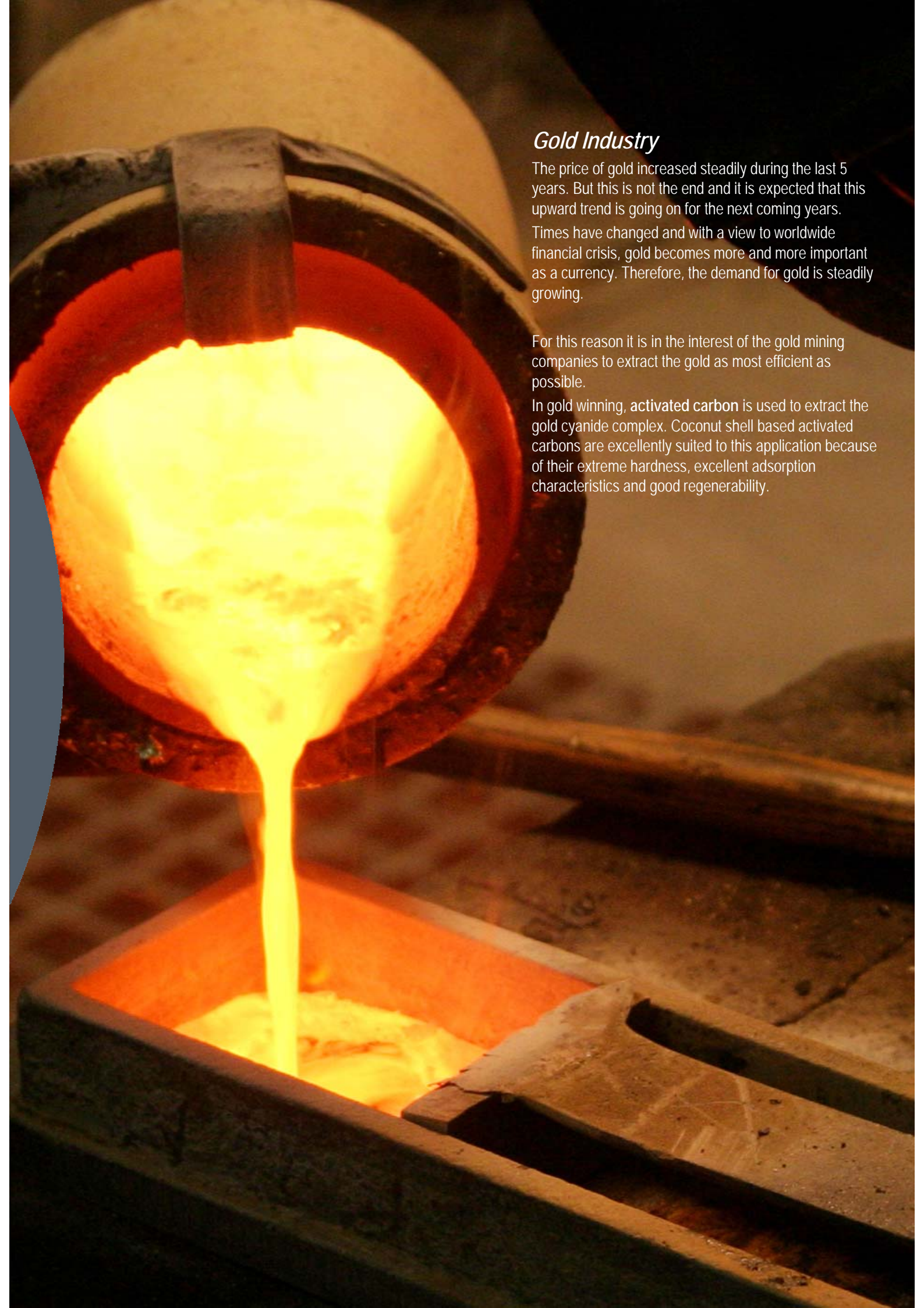


Activated Carbon for Gold Recovery Industry

ALCARBON®

A large industrial ladle, filled with bright yellow molten gold, is being tilted to pour the liquid metal into a rectangular mold. The ladle is held by a metal handle. The background is dark, and the scene is lit by the intense heat of the molten gold, creating a dramatic, high-contrast image. The mold is a simple rectangular container, and the gold is being poured into it from the ladle. The overall atmosphere is industrial and focused on the process of gold refining or casting.

Gold Industry

The price of gold increased steadily during the last 5 years. But this is not the end and it is expected that this upward trend is going on for the next coming years.

Times have changed and with a view to worldwide financial crisis, gold becomes more and more important as a currency. Therefore, the demand for gold is steadily growing.

For this reason it is in the interest of the gold mining companies to extract the gold as most efficient as possible.

