Equipment + Process Design

AKW EQUIPMENT + PROCESS DESIGN

Equipment & Process Units

YOUR SPECIALIST FOR MINERALS TREATMENT AND ENVIRONMENTAL TECHNOLOGIES

We offer solutions for the wet mechanical and water management processing.

Equipment + Process Design

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MORE THAN 50 YEARS OF EXPERIENCE IN MINERALS TREATMENT AND ENVIRONMENTAL TECHNOLOGIES

AKW Equipment + Process Design is a medium-sized, privately owned company focused on process engineering, equipment manufacturing as well as plant construction and service. Since the foundation of AKW A+V GmbH in 1963, innovation, new product ideas and technologies have turned the company into a global operating enterprise with offices in Kiel, Moscow, Shanghai, São Paulo, the headquarters in Hirschau (Bavaria) and agencies in several countries.

Experience, know-how, motivation, dedication and a steadily high international standard in quality and service have turned us into a first-class interlocutor when it comes to supporting your specific requirement.

Equipment + Process Design

THE MAIN MARKETS WE SERVE

Sand & Kaolin

- Construction sand
- Industrial sand
- Foundry sand
- Glass sand
- Special sand
- Kaolin

Environmental & Recycling

- Soil remediation
- Municipal residues
- Harbour sediments
- Slags
- Food leftovers
- Wastewater treatment

Ores & Minerals

- Bauxite
- Alumina
- Heavy minerals
- Phosphate
- Potash
- Gold
- Graphite
- Iron
- Rare earths

Chemicals & Food

- Salts
- Starch
- Proteins

FGD (Flue Gas Desulfurization)

- Limestone grinding
- Gypsum classification and upconcentration
- Wastewater pre-treatment

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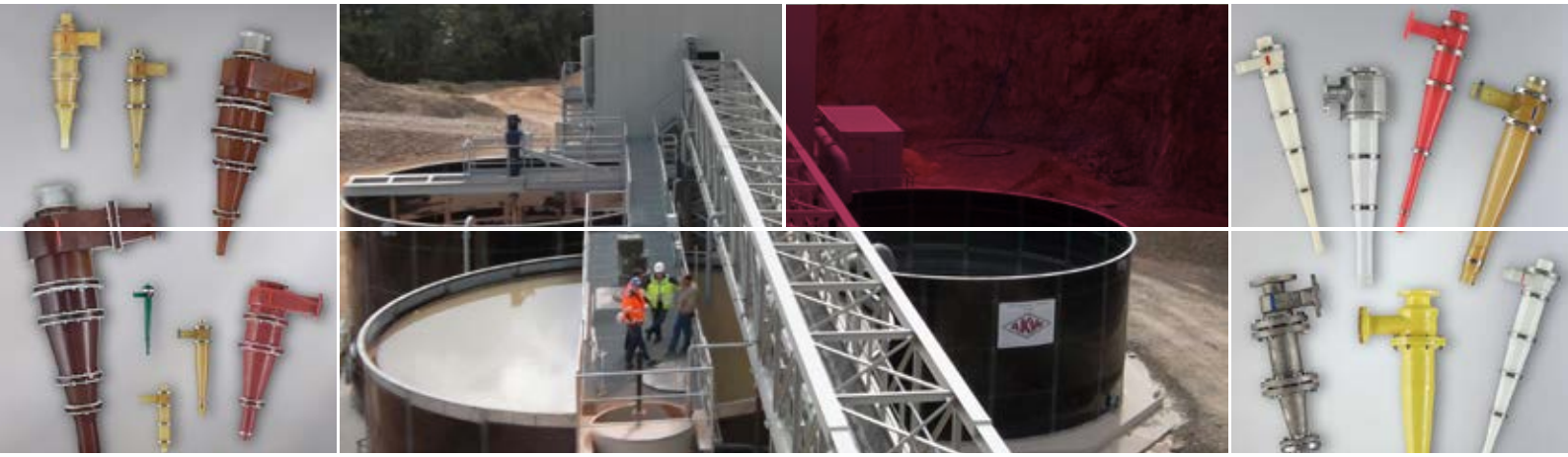

EQUIPMENT AND PROCESS UNITS

Equipment + Process Design

WASHING DRUMS **AKA-DRUM**

FOR DISSOLVING RAW MATERIALS

Processing of raw material begins in the washing and scrubbing drum. A good washing and scrubbing effect is a prerequisite for a high-quality product. AKA-DRUM is manufactured in various sizes. Rugged designs for mining and anti-abrasion coatings of rubber ensure a long service life time.

Principle of Operation

The internal components, such as lifting bars and alternate additional dissolving utilities produce the friction and turbulence required for a good disintegration of the raw material.

