Thumb" often used is to charge 10% of the list price of the complete TopDry. Electrical is separate and the Manuals have a list of all the conduit and wire runs that are required. Carefully going over these requirements and visiting an existing site with your Electrician so he is familiar with what is expected of him is highly recommended.

What are the typical construction issues?

- ✓ You should never run control wires of any kind with motor wires. Provide separate conduits for the two types of wire. Also it is best to use shielded wire for any sensing wire not carrying AC or DC voltage.
- ✓ Use only stranded machine wire, never use solid wire for anything on a TopDry.
- ✓ Make sure the hinge bolts on the dump chutes have locked double nuts and swing freely.

Dump Chutes

Make sure the Angle Dam is correct and double check to make sure the hinge bolts are locked and the Chutes swings completely free.



- ✓ The plenum sensor must be located just to the right of the furthest right unit. The best location is at the middle between the 1st and 2nd stiffener to the right of the fan ductwork. Do not go further than the middle of the bay between the 3rd and 4th stiffener.
- ✓ If you use vent crickets use bolts & nuts with the heads inside to prevent self tappers from injuring someone who is cleaning or working in the drying chamber.
- ✓ Before lifting the finished floor & roof make sure the dump chutes are all set completely parallel and that the cable goes through the side wall at the right place. (location & distance from stiffener)
- ✓ Think through the locations for drying and aeration fans, ladder or stairs, platforms etc. so they don't interfere with the unload, door or other peripheral devices or bins. (See location diagram in manual)
- ✓ If at all possible locate the upper storage chamber door and platform immediately to the right of the furthest right drying fan so the plenum temperature sensor, mechanical high limit, storage chamber rotary switch and grain temperature eave junction box can all be serviced from that platform. If it cannot, order an optional service platform and ladder for access and service for these items.
- ✓ When two fans and burners are used and LP gas is used for fuel make sure that the supply line comes to between the two fans and then T's right and left so any contaminates are equally split between the burners. If this is not done all contaminants will be delivered through the straight through line.

What if I use a Grain Leg to fill an AutoFlow TopDry and I don't want to use the GSI Flatop peak system?

✓ A Grain Leg is almost always a good choice to fill a TopDry but there are things that have to be done right if it is to perform correctly.

✓ If a downspout larger than 10" is used it is important to install a plate with an 10" centered opening at the top of the TopDry or if possible a removable angle iron "hogs back" to keep grain from being forced under the top leveling bands seriously affecting operation and possibly causing the overfilling of the drying chamber.

✓ The downspout entering the peak needs to be the same number of inches below a line across the top of the peak opening as the diameter of the downspout used.

✓ You will need to be able to adjust this depth. One way is to use large hose clamps to clamp a piece of leg belt around the spout allowing for adjustment to a lower discharge point. A slightly larger piece of spout can be placed around the downspout with chains attached and hooks fastened to the main spout to position it. Any method can be used to allow adjustment of the depth as long as it does not affect airflow through the peak.

Do I have to use all 5 of the possible Rotary Switches on an AutoFlow?

✓ No, some are optional and in 2015 only 3 will be shipped with an AutoFlow. Here is a list of the switches and whether they are required for operation.

- Wet Supply Rotary Switch: This is now an optional switch which will have to be ordered separately. This switch does not work correctly with a flat bottomed wet bin and the Out of Grain Timer is a much better way to monitor for an empty wet bin.
- Drying Chamber Overflow Rotary Switch: This switch is optional and does not have a function if a grain leg is used to fill an AutoFlow. Jump the terminal location for this switch if not used. One of the three switches that ships with an AutoFlow should be used for this location or for the Drying Chamber Low Level position. A fourth Rotary Switch will have to be ordered if you prefer to use both of these switch positions.
- Drying Chamber High Level Rotary Switch: This is a required switch and one of the three that is shipped must be used in this position.
- Drying Chamber Low Level Rotary Switch: This switch is optional and can be left out by jumping the terminal location for this switch. One of the three switches that ships with an AutoFlow should be used for this location or for the Drying Chamber Overflow position. A fourth Rotary Switch will have to be ordered if you prefer to use both of these switch positions.
- Storage Chamber Full Safety Rotary Switch: This switch is a required switch and one of the three switches that is shipped must be used in this position.

