www.aspanger.com

Distributed By –
UMC Ingredients
160 Chubb Ave., Ste. 206
Lyndhurst, NJ 07071
(201) 896-8666

ASPANGER
For better Performance

"Aspanger MICA – the sustainable European alternative of a pure Muscovite MICA with a lower carbon footprint for Cosmetics"

ROCK-STARS
MADE IN ASPANG

Agenda

1) Who is ASPANGER? – Facts & Figures
2) What is MICA?
3) Advantages of the functional filler ASPANGER MICA in Cosmetics
4) Actual processing of ASPANGER MICA
5) Future processing of ASPANGER MICA
6) Conclusion

1) Who is ASPANGER? Facts & Figures

- Founded: 1856
- Owned (since 2015) 100% family owned (Pürrer & Partlic)
- Turnover 2023: 5 M €
- Market: Worldwide from US to Japan
- Employees: 21
- Overall mining: 200,000 mt / year
- Thereof MICA: 4,500 mt / year
- Certification: ISO 9001 & 14001, COSMOS
- Deposit (MICA): ~ 1 M mt

COSMOS APPROVED

ISO 14001 TÜV SÜD ISO 9001

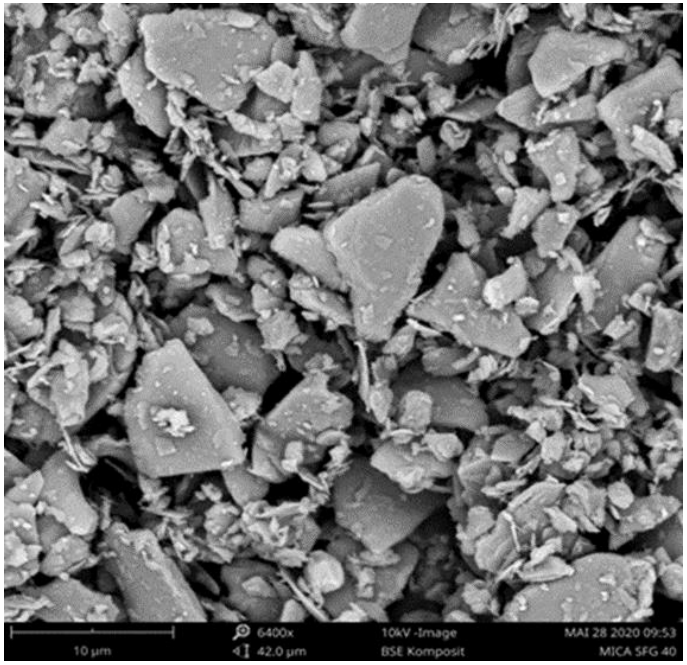
Aspanger Team

2) What is MICA?

- **Muscovite MICA** represents together with Phlogopite MICA the two industrial used MICA types. The MICA group consists of more than 30 minerals, but only these two mentioned types have a commercial significance.

- **The world`s MICA market is dominated by non-European MICA**. According to the statistics, the three biggest net exporters of MICA are **India, China and Canada**. In most of these cases we are talking about **MICA flakes from pegmatitic sources**. Pegmatitic sources are deposits, which are of magmatic origin, where the mica is present in form of **cm to dm thick MICA layers**. **(MICA flakes)**

- **In contrary** to these pegmatitic sources, **Aspanger**, representing a European MICA deposit, has a **sedimentary genesis** with a **weak metamorphic overprint**. Therefore, the Aspanger MICA is an excellent European alternative on the MICA market, particularly when talking about **fine grades in the meaning of MICA powder**.



- In the Cosmetics industry, a fine filler is needed to produce thin layers, therefore, MICA powder is used as functional filler. **Aspanger MICA is – due to the sedimentary genesis** with a **weak metamorphic overprint - extremely fine**, this means the MICA powder has a top cut (d98) of maximum 53 µm down to 13 µm (Mastersizer) – reached by **one short milling process only**. To reach the same fineness out of MICA flakes from pegmatitic deposits, **at least two processing steps** in the form of crushing and milling are needed.

- Each **processing step** will cause a slight **damage of the MICA structure** beside every additionally **production step** will **increase the cost** for the filler.