Design Features and Advantages

- Rugged design for mining
- Long service life time
- High wear-resistance
- Effective suspending of the raw material

Applications

- Kaolin and clay
- Soil remediation
- Municipal residues
- Slags

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WASHING DRUMS **AKA-DRUM**

TYPES

Type AKA-DRUM	WLT 125/375	WLT 150/450	WLT 175/525	WLT 200/600	WLT 250/750	WLT 300/900
Drum diameter	1.25 m	1.50 m	1.75 m	2.00 m	2.50 m	3.00 m
Drum length	3.75 m	4.50 m	5.25 m	6.00 m	7.50 m	9.00 m
Empty weight	5.0 t	8.0 t	10.0 t	17.5 t	27.0 t	50.0 t
Operating volume	1.0 m³	2.0 m³	2.7 m³	4.3 m³	8.4 m³	12.0 m³
No. of drive motors	1 pc.	1 pc.	2 pcs.	2 pcs.	2 pcs.	3 pcs.
Installed power	11 kW	15 kW	2 x 11 kW	2 x 18.5 kW	2 x 45 kW	3 x 45 kW

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WET CLASSIFICATION SCREENS **AKA-SCREEN**

FOR FINE SCREENING FOR PRODUCING FRACTIONS WITH SHARP CUT SIZES

The AKA-SCREEN is a wet classification technology used to produce fractions with sharp cut sizes in fine grain screening.

Principle of Operation

The AKA-SCREEN consists of up to 5 individual screen decks, screen layers made of polyurethane, screen frame coated with polyurethane as well as a spraying system for optimum screening efficiency. The AKA-SCREEN series is using two unbalanced motors with up to 2 g acceleration. This generates a composite-vibration of linear motion of the whole screen frames and additionally mesh vibration. The vibrating parameters can be controlled through frequency conversion.

Design Features and Advantages

- High resistant polyurethane fine mesh size panels
- Screen boxes coated with polyurethane varnish
- Open screen area ranging from 30% to 40%
- Available mesh size from 75µm to 800µm
- Customized sizes available upon request
- Very accurate cut sizes, with high throughputs
- Fast exchange of screen panels (standard fixture)
- Low power consumption
- Low vibrations to sub structure

Applications

- Ores and minerals
- Commodity sands
- Specialty sands

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WET CLASSIFICATION SCREENS **AKA-SCREEN**

TYPES

Type AKA-SCREEN	AKA-S1021	AKA-S1028	AKA-S2028	AKA-S3042	AKA-S4056	AKA-S5070	AKA-S2042	AKA-S3063	AKA-S4084	AKA-S5105
No. of screen decks	1 pc.	1 pc.	2 pcs.	3 pcs.	4 pcs.	5 pcs.	2 pcs.	3 pcs.	4 pcs.	5 pcs.
Screening area	2.1 m^2	2.8 m^2	2.8 m^2	4.2 m^2	5.6 m^2	7.0 m^2	4.2 m^2	6.3 m^2	8.4 m^2	10.5 m^2
Installed power	3.4 kW	3.4 kW	4.4 kW	4.4 kW	4.4 kW	4.4 kW	4.4 kW	4.4 kW	4.4 kW	4.4 kW

Equipment + Process Design

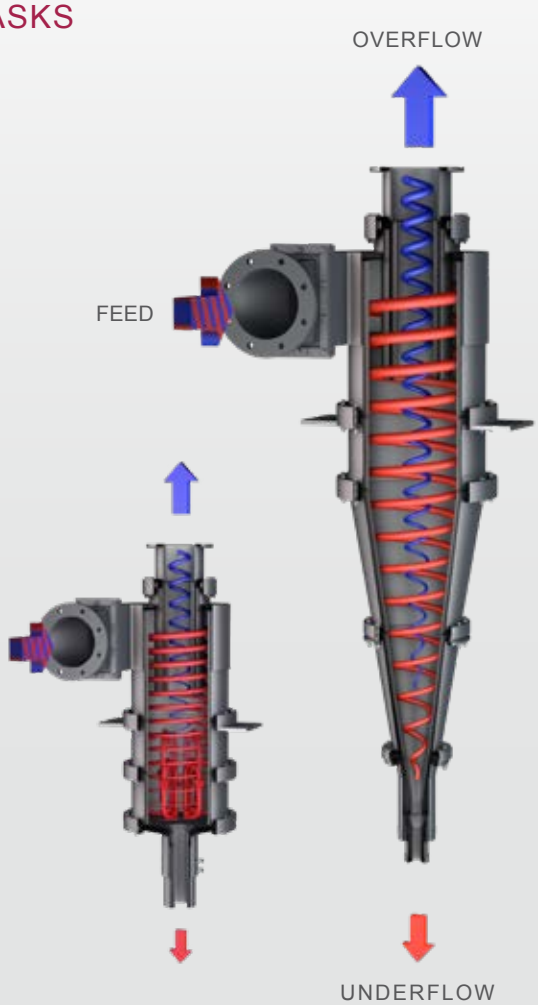
HYDROCYCLONES **AKA-VORTEX**

FOR SOLID-LIQUID SEPARATION AND DIFFICULT CLASSIFICATION TASKS

Hydrocyclones are important and economically viable systems for the wet-mechanical separation and classifying processes of ores and minerals.

