Drying Systems for grain and oil seeds.

Eco Dry, Eco Cool, Ecomation, Ecolntelligence.
Proper conservation safeguards the quality and, with it, the value of grain for the producer. In addition to thorough cleaning and the method of storage, the ideal drying process plays a key role in conservation. Bühler’s top quality drying systems ensure optimum product conservation and are also employed in process technology, e.g. at oil mills or in the production of parboiled paddy.

Bühler dryers are capable of drying grain, oil seeds and all types of pourable special products. The most commonly dried goods include corn, wheat, paddy and sunflowers.

At reception plants, the drying of grain and oil seeds to attain the proper storage moisture level usually occurs directly after initial cleaning. Especially when goods are received from the field, dryers are also used at terminal facilities for grain trade. In addition to making goods storable, the dryer’s main function is to prevent the product from spoiling during subsequent transport.

At oil mills, oil seeds are dried prior to extraction so that the remaining moisture content is precisely the amount necessary for subsequent processing. In the rice industry, rice must be dried to the storage moisture level following the parboiling process.

In each individual application, systems must meet the demand for a drying process that is as gentle as possible, yet also energy efficient. The cost of drying represents a central criterion for the competitiveness of grain producers. The impact is particularly strong with products that have a high crop moisture content; with corn, for example, moisture content can be even above 30%. Since energy consumption is becoming an ever more critical factor, from an economic standpoint, being able to rely on efficient drying systems is increasing in importance.

Thanks to their sophisticated and time-tested technology, Bühler’s patented Eco Dry systems meet all the demands today’s customers put on modern drying systems.
Product overview.
The ideal dryer for every application.

Eco Dry
The continuous flow dryer is used at reception plants, storage facilities and in processing industries. Air is heated either directly or indirectly. Heat can come from conventional sources like oil or gas as well as from alternative energy sources such as rice husks or other biomass fuels. An environmentally-friendly dedusting system is optionally available.

Eco Cool
The Eco Dry can be combined with a continuous flow cooler for drying corn (reception moisture > 25 %). The Eco Cool contributes to significantly reducing operating costs. The continuous flow cooler can also be equipped with a dedusting system.

Eco Dry™
Intelligent operating principle.

With Eco Dry, ambient air is drawn in through the main fan and is heated by a hot air generator. The positioning of the main fan on the suction side produces negative pressure inside the dryer and conveys air from the hot air generator through the drying column and the downstream dedusting before it is discharged via the rain flap.

Following hot air drying in the upper section of the drying column, the previously heated dried product is cooled in the lower section of the column. In order to increase the system’s energy efficiency, non-saturated exhaust air and non-saturated cooling air which has been heated by the product are added to the hot air through an air recirculation fan.

The v-shaped ducts are open on the bottom. Air flows from the heat source through the open inlet air ducts (red) to the product and escapes via the exhaust air ducts (blue). In the process, the product is heated and releases moisture into the warm air. The warm air absorbs the moisture given off by the grains and cools down through evaporation. One special feature of the Eco Dry line of dryers is the conical shape of the ducts. This allows for higher capacity columns and uniform air distribution inside the dryer. The conical shape also prevents unintentional product discharge via the ducts.

Performance range.

<table>
<thead>
<tr>
<th>Material</th>
<th>Δ F (%)</th>
<th>Capacity t/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>20</td>
<td>400</td>
</tr>
<tr>
<td>Corn</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>Wheat</td>
<td>4</td>
<td>157</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td>Sunflowers</td>
<td>7</td>
<td>156</td>
</tr>
</tbody>
</table>

BÜHLER GRAIN LOGISTICS DRYING SYSTEMS
Eco Dry™. Energy efficient and gentle heating technology.

Variable configuration of the heat source.
The system can employ hot air generators with gas or oil burners, gas line burners or biomass incinerators (e.g. rice husks in combination with steam heat exchangers). The hot air generator is available for direct and/or indirect heating.

Waste heat recovery as a potential source of savings.
By recirculating warmed cooling air and warm, non-saturated drying air, operational costs of the drying system can be significantly reduced. The size of the cooling zone is variably adjustable and allows the system to be ideally adapted to the specific nature of the raw goods and drying process.

Product flow separation for a more homogeneous drying result.

