

# ALPINE AGITATED BALL MILL ANR-CL

WET PROCESSING FINE SLURRIES



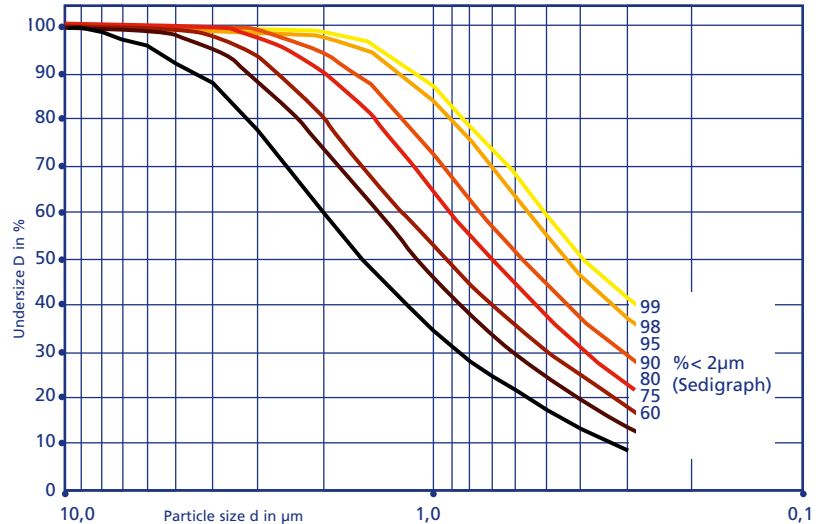
## **HOSOKAWA ALPINE**

**PROCESS TECHNOLOGIES FOR TOMORROW<sup>SM</sup>**

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The ANR-CL is designed for the cost-efficient ultrafine grinding of highly concentrated limestone slurries.



### PRINCIPLE OF OPERATION

The operating mode and the design permit the production of extremely high qualities with regard to fineness, degree of whiteness and abrasiveness. The mill design ensures low-maintenance continuous system operation with no expensive downtime periods.

The flow pattern through the vertically configured ANR-CL is from bottom to top, whereby the feed material is ground to the required end fineness with the aid of ceramic grinding beads. The grinding beads are separated from the discharging suspension by means of a low-maintenance combination of mechanical and dynamic classifier at the mill head.

The agitator ensures an exceedingly low-energy grinding process at low wear rates and high mill service life. The agitator elements and the grinding chamber wall are made of wear-resistant hardened materials. An efficient cooling of the mill stator removes the heat generated during grinding. The geometry of the mill permits trouble-free scale-up to high production-scale capacities. The product line includes small laboratory machines of 15 kW as well as production-scale mills up to the MW range.

### PROCESS

The powder is mixed with water and the requisite liquefier to a homogeneous slurry. The ANR-CL is charged continuously from the supply bin. After exiting the mill, the product is routed via a safety screening machine to a control bin where the product quality is monitored on an ongoing basis. The finish-ground suspension is then routed to large-volume storage tanks, from where