AKA-VORTEX are applied across the industry in various areas:

- **Sorting**
- **Desliming**
- **Solids recovery**
- **Classification**



Principle of Operation

In principle, the hydrocyclone is a solid bowl centrifuge of “slim” design. It can be compared to a high-speed tubular centrifuge but also with a long-tube decanter.

In the case of the hydrocyclone, however, the body is stationary. A rotation is initiated by the flow arising from the tangential feed under pump pressure.

The fluid is subjected to centrifugal forces, that lead to the creation of a primary vortex, which is directed downwards, and an internal secondary vortex directed upwards. This leads to a segregation effect of the particles present in the fluid, due to a radially outward sedimentation.

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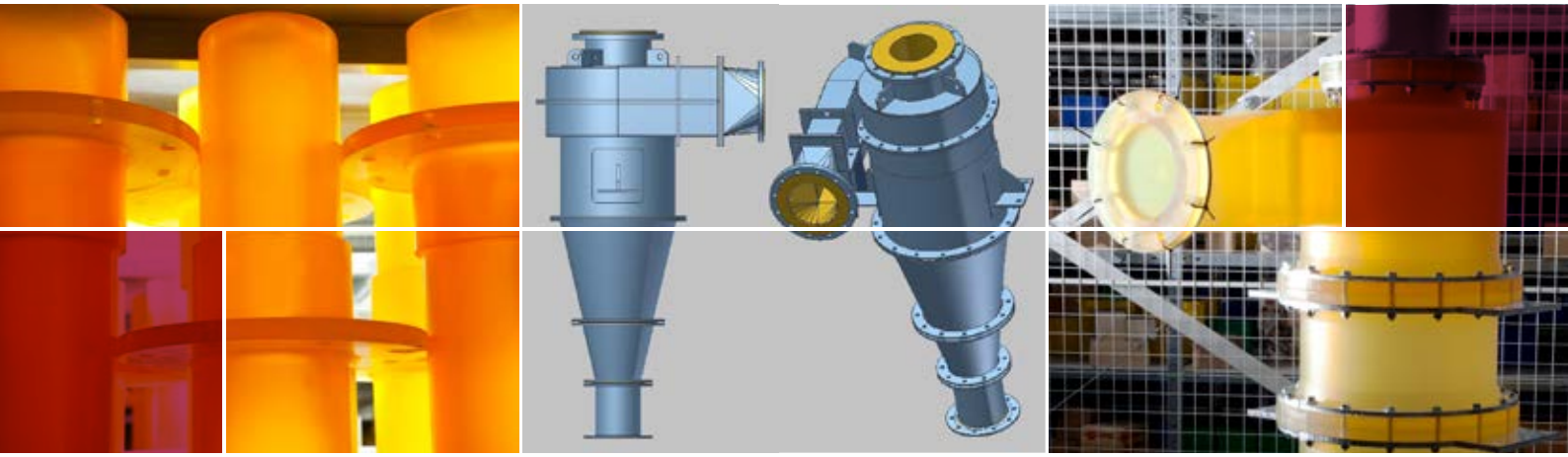
Design Features and Advantages

- Simple in operation
- Optimum separation characteristic at varying operating conditions
- Modular system through the use of simple connectors and adaptors (feed part, overflow and underflow nozzle)
- Easy adaption to changing operation parameters
- Fast and trouble-free changing of wear parts
- Low weight of single parts
- Long life time as per appropriate selection of material for each application: highly wear-resistant polyurethane, oxide- or SiC-ceramic, NiHard, titanium, diverse steels
- Can be lined with high wear-resistant, chemical- and corrosion-resistant materials

Applications

- Ores and Minerals
- Chemical intermediates
- Alumina
- Sands

Equipment + Process Design



HYDROCYCLONES **AKA-VORTEX**

TYPES

EXTRACT

Type Hydrocyclone	Nominal-Ø	Cut Size d_{50}	Pressure	Capacity
RWK42	20 mm	3 – 5 µm	2.0 – 3.5 bar	0.5 – 0.8 m³/h
RWS75	35 mm	4 – 8 µm	1.5 – 3.5 bar	0.8 – 2.9 m³/h
RWS105	50 mm	5 – 15 µm	1.5 – 3.0 bar	2.4 – 7.6 m³/h
RWT1530	75 mm	12 – 18 µm	1.5 – 2.5 bar	5.5 – 13.5 m³/h
TRT2128	100 mm	14 – 26 µm	1.5 – 2.5 bar	23 – 58 m³/h
KRS3128	150 mm	25 – 35 µm	1.5 – 2.5 bar	25 – 60 m³/h
RWT4118	200 mm	30 – 50 µm	1.0 – 1.7 bar	32 – 67 m³/h
TRT4118	200 mm	30 – 50 µm	1.0 – 1.7 bar	65 – 135 m³/h
RWT5118	250 mm	45 – 60 µm	1.0 – 1.7 bar	42 – 103 m³/h
RWN6518	325 mm	55 – 70 µm	0.8 – 1.5 bar	80 – 150 m³/h
RWH8124	400 mm	60 – 90 µm	0.7 – 1.3 bar	100 – 280 m³/h
NSW92.30	450 mm	65 – 95 µm	0.6 – 3.0 bar	130 – 475 m³/h
RWZ102.30	500 mm	80 – 120 µm	0.5 – 1.1 bar	160 – 490 m³/h
RWL132.30	660 mm	100 – 130 µm	0.5 – 1.8 bar	560 – 760 m³/h
RWS150.28	750 mm	100 – 150 µm	0.5 – 1.2 bar	210 – 720 m³/h
RWS240.28	1,200 mm	120 – 180 µm	0.4 – 1.0 bar	500 – 1,500 m³/h

More than 3,000 different combinations allow the handling under various process conditions and the reaching of the desired results (cut size d_{50}).