Greater efficiency through diagonal duct arrangement.
Due to the diagonally duct arrangement the product is passed through with alternating hot and already cooled air. This leads to an increase in energy efficiency and a reduction in thermal stress to the product. This in turn makes the drying process extremely gentle.

The product flow separation ensures gentle handling of the product.
The product flow separation further reduces energy consumption while allowing heat to reach moist kernels in the middle of the product flow more efficiently. Besides lower operating costs, the system thus achieves perfectly uniform drying results. In addition, thermal stress to the product is reduced by nearly 50%.

Key advantages in drying.
- Seeds (maintains germination capacity)
- Malting barley (maintains germination capacity)
- Paddy (less breakage)
- Bread grains (maintains baking characteristics)

Uniform drying result
Product supply
Product flow separation
Hot air generator
Gas line burner
Heat exchanger

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Eco Dry™
Product design.

Rugged product column and optional cladding.
The product column is made of galvanized steel. Aluminum and stainless steel versions offering maximum protection against corrosion are also available for use with especially high product moistures. The dryer can be optionally equipped with heat insulation or a supplemental cladding.

Effective aspiration technology.
Thanks to the highly efficient central separator, dust emissions can be reduced to levels below the legally required limits. In contrast to filters, the central separator eliminates the risk of clogging, even with moist exhaust air.

Effective protection devices.
For the drying of light-weight bulk materials, such as sunflower seeds, Buhler drying plants are generally furnished with collecting pockets attached to the exhaust air vents in the ducts. They prevent the dried material from the column from being aspirated and redirected into the circulating air or exhaust air hood.

Proven pneumatic discharge.
The discharge design ensures even feeding and uniform product dwell times in the dryer. The jerking motion of the discharge also results in a kind of self-cleaning of the columns. The use of pneumatic technology instead of electricity improves safety standards in the dust zone.

Tapered roofs.
The use of conical ducts noticeably increases the dryer capacity. This has a direct positive effect on the drying efficiency, which is subject to the dwell time of the product inside the grain drying column and the dryer content as well. Furthermore, the optimized shape of the supply air and exhaust air ducts assure an absolutely uniform air distribution. This special feature leads to a more homogeneous drying result.
The drying process is similar to that of the Eco Dry. A difference is that the dryer does not have its own cooling zone and that the warm product is transferred into the Eco Cool with a remaining moisture content of approx. 17%. There, the product “sweats” additional moisture. Moisture is removed from the kernel surface exclusively through the addition of fresh air. The result is a homogenous storage moisture level of approx. 15%.

**Customer values of the Eco Dry – Eco Cool combination.**
- High potential energy savings
- Eliminates dryer cooling zone and increases dryer capacity
- Reduces the flow time in the dryer by roughly 1 hour
- Reduces the impact of heat on the product
- Eliminates moisture variations through sweating in the Eco Cool

In cases where reception moisture is 25% or higher, the Eco Cool system helps to reduce the operating costs significantly.
Eco Dry™ for raw paddy.
Extremely gentle drying.

The diagonal duct arrangement and permanent alternation of air flow direction in Eco Dry dryers significantly reduces thermal stress to raw paddy. Nevertheless, the drying process has to be carried out in several stages, between which the rice is allowed to rest. Bühler’s drying technology and processing know-how guarantee ideal solutions for product-friendly handling of raw paddy.

Customer values of Eco Dry solutions for raw paddy.
- Low heat impact on the product: gentle handling and reduction of losses and breakage through stress cracking
- Uniform drying results thanks to duct arrangement and separation of the product flow
- Elimination of variations in moisture in the tempering bins

Eco Dry™ for parboiled paddy.
Economical and gentle.

The three-stage drying process employed by Bühler is extremely fast and nevertheless gentle to the product. It reduces moisture content from approx. 35 % to about 12 %. Different temperature settings and „rest periods“ in so-called tempering bins increase throughput capacity without any damage to the product.

Customer values of Eco Dry solutions for parboiled paddy.
- High capacity through optimized three-stage process
- Efficiency / Low energy consumption
- Less breakage / gentle handling

Schematic diagram of a parboiled and raw paddy drying process:
Eco Dry™ for pulses.
Accurate, uniform and consistent.