- Furthermore, in respect to its chemical composition, **Aspanger MICA has a very low content of heavy metals**. Consequently, it can be used for ecological paints as well. (**COSMOS approval** – Aspanger MICA is allowed being used as functional filler in the even **natural Cosmetics industry because of the extremely low heavy metal content**)

Heavy metal content

- Example: Guideline for Cosmetics industry
- Listed Elements: As, Sb, Hg, Cd & Pb
- Limits:

As[a]	< 2,5 ppm (2,4)*
Sb	< 0,5 ppm (0,13)
Hg	< 0,1 ppm (0,001)
Cd	< 0,1 ppm (0,08)
Pb[b]	< 5 ppm (1,9)

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a for theater, fan or carnival make-up

b for the poducts make up powder,rouge, eyeshadow, eye liner, kajal, as well as theater,fan or carnival make-up

*analysis from external laboratory EuroMinerals 08/23

Microbiology

Characteristic	Limit value
Total plate count (aerobic, mesophilic) cfu/g	Max. 100
Yeasts cfu/g	Max. 100
Moulds cfu/g	Max. 100
Enterobacteriaceae cfu/g	Max. 10
Coliforms mpn/g	Max. 3
Pseud. aeruginosa cfu/25g	Not detectable
E. coli cfu/25g	Not detectable
Salmonella cfU/25G	Not detectable

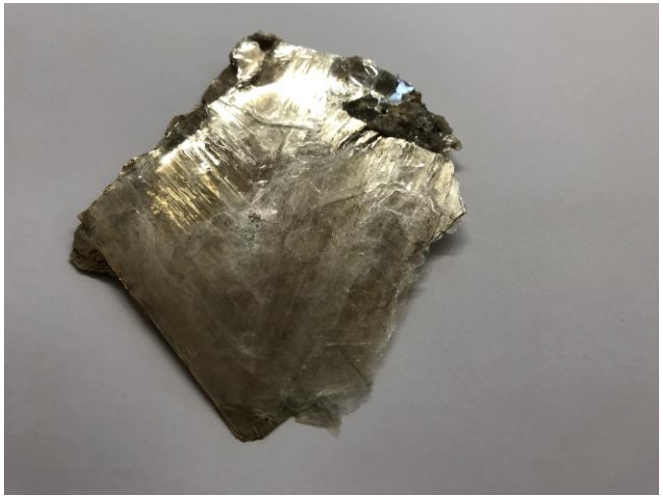
- **Aspanger MICA is <u>not</u> labelled** (including the finest grade MICA Cosmetics F) due to **crystalline silica content < 1%.** See MSDS chapter 02.

- Every filler needs to be labelled in case the **crystalline silica content** (quartz particles < 10 µm) is > 1% but < 10%.
  In this case the filler needs to be labelled (**H373**) with the symbol  and the wording "**Caution**".

- Every filler needs to be labelled in case the **crystalline silica content** (quartz particles < 10 µm) is > 10%.
  In this case the filler needs to be labelled (**H372**) with the symbol  and the wording "**Danger**".

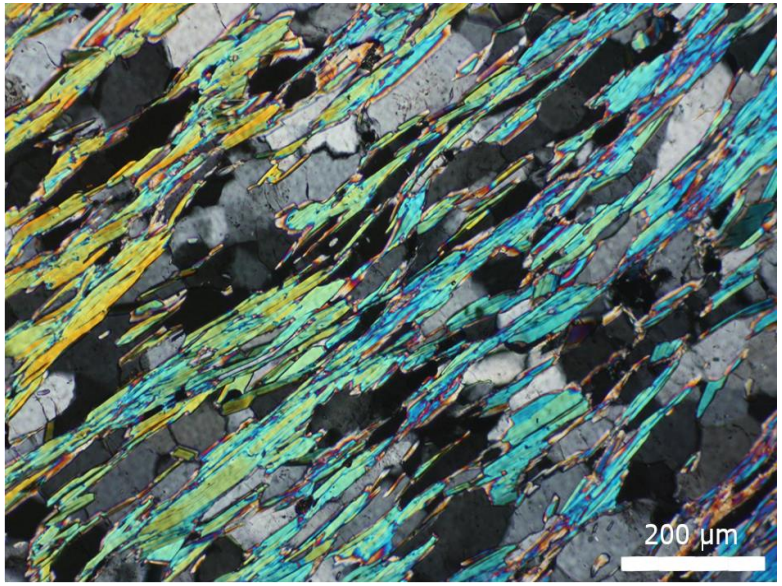
MICA deposits

- Muscovite MICA is: a rock forming mineral
- Appearance/deposits: pegmatitic rocks/leucophyllite