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HYDROCYCLONES **AKA-VORTEX**

TYPES

CONICAL Hydrocyclones

The CONICAL hydrocyclone is the historical and mainstream version of the AKA-VORTEX series, used in almost all industrial applications.

FLAT-bottom Hydrocyclones

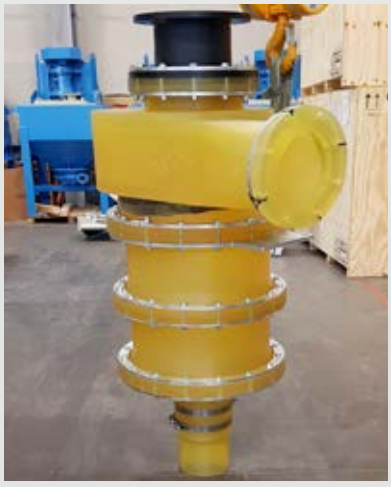
In comparison to the CONICAL hydrocyclone, the FLAT-bottom design is applicable to reach coarser cut sizes.

FLAT-bottom types have experienced growing popularity over time.

TWIN Hydrocyclones

The TWIN type, as opposite to standard CONICAL type, is equipped with a proprietary designed TWIN feed part, developed to minimize the investment costs of a hydrocyclone cluster as a result of:

- Reduction in the number of valves
- Optimizing of quantity of steelwork
- Overall space saving (reduced footprint)



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HYDROCYCLONES **AKA-VORTEX**

TYPES

Carbon Steel with Polyurethane Liner

Available in the size range 400, 500 and 660 mm diameters, these hydrocyclones are characterized by high flow rates and can be used amongst others in the closed grinding circuit applications. The apparatus is maintenance-friendly, and the possibility of adapting the polyurethane hardness to the mineral being processed, results in optimum lifetime.

Hydrocyclone Features

Over time, AKW A+V has developed a variety of additional hydrocyclone features, such as:

- Fishtail AKA-TAIL
- Antiblocking filter AKA-STRAINER
- Gritbox AKA-GRIT
- Special wear protections: ceramic made feedparts, overflow and apex nozzles

Equipment + Process Design

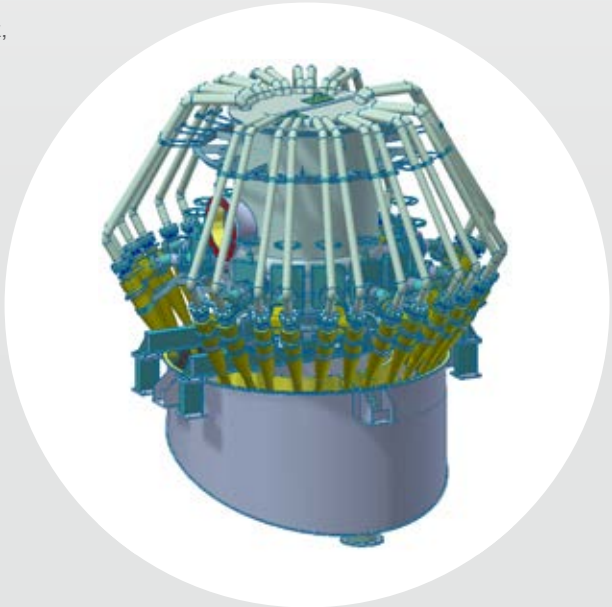
ANNULAR DISTRIBUTORS **AKA-SPIDER**

FOR HOMOGENEOUS AND EQUAL PRESSURE DISTRIBUTION OF THE SUSPENSION IN THE HYDROCYCLONES

AKA-SPIDER are annular distributors, combining several hydrocyclones together in order to reach a requested process throughput.

Principle of Operation

The hydrocyclones are connected to an inflow chamber (feed chamber) which is fed with the necessary amount of slurry at a calculated pressure. Each hydrocyclone is charged with the same pressure.
The hydrocyclone overflows will be collected in an overflow tank, and the underflows in a separate underflow chute.



Design Features and Advantages

- Homogeneous and equal pressure distribution of the suspension
- Reduced dead zone in the feed tank
- Equal flow distribution
- Our distributors are also available in longitudinal design
- Available with rubber liner
- Available with different shut off valves (butterfly, flat, bottom angle, …)
- Can be equipped with antiblocking filter AKA-STRAINER
- Customized design available

Equipment + Process Design

HIGH PERFORMANCE ATTRITION CELLS **AKA-TRIT**

FOR MECHANICAL SURFACE TREATMENT OF MINERALS

The attrition process is used for cleaning materials contaminated with impurities or pollutants on the surface.