Drying is one of the critical steps in pulses processing and in addition to removing excess moisture content from raw material, it also has a major influence on the process efficiency, yield and final product quality. Bühler presents the Eco Dry for pulses, an exclusive drying solution for pulses processing to meet the demands of the modern pulses mills.

With Buhler pulses dryers, you can achieve high batch to batch consistency through a better control on drying conditions, thanks to the intelligent sensing and control devices allowing you to easily check, manipulate and set a range of critical drying parameters for feeding, heating and discharge of the grains.

Uniform and rapid removal of the surface and core moisture of the pulses improves the pulses hulling and splitting efficiencies and subsequent reduction in re-processing, thereby allowing processors higher returns and lower cost of ownership.

Customer values of Eco Dry solutions for pulses:
- Uniform drying, exceptional quality
- Consistent performance
- Perfect drying for improved process efficiency

EcoIntelligence™ dryer control system.
Super-easy and effective operation.

With its numerous advantages the EcoIntelligence sets a new benchmark in the field of dryer control systems. Particularly outstanding is the intuitive operation and clear process visualization on industrial PCs with a large touch panel. Besides the minimization of training costs and operating errors, the user can rely on a convenient recipe management, full traceability and highly useful diagnostic options.

In addition, the access to the dryer via mobile devices offers high flexibility.

For high-standard systems the automatic moisture control system Ecomation is the solution to achieve top product quality with high energy efficiency at minimum drying times. The focus always is on the desired target moisture content of the product at the end of the drying process, which is automatically adjusted.

The distinctive structural features of the EcoIntelligence consist of its modularity and high configurability as well as easy wiring and commissioning. The platform-independent operating system ensures a long product life cycle. Last but not least the Total Care customer service and remote maintenance are additional options that increase the availability of the dryer.
Moisture control Ecomation™.
Your way to improve efficiency.

The drying costs incurred subject to the raw product and crop moisture represent a crucial factor for the producer’s competitiveness. With the Ecomation Buhler provides an automatic moisture control system for optimal monitoring, control and adjustment of the drying process.

Customer values:

Reduced energy consumption
Preventing overdrying of the product increases the dryer efficiency and significantly reduces the specific energy consumption.

Minimized risk of overdrying
The diagram above shows that in the absence of a control system the drying result is often inhomogeneous and generally too dry, since the storage of humid product would produce grain spoilage. The automatic control system allows to get much closer to the desired moisture value and thus to avoid cost-intensive overdrying.

Automated operation
The automated operation simplifies the use of the dryer and makes it much easier for the operator to cope with daily routine, because he can focus on other productive and value-adding activities.

Detailed and clear documentation
Owing to the recording of various parameters, such as the actual initial moisture content and the final moisture content, the operator can precisely reproduce and chart the degree of drying in the different grain portions.

Example Corn:
35% to 15%, 20,000 t/a, 20 t/h

<table>
<thead>
<tr>
<th></th>
<th>Without Ecomation</th>
<th>With Ecomation</th>
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</thead>
<tbody>
<tr>
<td>Expenses heating medium consumption</td>
<td>280,000 €</td>
<td>280,000 €</td>
</tr>
<tr>
<td>Expenses labor costs</td>
<td>25,000 €</td>
<td>19,000 €</td>
</tr>
<tr>
<td>Expenses mass loss caused by overdrying</td>
<td>24,000 €</td>
<td>6,000 €</td>
</tr>
<tr>
<td>Expenses total</td>
<td>335,000 €</td>
<td>305,000 €</td>
</tr>
</tbody>
</table>

Annual cost savings with Ecomation
30,000 €
Global presence.
Worldwide technology and service partner.

In the region – for the region. Today, Bühler produces machines and systems in more than 20 production facilities in 11 different countries: the USA, Brazil, Germany, Switzerland, Great Britain, the Netherlands, Spain, South Africa, Iran, China and India.

As a dependable technology partner with over 90 branch offices and presence in more than 140 countries, the company is always there for its customers. 2,300 sales and service representatives, who understand the respective local culture and language, devote themselves to maintaining personal contact with clients.

Strong, constructive partnerships form the foundation of a comprehensive range of products and services. Through its diverse business activities, Bühler meets the individual needs of its national and international customers.