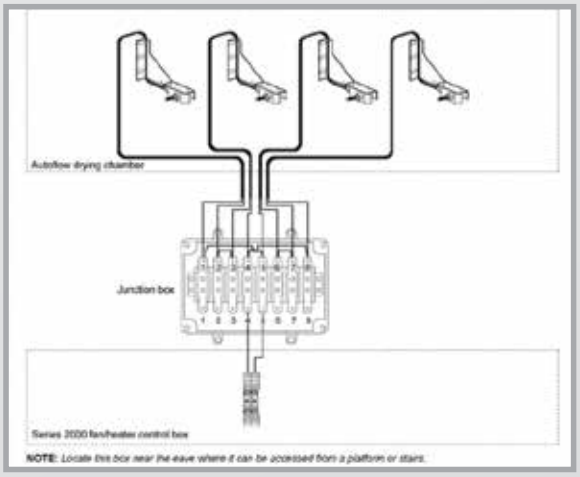
What are the typical construction issues? (continued)

✓ If a large LP tank is used and is located more than 100' away from the TopDry Burners make sure the buried pipes lowest point is at the TopDry and the pipe is straight without humps in the line which will accumulate vapor. Not doing so will cause vaporizer high limit shut downs for an extended time each time the TopDry is fired each day. In some cases if too much vapor is getting to the vaporizers in the burners it may be necessary to put a nurse tank as close to the TopDry as local codes allow to trap and keep the vapor from entering the vaporizers.

✓ Series Parallel Wiring must be done correctly for proper operation.

Series Parallel Wiring

Make no splices inside the drying chamber and make sure the Junction Box is located where it can be serviced.



✓ Grain Temperature Sensor Location is critical.

Grain Temperature Sensor Location

This is a critical setting. One of the most often made mistakes is to not get this right.

What is Cool Down Mode?

✓ When time is entered on the Cool Timer when the AutoFlow has a non emergency shutdown all other actions stop but the fan alone will continue for that amount of time. This allows for a cool down period. If this is desired set the timer for 10 minutes increasing if necessary until little or no steam is leaving the fans & vents.

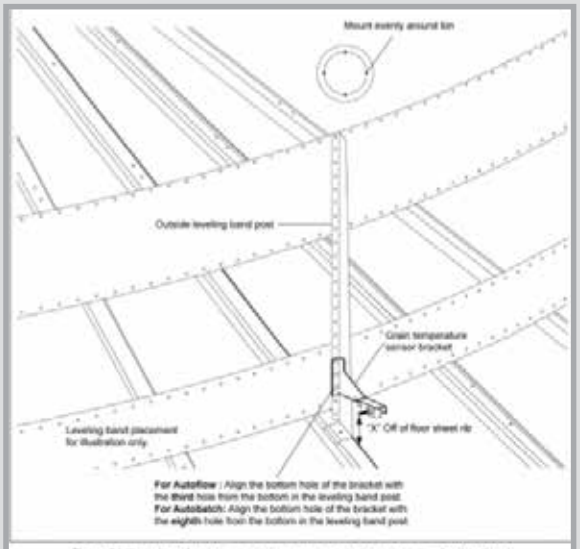


Figure 3J Illustration of grain temperature sensor mounted on outside leveling band post.

Height of Sensor Bracket	
Drying Mode	Approximate Height of "X"
Autoflow	8-1/2"
Autobatch	17-1/2"

NOTE: Prior to 2012, the Autoflow height with the old leveling band positions was 10-1/2".

In Automatic why do I need to set any dry time?

Before a Batch TopDry is started using Temperature control or an AutoFlow TopDry is running in Automatic it is best to keep at least 1/2 the chart dry time set, updating this if the incoming moisture changes 2 to 3 points. This helps maintain even operation and prevents accidental wet grain dumps when changes in incoming moisture occur, but must be updated as incoming moisture reduces to prevent over drying.

Why do some AutoFlows have to have the fans shut down when they dump?