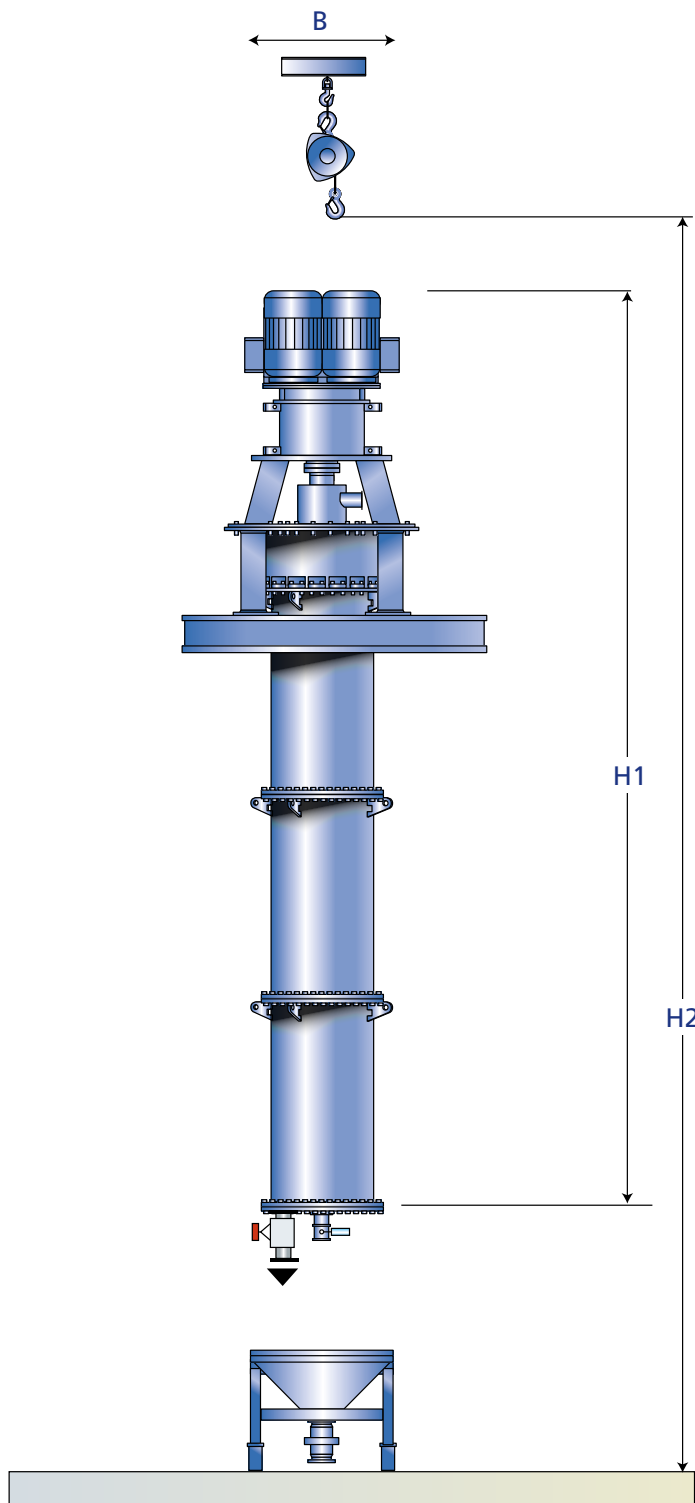
it is either transported directly to the end user or to a drying stage in a continuous micron drying system.

If the wet grinding system consists of several stages, a stirred intermediate bin with water cooling is installed between the individual grinding stages. System control can also be fully automatic if required.



### GCC fillers and coating pigments from ANR-CL-CL grinding systems

60% < 2 µm	45	kWh/t
90% < 2 µm	105	kWh/t
98% < 2 µm	180	kWh/t
Slurry concentration	70 - 78	Weight%
Viscosity	150 - 300	mPas
Feed size	99,9 % < 45	µm



### DRIVE CONCEPT

The ANR-CL has a simple drive concept that uses 4 individual motors to drive the rotor via a common gear wheel. The drive can also be operated with only 3 motors. If one motor fails, the mill is still capable of producing. And the spare parts costs are less because instead of a 1000-kW motor, only one of the 250-kW motors needs to be exchanged. The drive can also be operated quite economically using 4 x 250 kW frequency converters.

Type		250 ANR-CL	500 ANR-CL	630 ANR-CL	710 ANR-CL	800 ANR-CL	900 ANR-CL	1000ANR-CL
Installed drive power	kW	15	110	220	315	480	630	1000
Machine height H1	approx. mm	2500	4600	5900	6700	8200	8800	9400
Installation height H2	approx. mm	3300	7000	8500	9500	11200	12000	12800
Width B	approx. mm	510	1000	1300	1450	1500	1850	2050
Production data calcium carbonate (CaCO <sub>3</sub> of average grindability)								
Fineness 60% < 2µm	approx. kg/h **	240	1800	3700	5200	8200	10400	16600
Fineness 90% < 2µm	approx. kg/h **	100	750	1500	2200	3400	4300	6900
** kg/h of dry material							on request	



*Besides the mill design, there are a number of other factors that make a major contribution to the success of a grinding process, namely the type of grinding media used, the wear-protection materials, the separation of the grinding beads and naturally also the process as a whole.*

**YSZ POWER BEADS**

are characterised by their exceptionally high quality. The excellent surface quality and the clean fractionation in combination with outstanding mechanical properties guarantee mill performance on the highest level. The mechanical properties of Alpine's Power Beads are adjusted to suit operation in all known designs of agitated ball mills.

