Lungmuß
FEUERFEST

Lungmuß Taphole Clays for Submerged Arc & Shaft Furnaces

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Lungmuß Feuerfest was established on February 1st of 1958 by Hans Lungmuß and is now being run by the third generation.

Starting from the original production plant in the Dortmund harbour area the production increased continuously. A second production plant opened 1971 in the immediate neighbourhood. In 2007, a producing plant for prefabricated products started up.

While the focus was originally mainly on the local market, Lungmuß Feuerfest has meanwhile become a player in the global market.

Why Lungmuß' taphole clays?

- Lungmuß is a German producer specialized in taphole clays.
- The company is the largest taphole clay producer in Europe.
- All clays are produced at 2 production lines in Dortmund (Germany) only, guaranteeing most constant clay quality.
- Lungmuß' taphole clays are tailor-made for each process/furnace, produced on a technologically advanced level and offer taphole stability and flexibility and furthermore an extended life of refractory living.
- All clays are coal tar free. Starting 2014, totally PAH free clays are available on request.

With Lungmuß' taphole clays operators can achieve low clay consumption combined with improved taphole performance and longer taphole life.
This results in the lowest cost together with less environmental impact or concerns.

Development of Lungmuß' taphole clays

In the field of taphole clays, Chemikalien-Gesellschaft Hans Lungmuß GmbH & Co. KG has been among the leading producers worldwide for more than 40 years. In relation to environmental protection, we were among the first to develop tar-free and pitch-free taphole clays in the early 80ies.

Today, Lungmuß' taphole clays are used in more than 35 blast furnaces across Europe from 6 meters up to 15,1 meters of hearth diameter.

Since 2001 Lungmuß has also successfully delivered taphole clays to non-iron and ferroalloys applications, mainly replacing water or tar based clays. On the one hand these "old-fashioned" clays are usually low in price and easy to manufacture. On the other hand, they have disadvantages in view of health issues and the aspect of extending the life of the refractory taphole.

The major goal of Lungmuß is to supply "workable" clays for a wide range of tapping scenarios in submerged arc furnaces and shaft furnaces. Our services also include advising our customers on appropriate taphole equipment and effective taphole management. Together with using the best quality taphole clay, these are key factors in obtaining excellent taphole performance.

Differences in equipment, tapping temperature, slag analysis and furnace pressures result in a need for individually tailored clays for each application and furnace. We are presently offering tailored taphole clays worldwide to furnaces producing:

- FerroNickel (FeNi)
- FerroManganese (FeMn)
- FerroSilicon (FeSi)
- SiliconMetal (Si)
- SiliconManganese (SiMn)
- FerroChrome (FeCr)
- FerroTitanium (FeTi)
- Titanium Oxide Slag (TiO_2)
- Copper (Cu)
- Lead (Pb)
- Calcium carbide (CaC_2)

A smooth furnace operation strongly depends on the quality of the taphole clay. The taphole clay should meet the following important requirements:

- **Adjusted plasticity**
  smoothness in taphole gun/charging system and taphole channel
  ⇒ enable accurate filling of the taphole channel

- **Quick and reliable curingof the clay**
  ⇒ ensure safe closing of the furnace

- **High metal and slag resistance**
  against ceramic, mechanical and chemical attack
  ⇒ keep a constant diameter of the taphole channel during the entire tapping

- **Protecting/ Growing abilities**
  ⇒ create a layer inside the furnace to protect the refractory lining

And at the same time offer the following:

- **Easy and safe handling**
  ⇒ taphole clays “ready to use” & tar-free

- **Easy drilling**
  ⇒ important in the case of weak drilling equipment

- **Fast curing at low temperatures**
  ⇒ in the case of well-cooled tapholes

- **Slow curing**
  ⇒ in the case of high temperature exposure to taphole clay – taphole gun/charging system is not cooled or located close to the runner

Consistence of Lungmuß' taphole clays

The nature of high quality Lungmuß taphole clays has changed remarkably over the past 40 years. The mixtures today are much more complex satisfying the requirements from high productivity and high demands on performance. Up to 18 different components are used in one clay quality. This offers our customers improved working environment as well as improved taphole operation.

The taphole clays consist of the following:

Raw Material Basis: It is the refractory basis of the clay and has to guarantee the stability in the upper temperature range (> 1.400°C).
Raw materials on Al_2O_3 and SiO_2 basis have proved their suitability in use in some of the world's most demanding furnaces.
Typical components include: Clay sticky sand, fire clay, andalusite, mullite, bauxite, corundum and tabular alumina.