Principle of Operation

In a high performance attrition the process conditions can be selectively adjusted by means of on-line measurement of the solids concentration and in addition of diluting water. The efficient measuring and control unit guarantees that the attrition conditions are reliably controlled for the entire duration of the process and thus ensure an effective cleaning action.

Design Features and Advantages

- Tank with vertical agitator and V-belt drive
- 2-, 4- or 6-cell construction with cell volume of 0.5, 1.0, 2.0, or 3.0 m³
- Robust, wear-resistant and low-maintenance construction in steel/stainless steel with wear protection for tank and agitator (rubber/polyurethane)
- Controlled, defined solids concentration
- Strong motors for reliable operation at high solid concentration

Applications

- Processing of ores, minerals and sands
- Wet mechanical purification of contaminated soil
- Conditioning upfront to flotation process

Equipment + Process Design

HIGH PERFORMANCE ATTRITION CELLS **AKA-TRIT**

TYPES

Type AKA-TRIT	RS05-2	RS05-4	RS10-2	RS10-4	RS20-2	RS20-4	RS30-2	RS30-4
No. of cells	2-cells	4-cells	2-cells	4-cells	2-cells	4-cells	2-cells	4-cells
Total cell volume	0.9 m³	1.8 m³	2.3 m³	4.6 m³	4.3 m³	8.6 m³	6.2 m³	12.4 m³
Empty weight	2.3 t	4.5 t	4.2 t	7.9 t	5.8 t	11.2 t	8.0 t	15.5 t
Installed power	2 x 18.5 kW	4 x 18.5 kW	2 x 37.5 kW	4 x 37.5 kW	2 x 55 kW	4 x 55 kW	2 x 75 kW	4 x 75 kW
Length	2,096 mm	3,659 mm	2,863 mm	5,035 mm	3,300 mm	5,911 mm	3,654 mm	6,666 mm
Width	1,350 mm	1,350 mm	1,582 mm	1,582 mm	1,724 mm	1,724 mm	1,973 mm	1,973 mm
Height	2,280 mm	2,280 mm	2,512 mm	2,512 mm	2,916 mm	2,916 mm	3,248 mm	3,248 mm

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UPSTREAM CLASSIFIERS **AKA-SIZER**

TO REACH SPECIFIC CUT SIZE

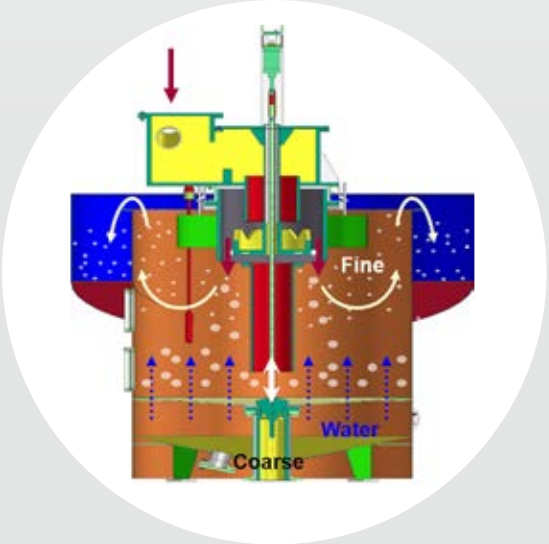
AKA-SIZER type TAK can produce products with cut sizes up to 0.8 mm/800 µm.

Principle of Operation

An optimum distribution of the upstream water from the bottom via a self closing nozzle plate, results in a homogeneous classifying bed, which enables a precise separation. By varying the water flow, different cut sizes can be achieved.
A special designed discharge regulation system controlled by the density of the fluidized bed, ensures a uniform cut size even in the case of fluctuations of the feed specification (grain size, concentration, capacity).

Design Features and Advantages

- Self closing nozzles
- Special designed discharge dart valves
- No dead zone above the discharge valves
- Adjustable and sensitive density sensor
- Central feeding for an effective distribution into the tank



Applications

- Glass, foundry and industrial sands
- Phosphate
- Chromite
- Slag

UPSTREAM CLASSIFIERS **AKA-SIZER**

TYPES

Type AKA-SIZER	TAK 121	TAK 161	TAK 191	TAK 222	TAK 262	TAK 303	TAK 363
Diameter	1,200 mm	1,600 mm	1,900 mm	2,200 mm	2,600 mm	3,000 mm	3,600 mm
Height	3,278 mm	3,750 mm	3,940 mm	4,395 mm	4,596 mm	4,549 mm	4,670 mm
Operating square	1.1 m^2	2.0 m^2	2.8 m^2	3.8 m^2	5.3 m^2	7.1 m^2	10.2 m^2
Empty weight	1.2 t	1.7 t	2.0 t	2.6 t	4.0 t	4.5 t	5.0 t
Installed power	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	3 x 1.5 kW	3 x 1.5 kW

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SPIRALS **AKA-SPIN**

FOR GRAVITY SEPARATION OF MINERALS

Spirals AKA-SPIN are sorting devices which separate materials according to their density differences. They can be used for a grain size range from 60 µm up to 2 mm, with a throughput per spiral ranging between 1– 4 t/h. If a higher throughput is required, 2 or 3 spirals can be combined to form one column.