Leucophyllite (Type Aspang)

Current Aspanger open quarry III



Leucophyllite under microscope

Leucophyllite (Type Aspang)

- **Mining activity since 1856**
- **Deposit will last for more than the next 100 years**
- **Sedimentary genesis** with a weak metamorphic overprint
- **Type Aspang is unique**
  a) **extremely fine mineral structure** (short milling time to produce MICA powder)
  b) **very low heavy metal content**
  c) **purity** – due to very low quartz content the **crystalline silica** content (particels < 10 µm) is less than 1% - **no labelling issue**
  d) **only European Muscovite MICA** which is **produced 100% at one production site** (Mining & processing the MICA powder)

3) Advantages of the functional filler ASPANGER MICA in Cosmetics

Comparison Silicate fillers

	Mica	Talcum	Kaolin
Main differences			
Mohs hardness	2.5	1	2
Aspect ratio	**– 60:1**	– 30:1	– 15:1
Benefits	**Excellent wettability (low oil absorption) Reduction of permeability (e.g. barrier effect due to high Aspect ratio)**		
Polarity	**hydrophilic**	surface (hydrophobic), edge (hydrophilic)	hydrophilic
General information			
pH-value	9.5	9	4.5 – 7.5
Refractivity	1.56	1.57	1.56
Density	2.85 / 2.75	2.75	2.6
Particle structure	lamellar, **flat** and platy	lammellar, wavy and platy	lamellar
Chemical resistance	✓ (except HF acid)	✓ (except HF acid)	✓ (except HF acid)

Why MICA in decorative cosmetics?

1.) Excellent wettability due to low oil absorption

2.) Ideal filler not only for make-up, lipsticks & eyeliner

3.) REACH, CMR and Nanoparticle regulations are not applicable

4.) Marginal content of heavy metals (COSMOS)