In gold winning, **activated carbon** is used to extract the gold cyanide complex. Coconut shell based activated carbons are excellently suited to this application because of their extreme hardness, excellent adsorption characteristics and good regenerability.

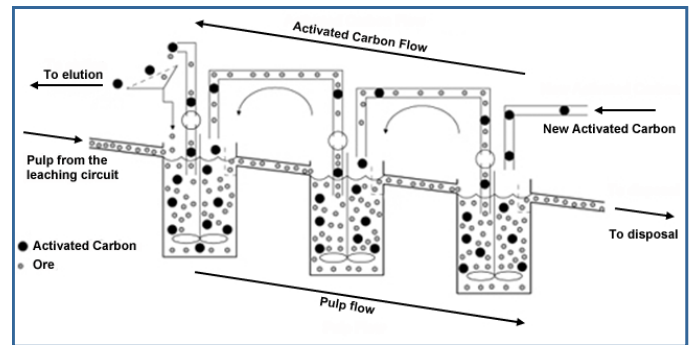
Alcarbon® - Activated Carbons for the Gold Recovery

There are several gold processing operations requiring activated carbons:

- CIP (Carbon in Pulp): gold pulp is mixed with sodium cyanide, then is contacted with activated carbon in a series of large agitated adsorption tanks
- CIL (Carbon in Leach): similar to CIP but leaching and adsorption occur simultaneously
- CIC (Carbon in Column) for Heap leaching: dilute cyanide solution percolate over a heap of crushed ores and is then pumped through activated carbon columns

All require a maximum gold loading with rapid adsorption kinetics.

It is important to choose the most suitable activated carbon for the process of the gold recovery because each loss of activated carbon stands for a reduction of the gold output. **Alcarbon® IC series** are granulated activated carbons specifically developed by Donau Carbon for use in gold metallurgy.



Schematic CIP/CIL process with three tanks.

Donau Carbon Production Philippines

In beginning 2011, after a construction time of only 5 months, the newest Donau Carbon site was opened: a plant for production of high quality granular activated carbon on coconut shell basis, situated in the north of Philippines' Mindanao island. Meanwhile, the production capacity was doubled beginning 2013.

In our subsidiary Donau Carbon Philippines Corp., an experienced team under German management takes care of the production of special granular activated carbon qualities for our customers world-wide in modern rotary kilns.

The production plant is operating according to German quality and safety standards, is ISO-certified and is using state-of-the-art production processes in both activation and processing technology.

Quality assurance is one of our major concerns - beginning already with a selective choice of our raw materials and local suppliers to ensure the best possible product quality for our customers. Our state-of-the-art, ISO-certified laboratory, active in both quality assurance and R&D, does not only stand for high-quality products but also for the development of new products and applications.