Principle of Operation

The slurry (10 – 40 % solids depending on application) is fed into the spiral from the top. Spread on the spiral surface, it moves down by gravity. A transverse flow is superimposed to the main flow downwards. This combination results in a separation of the particles contained in the suspension, depending on their density. Particles with a lower specific gravity, such as wood, coal or organic matter, are concentrated in the outer areas of the flow. Particles with a higher specific gravity are directed towards the spiral axis.

Design Features and Advantages

- Separation of up to 3 fractions: heavy, middling and light density products
- Wear resistant polyurethane coating of the spiral body
- Light weight and robust design
- Spirals can be designed into columns and banks

Applications

- Ore and mineral sorting
- Coal processing
- Sand cleaning
- Soil remediation
- Municipal residues

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HIGH PERFORMANCE THICKENERS **AKA-SET**

FOR SLUDGE THICKENING AND VALORIZING

Principle of Operation

Macro flocs will be created due to the flow route of the flocculated feed slurry in counter-current to the sedimenting particles in the filtering zone. These flocs will sediment at a higher speed than the micro flocs of conventional thickeners. This results in a higher loading rate per unit settling area and smaller thickener diameters, compared to the traditional static thickeners.

Design Features and Advantages

- High loading rate per unit settling area
- Consistently steady high sludge concentration
- Fully automated
- Low energy system
- Produced out of customized or corrosion-resistant materials (steel, stainless steel)
- Coating with chemical and corrosion-resistant materials as an option (rubber, polyurethane, ceramic glazed)
- Lifting rake system as an option
- Available in conical and flat-bottom versions

Equipment + Process Design

HIGH PERFORMANCE THICKENERS **AKA-SET**

CONICAL TYPES

Type AKA-SET	28/150	40/150	60/150	80/150	100/150	120/150	140/150	160/150	180/150
Diameter	2.8 m	4 m	6 m	8 m	10 m	12 m	14 m	16 m	18 m
Clarifying area	6 m^2	12 m^2	28 m^2	50 m^2	78 m^2	113 m^2	196 m^2	201 m^2	254 m^2
No. of rake arms	2 pcs.	2 pcs.	2 pcs.	4 pcs.	4 pcs.	4 pcs.	4 pcs.	4 pcs.	4 pcs.
Drive power rake system	0.37 kW	0.55 kW	1.5 kW	2.2 kW	4 kW	4 kW	7.5 kW	9.2 kW	15 kW

Applications

- Mineral products (kaolin, salt, clay)

HIGH PERFORMANCE THICKENERS **AKA-SET**

FLAT TYPES

Type AKA-SET	80/180	100/180	120/180	140/180	160/180	180/180
Diameter	8 m	10 m	12 m	14 m	16 m	18 m
Clarifying area	50 m^2	78 m^2	113 m^2	196 m^2	201 m^2	254 m^2
No. of rake arms	4 pcs.	4 pcs.	4 pcs.	4 pcs.	4 pcs.	4 pcs.
Drive power rake system	2.2 kW	4 kW	4 kW	7.5 kW	9.2 kW	15 kW

Applications

- Mineral waste (sand, slag, soil remediation sludges)

Equipment + Process Design

FREE-FALL CLASSIFIERS **AKOREL**

FOR PRODUCTION OF CONSTRUCTION SANDS WITHIN THE DESIRED GRAIN SIZE

The AKOREL corrects the grain size of the natural sand deposit according to the required grain size distribution.

Principle of Operation

One or two sand qualities within the desired PSD (plus an uncontrolled sand grade) can be produced by blending 6 to 16 individual grain size fractions, via a user programmable control unit.

Design Features and Advantages

- High quality products according to customers' requirements
- Programmable control unit
- Adaptation to customer specific grades and standards
- Recipes and standards can be saved and called up

Applications

- Construction sands 0 – 4 mm

Equipment + Process Design

FREE-FALL CLASSIFIERS **AKOREL**

TYPES

Type AKOREL	LFK 21/60	LFK 28/80	LFK 28/100	LFK 28/120	LFK 35/80	LFK 35/100	LFK 35/120	LFK 35/160
Width	2.1 m	2.8 m	2.8 m	2.8 m	3.5 m	3.5 m	3.5 m	3.5 m
Length	6 m	8 m	10 m	12 m	8 m	10 m	12 m	16 m
Capacity	40 – 70 t/h	60 – 100 t/h	80 – 150 t/h	100 – 180 t/h	120 – 180 t/h	140 – 300 t/h	160 – 400 t/h	200 – 500 t/h
No. of outlets	6 pcs.	8 pcs.	10 pcs.	12 pcs.	8 pcs.	10 pcs.	12 pcs.	16 pcs.
Installed power	5 kW	5 kW	5 kW	5 kW	5 kW	5 kW	5 kW	9 kW
Need of compressed air	0.6 Nm^3/h	0.8 Nm^3/h	1 Nm^3/h	1.2 Nm^3/h	0.8 Nm^3/h	1 Nm^3/h	1.2 Nm^3/h	1.6 Nm^3/h