Bonding Agents: The bonding system mainly serves to support the fast curing of the clay in the taphole channel. Additionally, it has to guarantee the resistance of the clay against metal and slag in the temperature range up to 800°C. We use different types of phenolic resin that cures at temperatures from 100°C to 200°C. Furthermore, we use mineral or anthracitic oil as additional carrier of carbon.
To meet the fast growing demand for totally PAH free working environments, we can on request also offer newly developed taphole clays offering a superior product free of PAH.

Additives: Additives have various tasks. They serve i.e. as sinter supporting agents, which stabilise the mixture in the temperature range from 800°C to 1400°C. Another task of the additives is the improvement of the carbon stability or of the growth of the taphole mushroom. Typical components include SiC, Si-metal, graphite, soot and Si_3N_4

Taphole clay **FA 1**

Customer: Copper plant (recycling)

Furnace: shaft furnace
Metal temperature: 1.150 °C

VDEh-code no.	89 39 77 15 19 60
Product type	taphole clay
Delivery condition	ready for use, plastic wrapped block
Binder	organic-chemical
Storage life	6 months, max. 25°C
Main chemical components	carbon, acid-raw materials

Main chemical components; content in weight percent (after calzination)	Al_2O_3	**10,9**	content in weight %
	SiO_2	**73,4**	content in weight %
	Fe_2O_3	**0,9**	content in weight %
	C	**12,4**	content in weight %

Bulk density	1,95	g/cm³
Content of volatile components	15,0	content in weight %
Ignition loss	17,6	content in weight %
Max. grain size	3	mm

Workability according to EN 1402-3	20 - 40	%

Cold crushing strength	400°C / 30 min	**> 4,0**	N / mm²

Taphole clay **FA 5**

Customer: FerroNickel plant

Furnace: submerged arc furnace

Metal temperature: 1.500 °C - 1.550°C

VDEh-code no.	89 39 77 15 19 60
Product type	taphole clay
Delivery condition	ready for use, plastic wrapped block
Binder	organic-chemical
Storage life	6 months, max. 25°C
Main chemical components	carbon, chamotte, acid-raw materials, additives

Main chemical components; content in weight percent (after calzination)	Al_2O_3	**27,8**	content in weight %
	SiO_2	**50,3**	content in weight %
	Fe_2O_3	**2,9**	content in weight %
	C	**16,8**	content in weight %

Bulk density	1,95	g/cm³
Content of volatile components	9,3	content in weight %
Ignition loss	12,5	content in weight %
Max. grain size	3	mm

Workability according to EN 1402-3	20 - 40	%

Cold crushing strength	400°C / 30 min	**> 2,5**	N / mm²

Taphole clay **HT 30 N**

Customer: FerroTitanium plant

Furnace: submerged arc furnace

Metal / Slag temperature: 1.550° C/ 1.700 °C

VDEh-Code No.	89 39 46 05 22 60
Product type	taphole clay
Delivery condition	ready for use, plastic wrapped block
Binder	organic-chemical
Storage life	6 months, max. 25°C
Main chemical components	silicon carbide, mullite, carbon

Main chemical components; Content in weight percent (after calzination)	SiC	**10,2**	content in weight %
	Al_2O_3	**25,0**	content in weight %
	SiO_2	**40,3**	content in weight %
	Fe_2O_3	**1,0**	content in weight %
	C	**14,6**	content in weight %

Bulk density	2,15	g/cm³
Content of volatile components	10,8	content in weight %
Ignition loss	11,7	content in weight %
Max. grain size	3	mm

Workability according to EN 1402-3	20 - 40	%

Cold crushing strength	400°C / 30 min	**> 2,5**	N / mm²

Taphole clay **DSP 6**

Customer: Silicon Metal plant

Furnace: submerged arc furnace
Metal temperature: 1.600 °C

VDEh-code no.	89 39 46 15 23 60
Product type	taphole clay
Delivery condition	ready for use, plastic wrapped block
Binder	organic-chemical
Storage life	6 months, max. 25°C
Main chemical components	silicon carbide, corundum, mullite, carbon

Main chemical components; content in weight percent (after calzination)	SiC	**24,9**	content in weight %
	Al_2O_3	**26,0**	content in weight %
	SiO_2	**32,5**	content in weight %
	Fe_2O_3	**0,5**	content in weight %
	TiO_2	**0,8**	content in weight %
	C	**15,1**	content in weight %

Bulk density	2,30	g/cm³
Content of volatile components	11,0	content in weight %
Ignition loss	12,5	content in weight %
Max. grain size	3	mm

Workability according to EN 1402-3	20 - 40 %

Cold crushing strength	400°C / 30 min	**> 10,0**	N / mm²

Please contact us for a discussion on what would be the best clay we can offer for your specific production.

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