YSZ Power Beads are made of a high-grade zirconia raw material in the nanometre range. This material ensures

excellent mechanical properties, high wear resistance and good corrosion resistance. These grinding beads are used to achieve maximum grinding results at minimum product contamination rates.

The outstanding price-performance ratio of Alpine's Power Beads is the result of using first-class raw materials in combination with modern and cost-effective manufacturing processes.



- STANDARD SIZES mm**
- 0.1
  - 0.2
  - 0.3
  - 0.4 – 0.6
  - 0.8 – 1.0
  - 1.4 – 1.7
  - 2.0 – 2.5

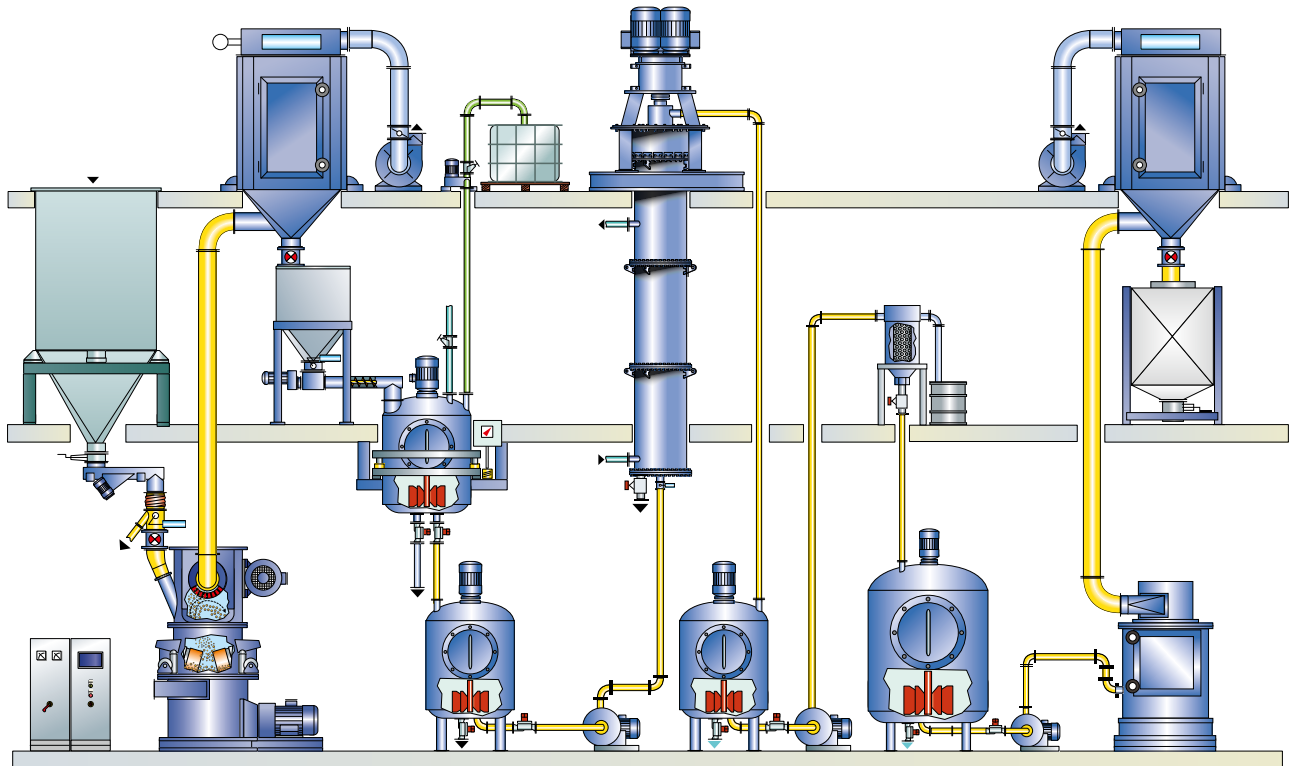
Chemical composition	ZrO <sub>2</sub> :	94.6 ± 0.2%
	Y <sub>2</sub> O <sub>3</sub> :	5.2 ± 0.2%
	Remainder:	0.2 ± 0.05%
Specific weight	≥ 6.0 g/cm <sup>3</sup>	
Bulk density	≥ 3.8 g/cm <sup>3</sup>	
Mohs' hardness	9	
Breaking load	≥ 1500 N	
Roundness	≥ 95%	
Open porosity	0%	
Colour	white	
Surface finish	glossy	