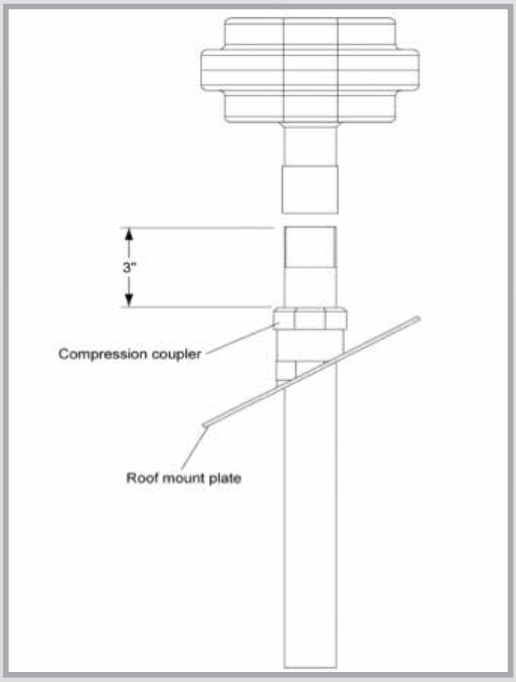
When the air velocity hits the maximum allowable for efficient operation on each diameter of AutoFlow, as it does with the maximum allowed fans, it becomes capable of carrying dust from the end of the dump chutes up and onto the bottom of the drying floor where it accumulates until the airflow is reduced which in turn reduces capacity and affects proper fan & burner operation. By shutting down the fans with the fan delay for slightly longer than the short dump time this build up is stopped eliminating all the effects. Testing suggests the highest airflow mildly disrupts how the grain flows on the floor and out of the dump chutes. It has been determined that the shutting down of the fans for a short period does not affect the capacity of the system by allowing more uniform operation. All single phase fans have non reversible bearings on the motors so repeatedly shutting down and starting a 2 fan AutoFlow does not cause the second fan to start backwards.

Why is it important to keep the peak area of any TopDry filled?

TopDry's like to have the peak of the drying chamber as full as possible so a shallowing or an exposed peak doesn't allow drying air to escape and negatively alter operation. On a Batch TopDry this means any time you are drying grain over 20% you need to refill the top at 1/2 of the expected drying time. On an AutoFlow it is important to fill at an adequate rate to keep air from escaping. (See What is the right fill capacity? In the Configuring the Model FAQ section). It is also important on a standard fill system to position the Adjustable High Level Rotary Switch and set the Load Delay Timer so that the peak section is as full as possible without tripping the Over Flow Rotary Switch. For a choke fill system see the next FAQ.

Adjustable High Level Switch

Adjust to maximize peak grain depth without tripping the Overflow Rotary Switch



In the case of a Choke Fill load system on an AutoFlow how can I make operation the same no matter where the wet grain is coming from?

When an AutoFlow is being filled with a choke fill it will still have to load from a wet bin at a slower rate. When the dump is running the AutoFlow is always full and the fill pipe is also full. However when there is no grain being received the TopDry will fill from the wet bin so the High Level Rotary Switch still needs to be operating and set for its highest position. It is also important to set the Load Delay Timer to

long enough that when filling from the wet bin that the top of the AutoFlow and the fill pipe is filled putting a small amount of grain back into the wet bin. This allows the AutoFlow to operate the same no matter where the grain comes from. If a downspout larger than 10" is used it is important to install a plate with an 10" centered opening at the top of the TopDry or if possible a removable angle iron "hogs back" to keep grain from being forced under the top leveling bands seriously affecting operation and possibly causing the overfilling of the drying chamber.

How do I take a moisture sample?

At one time we offered a sampler that took a small amount of grain from a single dump chute on an AutoFlow. In rare occasions this system worked well, but the majority of the time it was too inaccurate for use. With today's Zero Entry efforts it is a risk to enter the storage area whether the TopDry is operating or not, so taking samples inside is not a recommended method. The best way is to use the chart time estimates to dry 2 to 3 rings of grain, let it cool to outside temperatures and then move some of the grain to another bin taking samples during the transfer. The Moisture Control is based upon temperature approximately 5 degrees equals 1% of moisture. Using that ratio, adjustments can be made in the settings to bring the grain to the desired range. Any time grain is moved out of the TopDry it should be sampled to keep the grain within limits. Many Owners have installed Calc-U-Dri's on the TopDry discharge auger with its operation tied to the unload auger's running so an average of the moved grain can be monitored.