For the AKOREL, different levels of control systems are available:

Basic Standard-Control Option

Suitable for the production of simple and constant quality sand output

High Standard-Control Option

Suitable when production requires flexibility in quality sand outputs

Premium-Control Option (Siemens S7 with WinCC)

Suitable when production requires flexibility in the handling of varying input and output recipes

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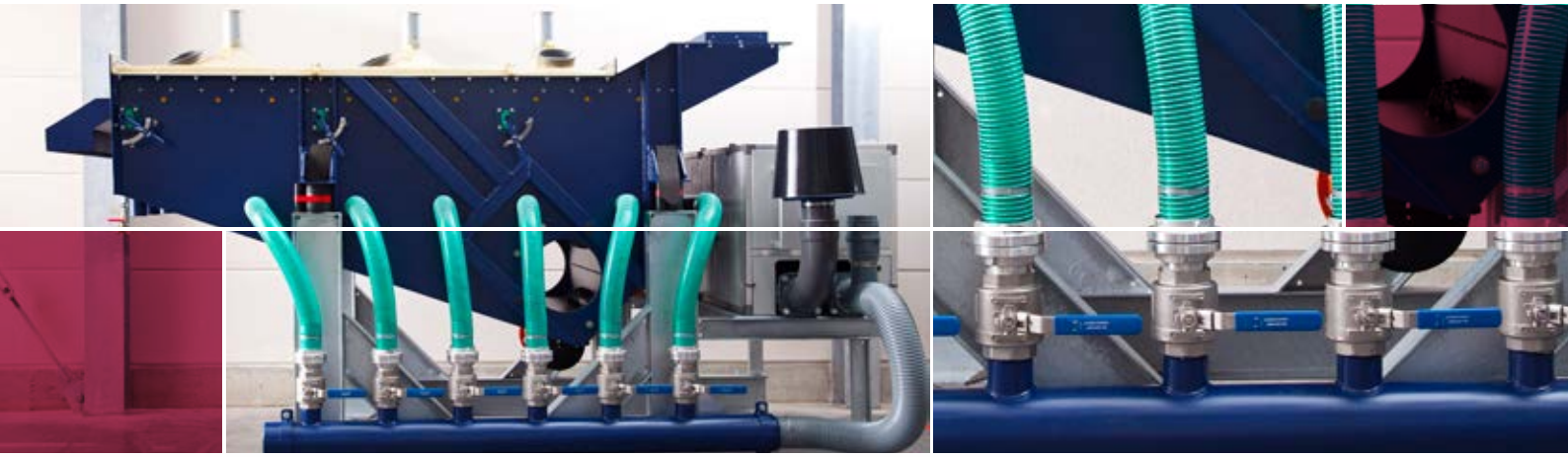


DRY GRAVITY SEPARATORS **AKA-FLOW**

FOR DRY GRAVITY SORTING AND ENRICHMENT

AKA-FLOW is a specific equipment within AKW Equipment + Process Design offer range, as it utilizes a dry processing route. This is a dry working gravimetric sorting device, used for preliminary mineral separation and enrichment.
AKA-FLOW is typically used as pre-stage to further wet mechanical separation processes.

Principle of Operation

The functionality of AKA-FLOW is based on a combination of an air fluidized bed with a specially developed discharging system. Studies with different raw materials have shown outstanding performance both in terms of throughput, as well as classifying and density sorting.The optimum grain size is ranging from 30 µm to 1 (2) mm.
Depending on the size of the AKA-FLOW and on the material, throughputs between 3 – 6 t/h and 9 – 18 t/h can be achieved.

Design Features and Advantages

- Fully dry working gravity sorting method
- Pre-enrichment for subsequent wet-processing
- Enables classification in arid and permafrost areas
- Pre-treatment to reduce transport costs
- Eco-friendly mining
- Low energy consumption

Applications

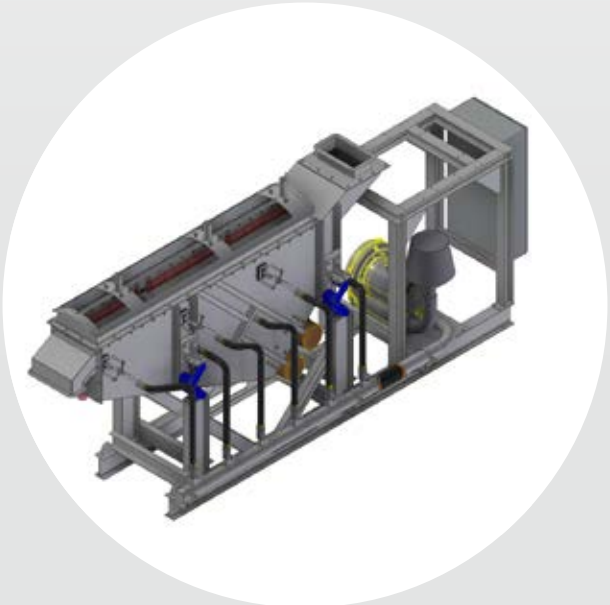
- Stainless steel slag
- Different iron ores
- Various heavy minerals
- Barite
- Primary and secondary sand deposits
- Tantalite ore
- Construction waste
- Mineral sands