5.) Increases opacity & coverage

6.) Reduces cracking & shrinkage

7.) Improves surface properties & adhesion

8.) Excellent Dispersibility

9.) Basis material for pearlescent pigments

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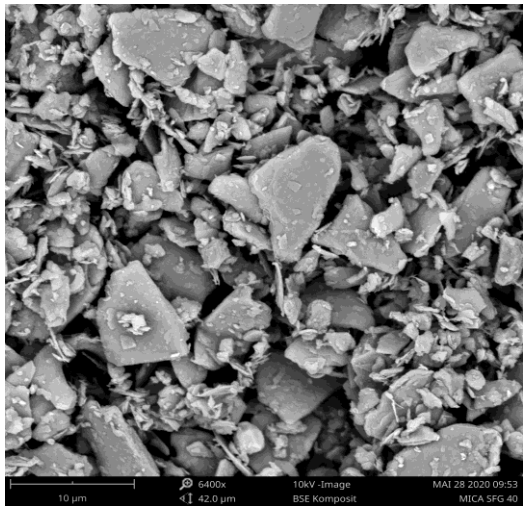
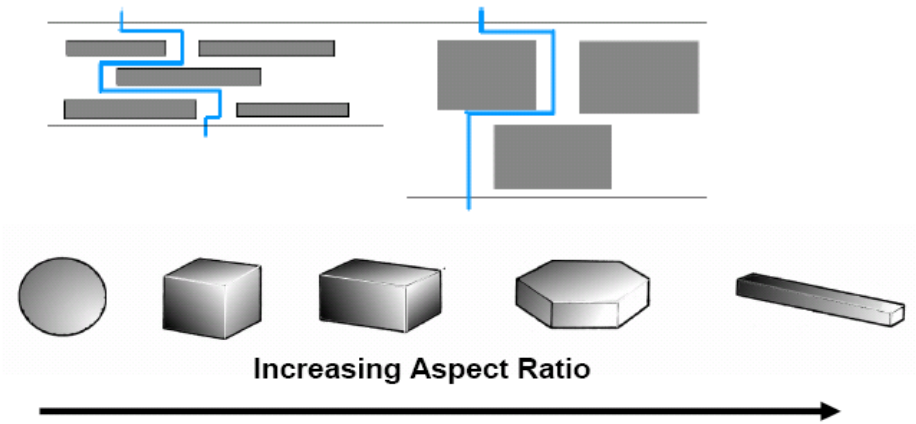
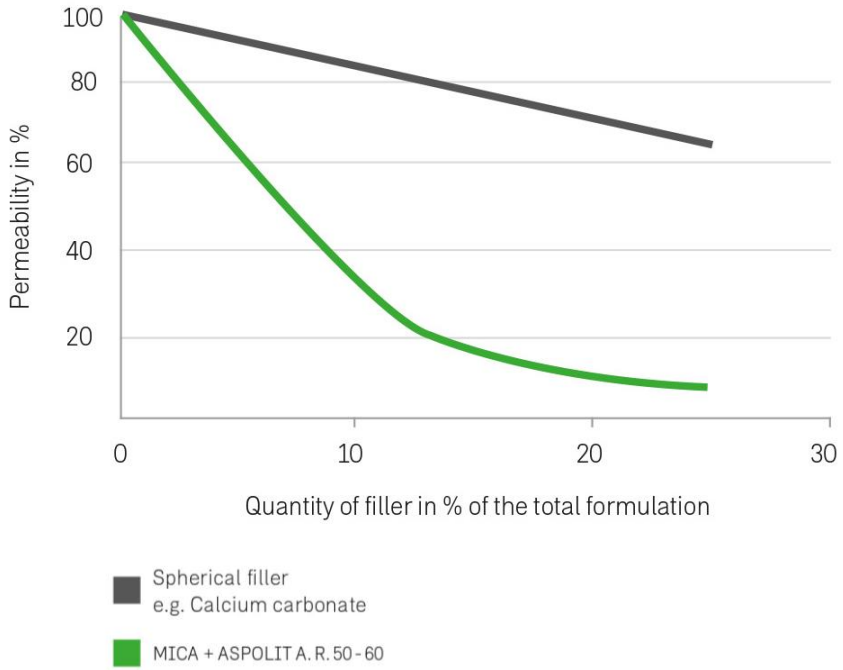
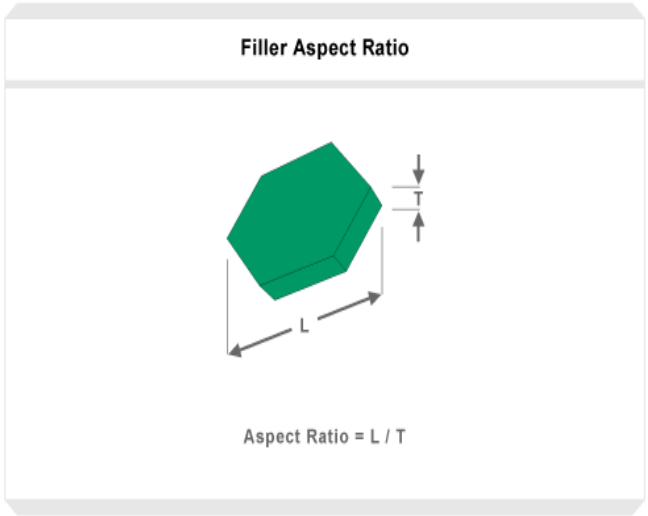
Grain size distribution	Cosmetics F	Cosmetics M	Cosmetics C
D98 (Mastersizer)	21 µm	36 µm	50 µm
D50 (Mastersizer)	7,5 µm	11,5 µm	16 µm