Can grain be moved while the TopDry is running?

Yes, it may be. Grain temperature in a TopDry is lower than with other high speed dryers. Moving grain creates a V in the middle of the bin increasing airflow in that area. Moving up to half the grain in the storage chamber making sure to stop 3' to 6' off the floor will not seriously affect operation or efficiency. This seems wrong to most newbie TopDry operators, but anyone experienced knows it has no bad effects.

Does the storage chamber have to be emptied completely each time grain is moved?

It is recommended that the storage chamber is completely emptied before the last fill which could stay in storage for an extended period. Most Operators bring the grain down to a V 3' to 6' off the floor for repeated grain transfers during the drying season and do not completely unload the storage area. They do however market or use the grain in the TopDry making it the first bin to be emptied each year.

Is it possible to disable the Storage Chamber Limit for more storage capacity?

It is never safe to try to tamper with the Storage Chamber Limit and damage can occur to the TopDry if it is not working properly. In operation the limit checks both positions and cannot be bypassed in any case.

Can I remove the peak cap of the drying floor to fill the center of the bin for more storage?

Never remove the peak cap for any reason other than major repairs.

Is after season grain storage management different than any other bin?

The TopDry is a dryer and there is a chance of segregation of grain with no mixing which occurs when the grain is moved. Fortunately the TopDry spreads the fines evenly through the grain which allows for very even aeration. The aeration fan should be run for twice as long as a normal temperature change cycle, at least for 10 days, to make sure the kernel moisture is as even as possible and the grain stored in the TopDry should be the first grain to be marketed. It is important to make sure the drying fan(s) have the supplied cover(s) over their openings during storage and it is very important that they be removed before starting the fans the following fall.

How often should the dump chute aircraft cable be replaced?

On model's prior to August 2013 with the original actuator the cable from the connection in the actuator to 6' above it should be replaced every 5 years due to frequent re-bending. Typical life for this lower portion is 7 to 10 years due to the re-bending that occurs in the actuator. The cable above 6' above the actuator should be replaced every 10 years. The expected life for this portion is 15 to 20 years due to the minor re-bending at the eave and under the peak cap. On models after August 2013 with the new Chute controller the replacement schedule is greatly reduced. The Chute Controller uses a sprocket and chain so no re-bending of the cable occurs. The pulleys at the eave and under the peak cap have been increased in diameter so the entire cable should only be replaced when obvious wear is present or 20 years of life.

What is mixed voltage?

On AutoFlow TopDry's with the original actuators with their 24 volt DC system the DC voltage can be accidentally mixed with the AC voltage via a short or water in boxes or conduits. If odd or constantly changing errors keep coming up, very odd behavior occurs or new boards do not fix communication errors mixed voltage may be the issue. The Service Tips downloadable from the Portal cover the likely causes and have a rock solid test method to identify this condition. The new Chute Controller which started shipping in August 2013 greatly reduces the chance of a mixed voltage condition since the 24 volt DC and batteries for the actuator system are not present.

For other Service Tip's and Information.

The TopDry Batch and TopDry AutoFlow like each of the Portable Dryers have written Service Tips available on the Dealer Portal. Look under Parts & Service / Service Tips to find the Service Tips.

Notes

Use the following as a suggested guideline for placing the TopDry components and accessories.

When locating the manway, make sure that the outside ladder will not interfere with other accessories below. Roof vents should be spaced evenly around the roof. (Quantity will vary with individual systems.)

IMPORTANT: *1. Items (I), (K), (M), and (O) must be in this location between the first two stiffeners to the right of the fan for proper operation.*
2. Items (I), (K), and (M) must be at platform or an optional ladder and platform will be required.
3. The aeration fan must be at least 90 degrees away from the main drying fans.
4. Storage chamber rotary switch should be mounted 3 ft. below fan/heater duct opening.