PACKING UNIT  
5 KG OR 25 KG





# SYSTEM EXAMPLE MINERAL SUSPENSIONS



## WET GRINDING LOW-VISCOSITY SUSPENSIONS

The system shown is designed for a classic application, i.e. for grinding superfine calcium carbonate slurries for the paper industry. The suspension is prepared in the mixing bin and introduced via a feed bin to the mill by means of an eccentric screw pump. The safety screen prevents coarse contaminants from ingressing the end product. Preliminary dry milling with an Alpine table roller mill AWM is shown as an option. For other mineral powder applications, an impact drying step is added to the wet milling step. We offer different electric monitoring options for all our system concepts.



*The ANR-CL-CL agitated ball mill can be integrated into industrial production processes in a number of ways.*

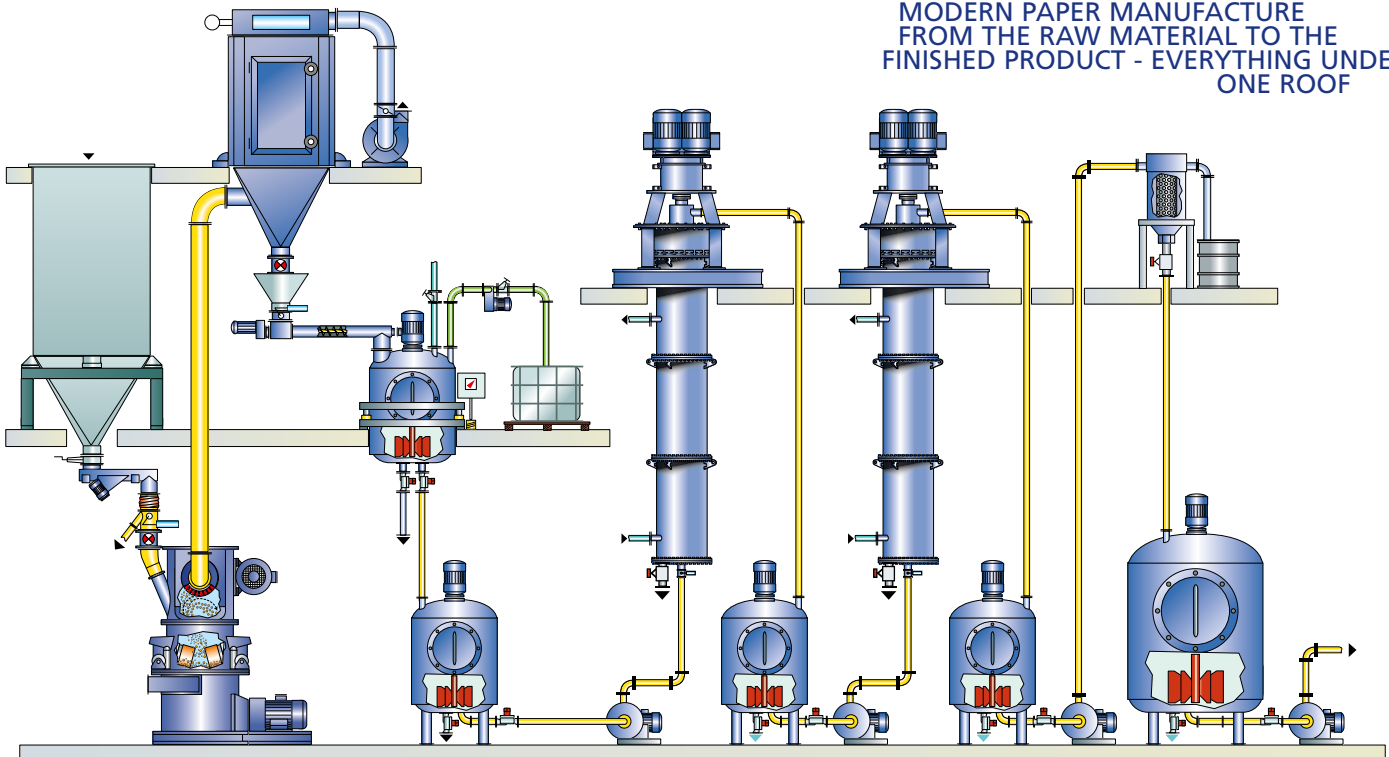


The possibilities range from a stand-alone machine to a fully automatic turnkey system. The user can be either the mineral powder producer or the end user himself. Especially in the case of the paper industry, the great variety of mineral applications can make a universal processing system advantageous. Located right next to the paper mill, such a

satellite system can be adapted at any time to suit the specific requirements of the paper production process. And because on-the-spot preparation of the coating pigments and fillers is possible in precisely the quality and with the solids concentrations required by the user, considerable savings in terms of liquefier and additives can be made.

### ADVANTAGE OF THE SATELLITE SYSTEM CONCEPT

- Maximum flexibility in adapting the mineral powder slurry to the paper production process
- No transport necessary
- The resultant slurry can be routed directly to the paper mill without drying
- Maximum dispersing quality brought about by just-in-time processing
- No re-agglomeration
- No preservatives necessary
- No constraints regarding delivery contracts and raw materials availability
- Cheaper raw materials
- Self-made recipes with self-selected additives
- Lower additives requirement brought about by optimum adaptation to the paper process
- Rapid reaction to market changes possible
- Advance testing of future trends