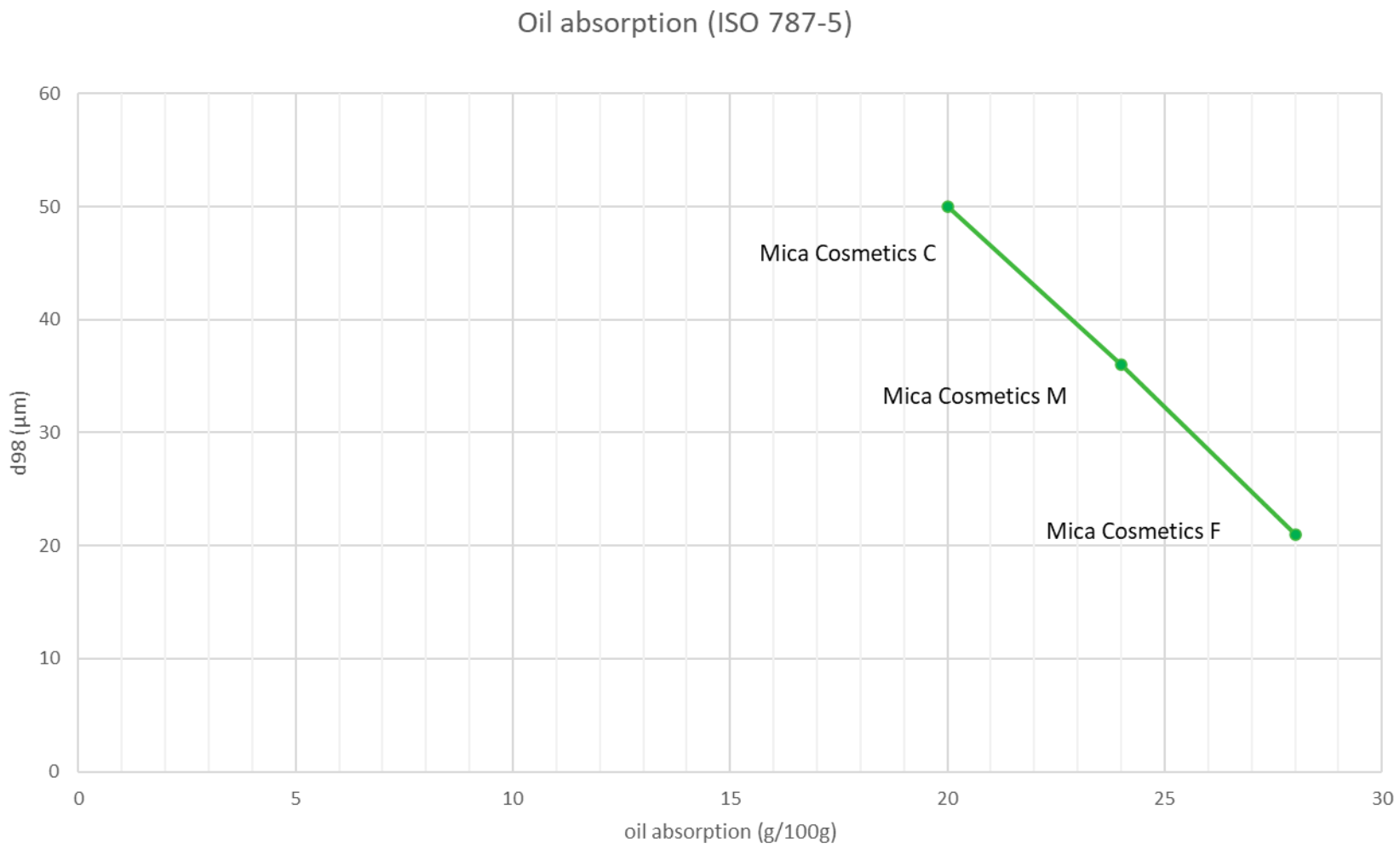
Relationship between Aspect Ratio and Permeability