Alcarbon® IC 50 and Alcarbon® IC 60 Production & Characteristics

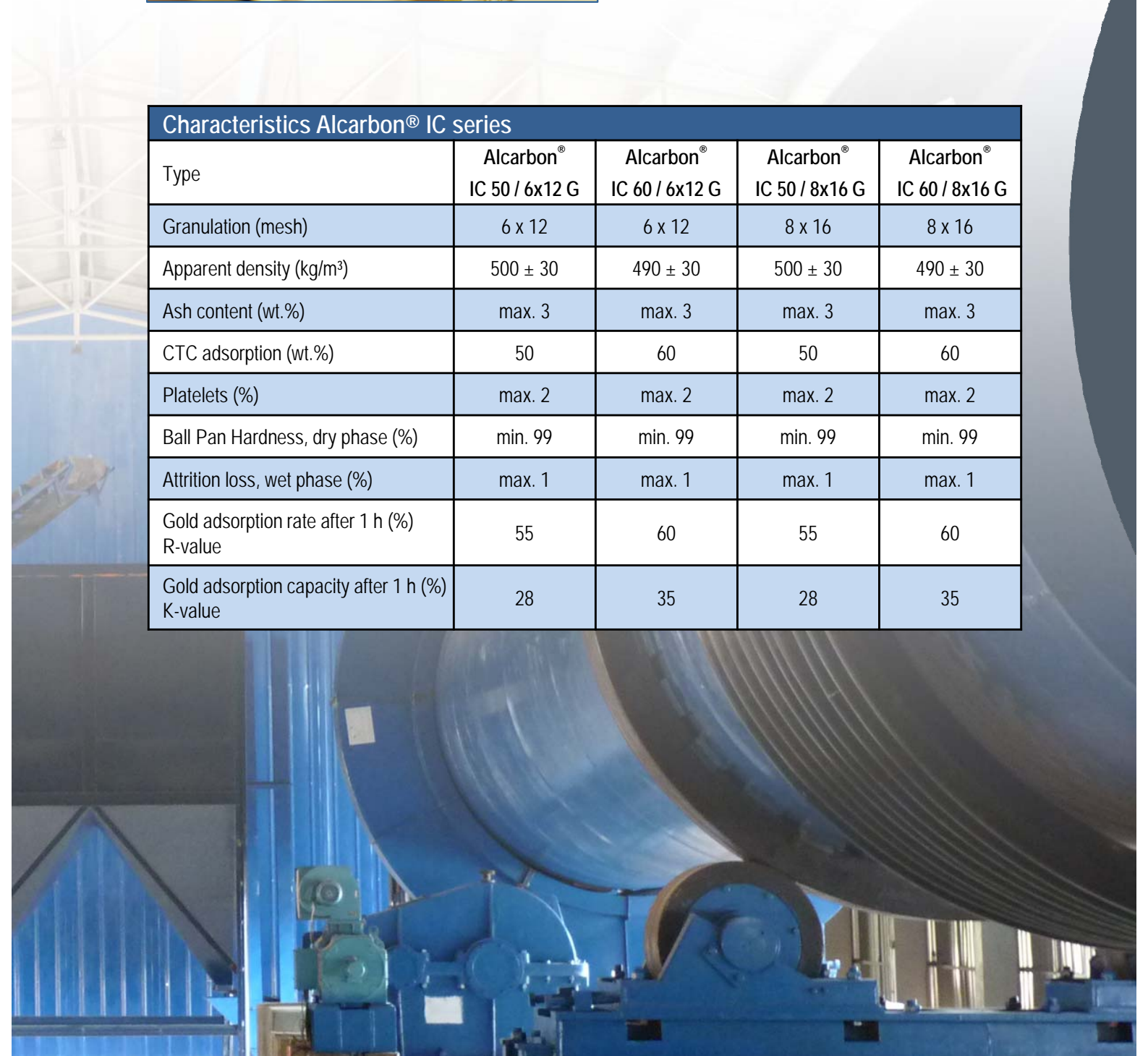


Our activated carbons are manufactured from selected highest quality coconut shells in order to achieve outstanding hardness and attrition resistance.

The highly developed micro porous pore structure suits particularly to provide the best adsorption from aqueous cyanide solutions in CIP, CIL and CIC systems.

Alcarbon® products are processed through vee-wire screens to keep the platelets to the minimum. They are further de-dusted to meet the stringent requirements of our customers.

Characteristics Alcarbon® IC series				
Type	Alcarbon® IC 50 / 6x12 G	Alcarbon® IC 60 / 6x12 G	Alcarbon® IC 50 / 8x16 G	Alcarbon® IC 60 / 8x16 G
Granulation (mesh)	6 x 12	6 x 12	8 x 16	8 x 16
Apparent density (kg/m ³)	500 ± 30	490 ± 30	500 ± 30	490 ± 30
Ash content (wt.%)	max. 3	max. 3	max. 3	max. 3
CTC adsorption (wt.%)	50	60	50	60
Platelets (%)	max. 2	max. 2	max. 2	max. 2
Ball Pan Hardness, dry phase (%)	min. 99	min. 99	min. 99	min. 99
Attrition loss, wet phase (%)	max. 1	max. 1	max. 1	max. 1
Gold adsorption rate after 1 h (%) R-value	55	60	55	60
Gold adsorption capacity after 1 h (%) K-value	28	35	28	35



General Information

Alcarbon®

Analytical parameters

- **Platelets** are the fraction of carbon granules that plug the screens. Those flat particles are not removed by normal screening.
- **R-value** reflects the gold adsorption rate and the kinetic properties of the activated carbon. The percentage of gold adsorbed after 1 h from a prepared 10 mg Au/l solution is known as "R-value".
- **K-Value** reflects the gold adsorption capacity at equilibrium. It is issued from the Freundlich adsorption isotherm of pulverized activated carbon in a 1 mg gold/liter solution.



Carbon Regeneration

To improve the economical use of activated carbon in gold recovery processes, attention should be drawn on proper acid washing and efficient regeneration.

Thermal regenerations' only objective is to remove the organics loaded on carbon and it has thus to be temperature controlled to avoid overburning.

Its efficiency should be determined by measuring the remaining VOCs only before and after the kiln; other types of measurement could be misleading (e.g. gold kinetics due to the pH of the carbon before and after acid washing).

With our experience we support our customers to improve their carbon regeneration by showing easy ways to measure and increase their efficiency – the more efficient the more value for the customer!

Laboratory / Application Technology consulting

In our own laboratories we prove and evaluate new and used activated carbons utilizing our own analytical methods as well as National and International Test Procedures.

Our technical applications are based on decades-long experience and our team has special knowledge about the gold mining industry.



Donau Carbon world-wide



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