Equipment + Process Design

DRY SEPARATION MACHINES **AKA-FLOW**

TYPES

Type AKA-FLOW	AKA-FLOW AF04	AKA-FLOW AF12
Grain size range	approx. 30 µm up to 1 (2) mm	approx. 30 µm up to 1 (2) mm
Capacity	up to 6 t/h	9 – 18 t/h
Installed power	2 x 1.18 kW	2 x 2.2 kW
Dimensions of module	approx. 4,600 x 1,200 x 2,300 mm	approx. 4,800 x 2,500 x 2,300 mm
Weight of module	approx. 1.4 t	approx. 2.5 t



YOUR GLOBAL PARTNER

Our experts are always within reach, directly or through our qualified representative network.

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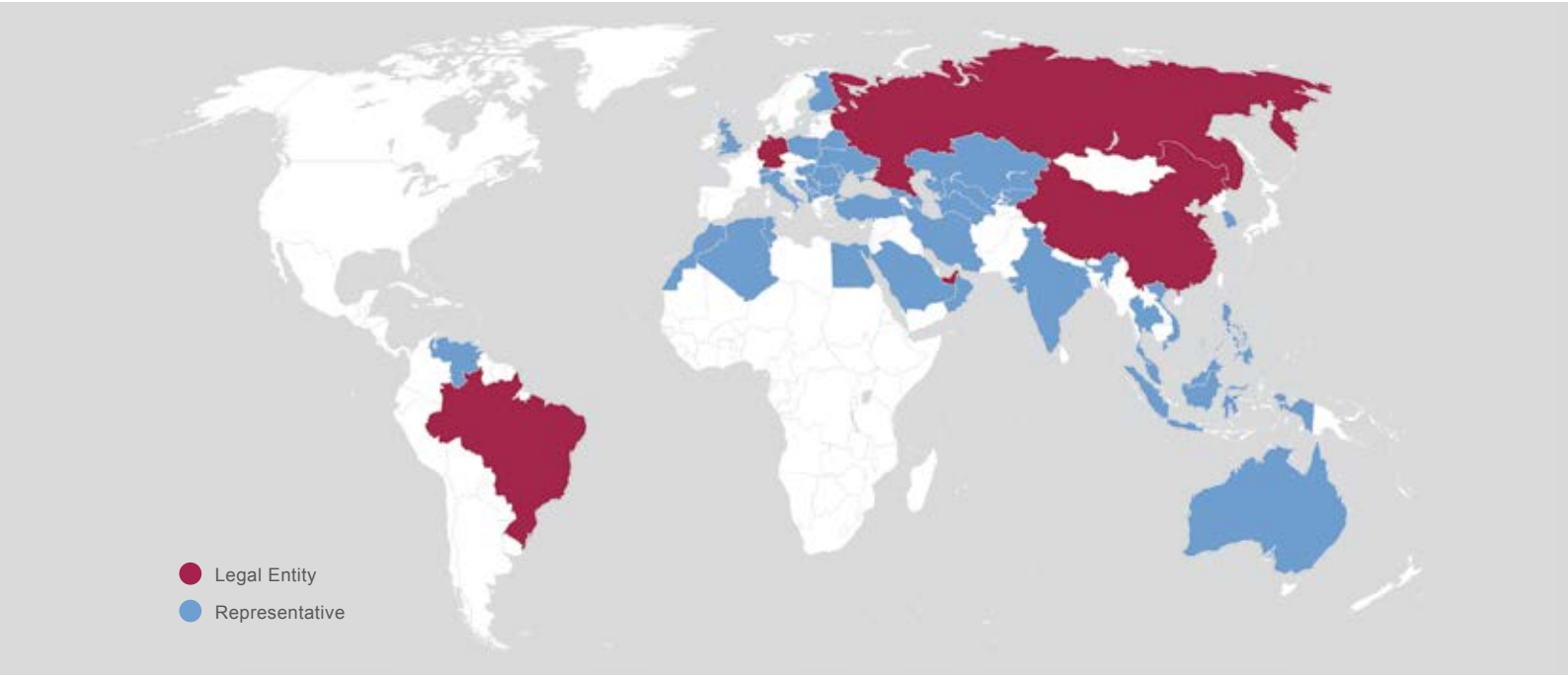

GET IN TOUCH

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Our Capabilities

- Technical Laboratory & Trials
- Engineering
- Equipment & Process Units
- Plant Realization
- Spare Parts & Service

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