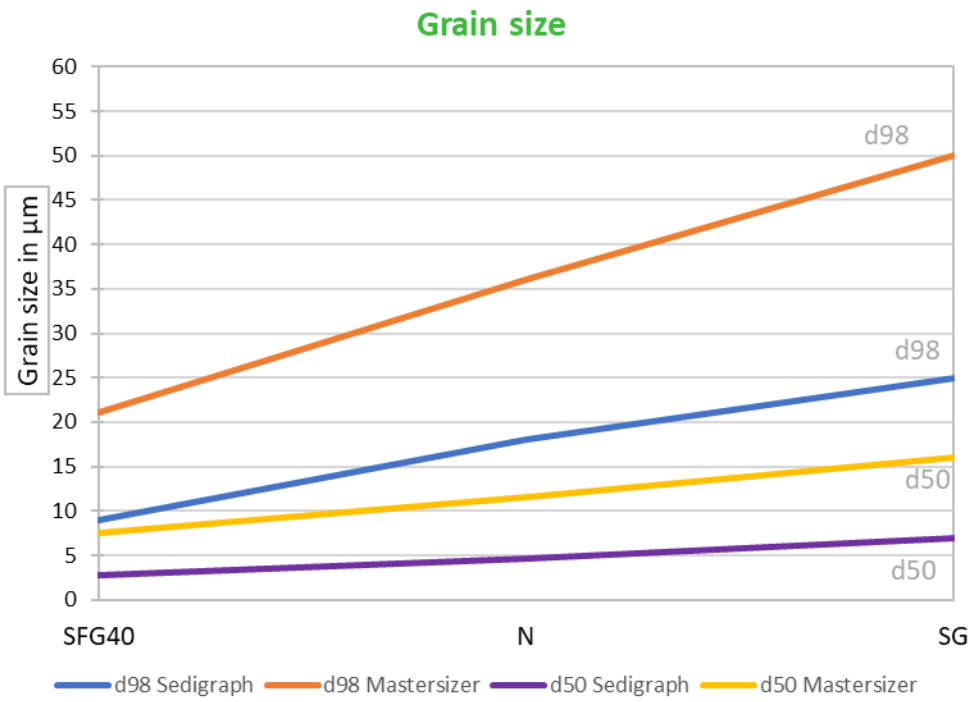

Oil absorption (ISO 787-5)
d98 (µm)
60
50
40
30
20
10
0
0
5
10
15
20
25
30
oil absorption (g/100g)
Mica Cosmetics C
Mica Cosmetics M
Mica Cosmetics F

Color - L*-value comparison

	L*-value
Aspanger MICA Cosmetics C	90
Aspanger MICA Cosmetics M	91
Aspanger MICA Cosmetics F	93
Typical MICA competitor	89
Typical Kaolin competitor	87
Typical Talcum competitor	93