**MODERN PAPER MANUFACTURE FROM THE RAW MATERIAL TO THE FINISHED PRODUCT - EVERYTHING UNDER ONE ROOF**

# APPLICATION TEST CENTRE

Alpine's application testing centre offers unique facilities for carrying out customer trials aimed at finding the best possible system design and at determining the technical warranty parameters. Tests are carried out both on a production scale and a pilot scale.

Spread over approx. 3000 m<sup>2</sup>, the application testing centre provides ample space for execution of all the basic operations of mechanical and thermal process technology, e.g.:

- Size reduction (dry and wet)
- Granulator technology / shredding
- Air classification
- Wet classification
- Sieving, separation
- Mixing, drying, flash drying
- On-line (i.e. direct at the grinding-classifying system) particle size analysis of dry powders in the range 0.5 - 850 µm.

Taking advantage of ALPINE's application technology also means being on the receiving end of our customer service, the scope of which includes detailed test reports containing all the relevant testing data and parameters.

With over 60 machines and complete systems, ALPINE's application testing centre is ideally equipped to meet every customer testing requirement. Annexed to the testing centre is a laboratory equipped with numerous state-of-the-art measuring and testing units for determination of powder properties. All system operating data can be recorded. This enables seamless documentation of the test results that are submitted to the customer.

Test systems must always be state of the art if optimum scale-up data are to be delivered. Our plant and machinery is renewed on an ongoing basis and is constantly supplemented with newly developed machines.

Special features of the testing centre:

- Selected systems used for size reduction and classification in the fine and ultrafine range are protected against dust explosions.
- Oil-free and water-free compressed air.
- Hot-gas operation.
- Cryogenic operation with LN<sub>2</sub> to -80°C operating temperature.
- Contamination-free processing trials carried out with special systems for ultrafine comminution and air classification.
- Grinding-classifying circuit mode, e.g.: closed circuit between ball mill and ultrafine classifier; open product circuit between impact mills and sieving machines, air classifiers.



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