Figure 2-2 *Location of TopDry Components and Accessories — Top View*

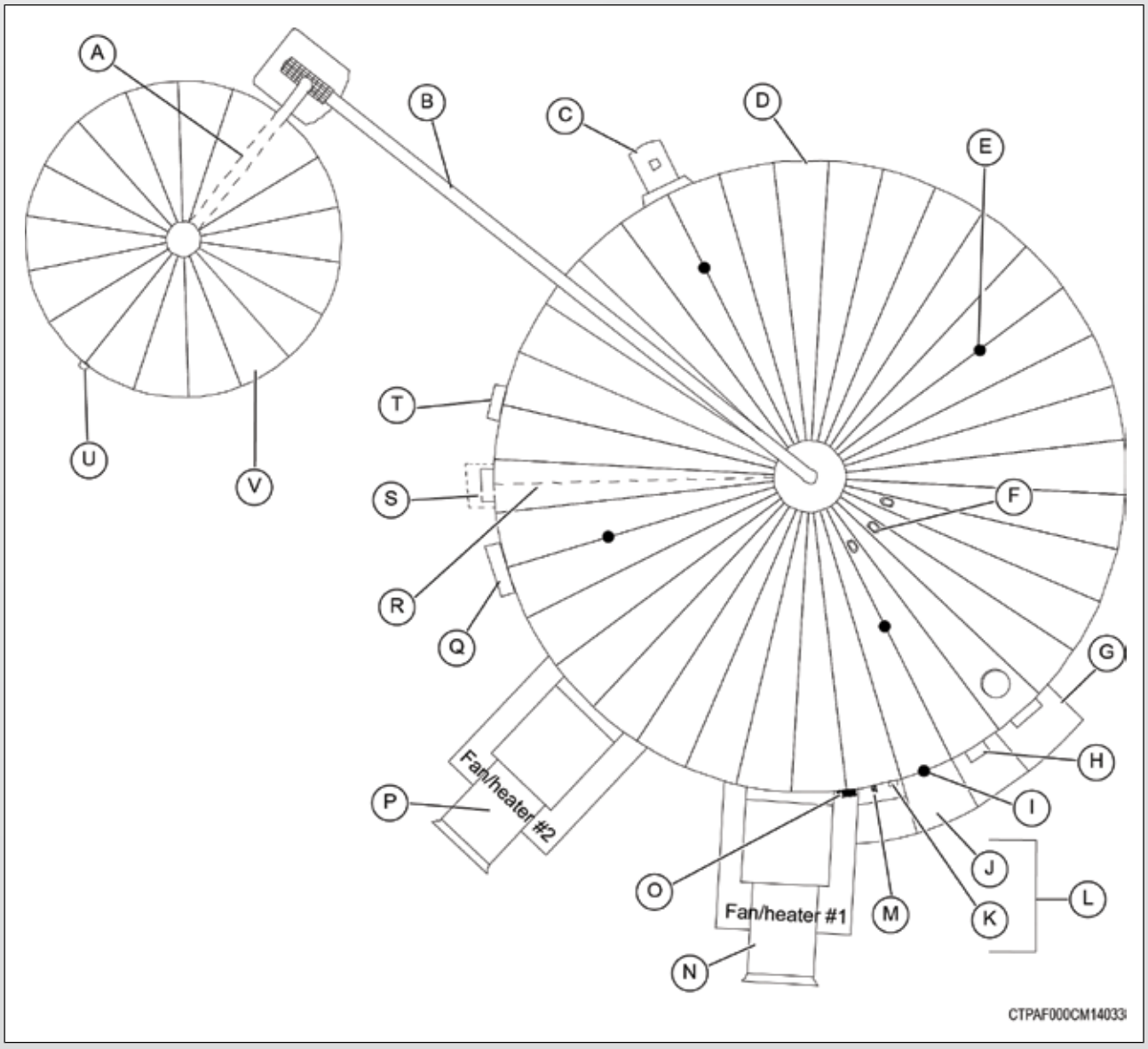
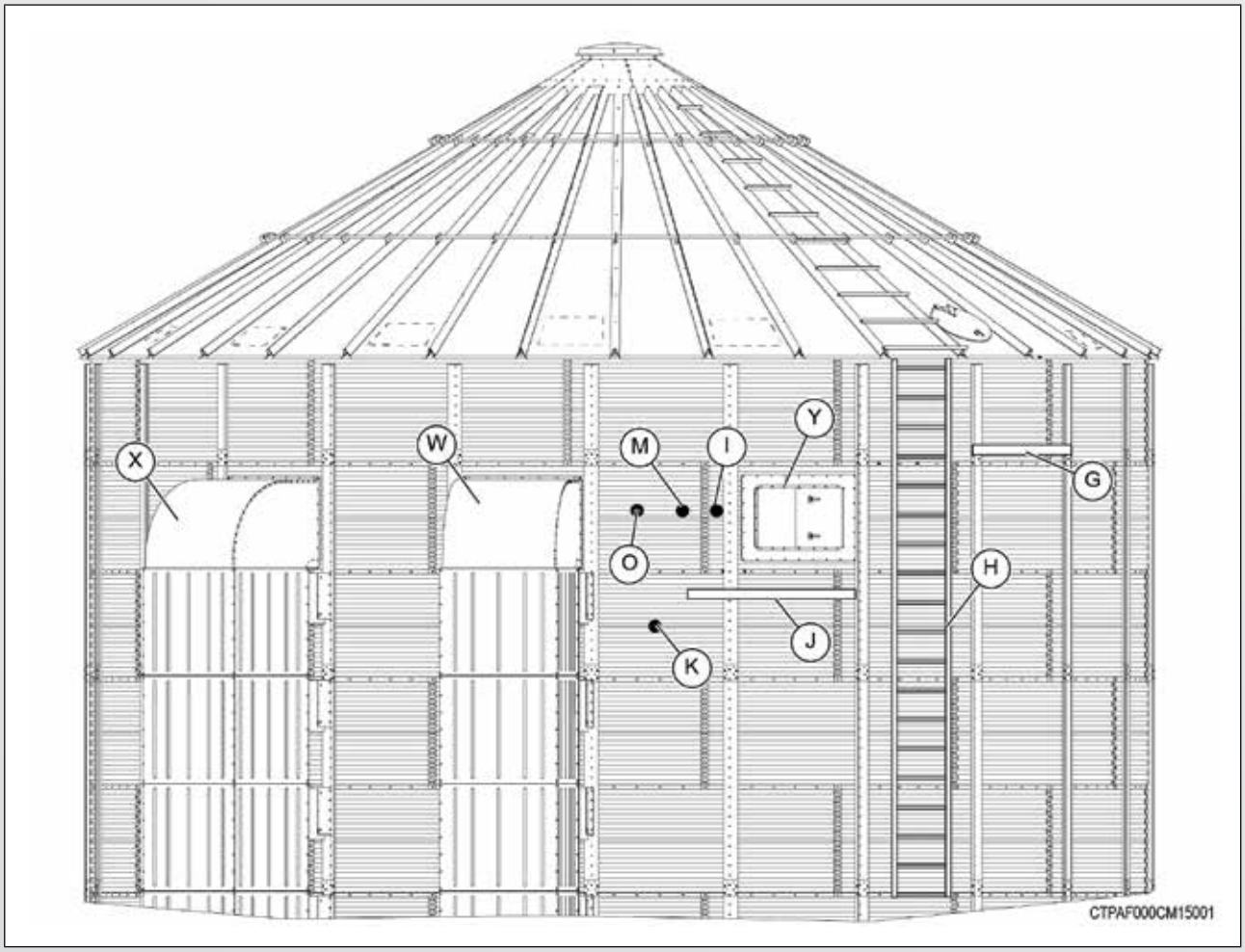
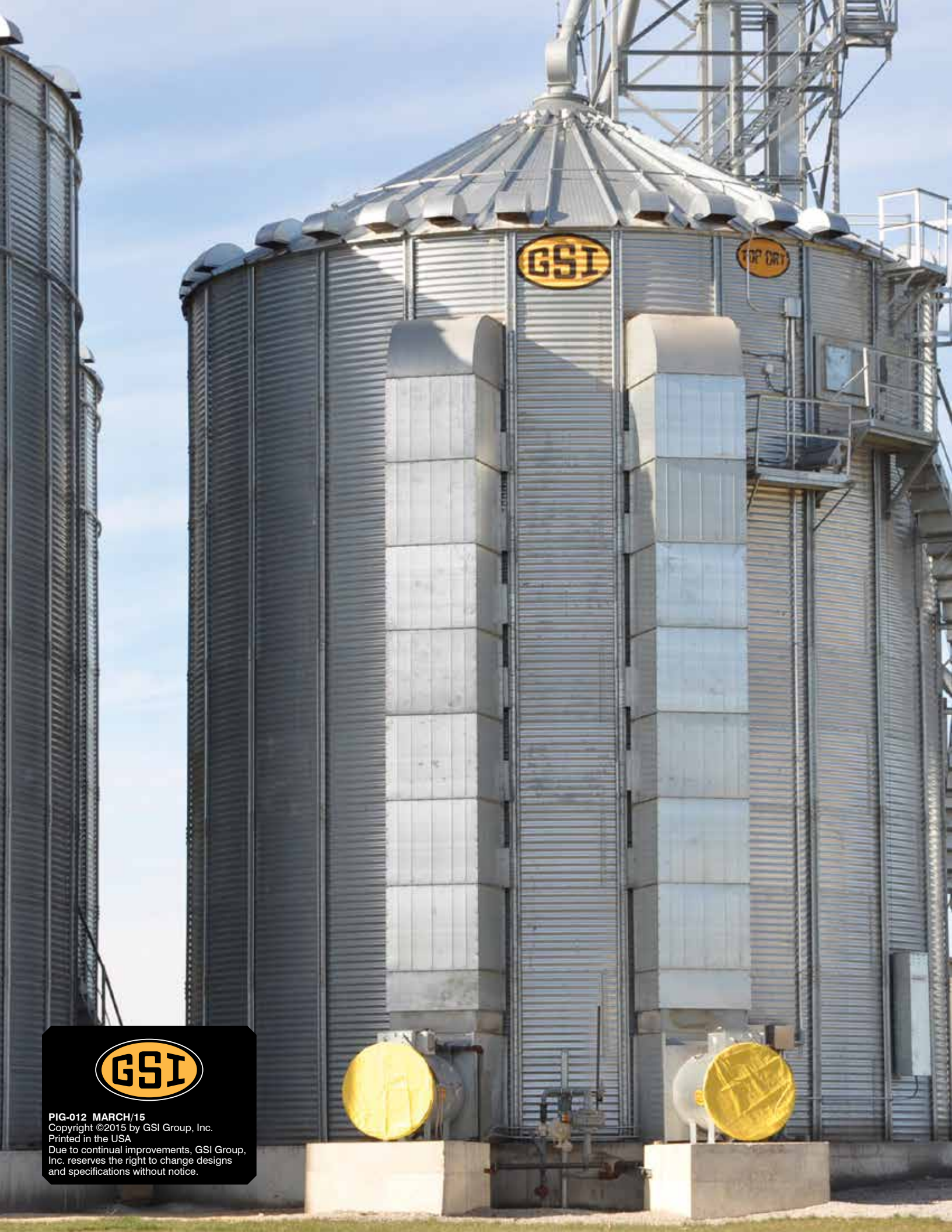


Figure 2-3 *Location of TopDry Components and Accessories — Side View*



A	Fill system no. 2	L	Mount even with fan/heater
B	Fill system no. 1	M	Grain temperature sensor junction box[12]
C	Aeration fan[3]	N	Control fan/heater
D	TopDry drying bin	O	Plenum temperature sensor[1]
E	Grain temperature sensors	P	Fan/heater
F	Drying chamber rotary switch	Q	Autoflow control box mounted at eye level
G	Eave platform	R	Cable route
H	Ladder	S	Chute controller
I	Plenum high limit sensor[12]	T	Fill system control box mounted at eye level
J	Storage chamber platform	U	Wet supply rotary switch (optional)
K	Storage chamber rotary switch[124]	V	Wet storage tank

1. Must be in this location between the first two stiffeners to the right of the fan for proper operation.
2. Must be at platform or optional ladder and platform will be required.
3. The aeration fan must be at least 90 degrees away from the main drying fans.
4. Should be mounted 3 ft. below fan/heater duct opening



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