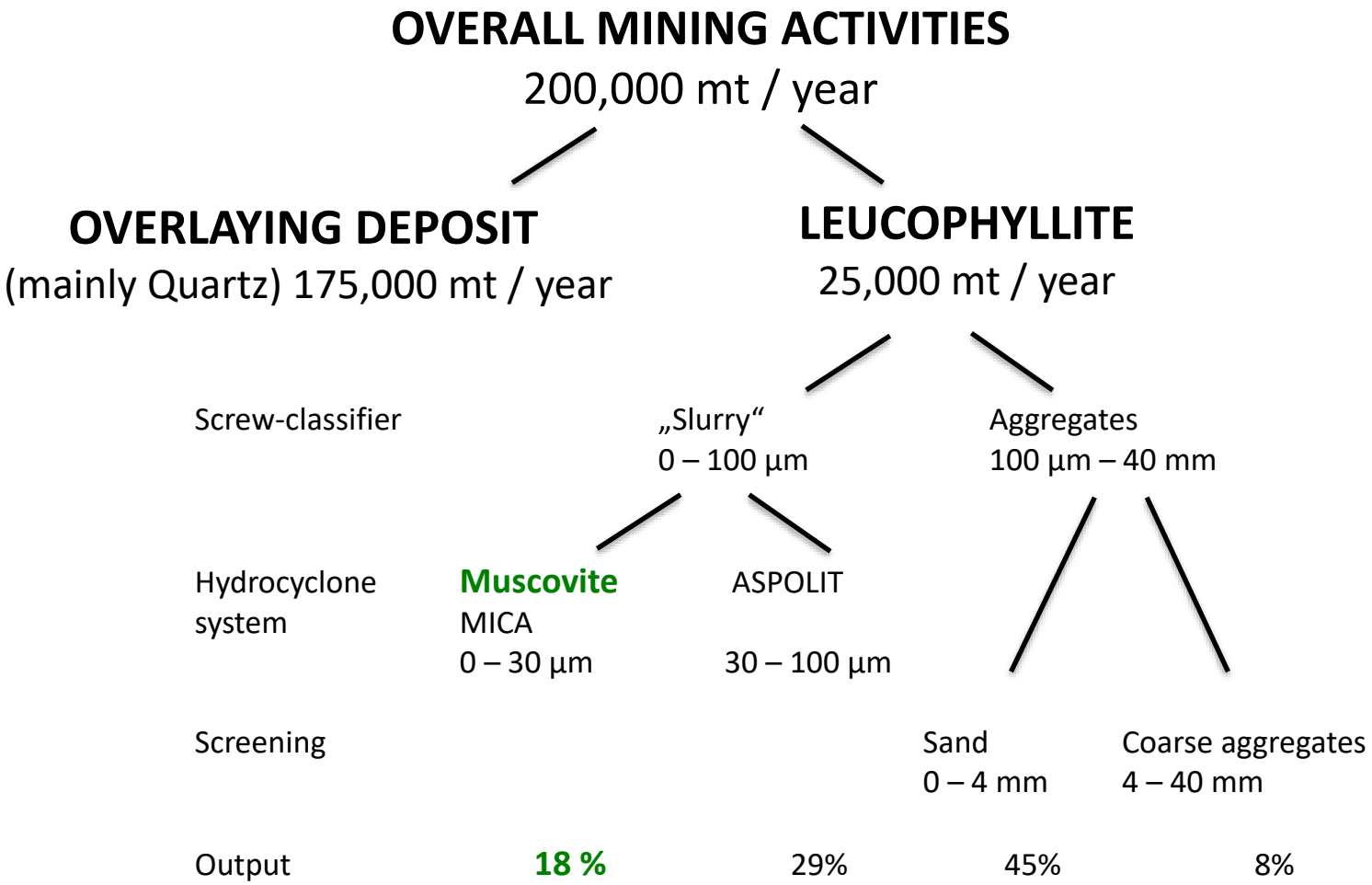
MICA

- Density 2,85 g/cm³
- Mohs hardness 2,5
- Refractivity 1,56
- pH-value 9,5
- Moisture < 1%



Physical Data MICA	Cosmetics C	Cosmetics M	Cosmetics F
Oil absorption (g/100g)	20	24	28
L* value (%)	90	91	93
Grain size D98 (µm) (Sedigraph/Mastersizer)	25 / 50	18 / 36	09 / 21
Grain size D50 (µm) (Sedigraph/Mastersizer)	07 / 16	4,6 / 11,5	2,7 / 7,5

4) ACTUAL PROCESSING OF ASPANGER MICA



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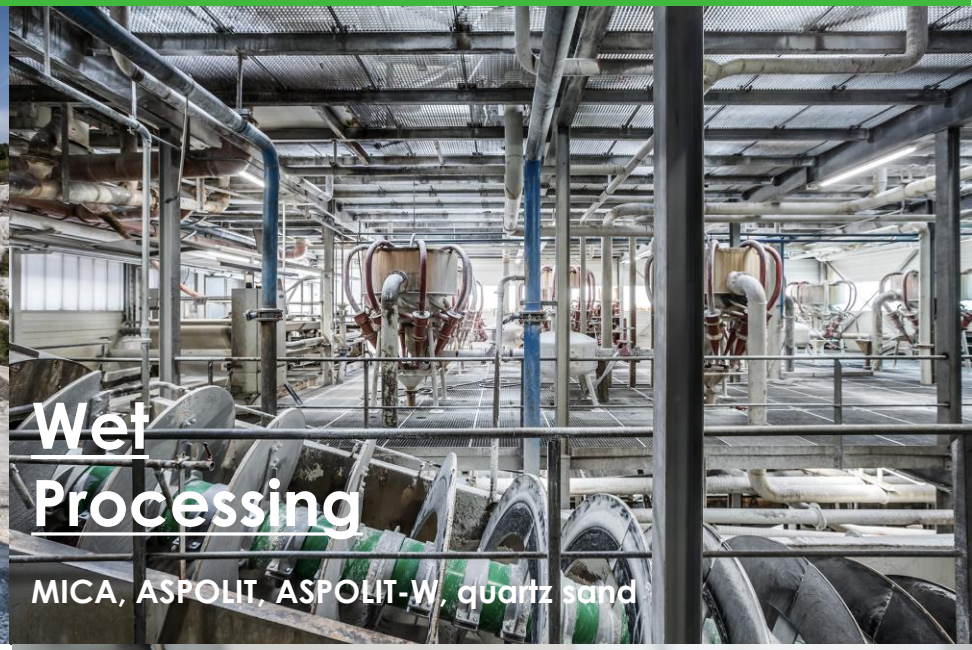
Opencast Mining



Wet Processing

MICA, ASPOLIT, ASPOLIT-W, quartz sand

Dry Processing

MICA , ASPOLIT,

ASPOLIT-W

Laboratory

Quality assurance

5) FUTURE PROCESSING OF ASPANGER MICA

Advantages of the future ASPANGER MICA:

a) 100% recycled functional filler
b) higher purity (positive impact on future labelling regulation & better L*a*b*-value)
c) much lower carbon footprint
d) reduced dependency on energy costs

How to produce a sustainable, recycled MICA and ASPOLIT filler with much lower carbon footprint?

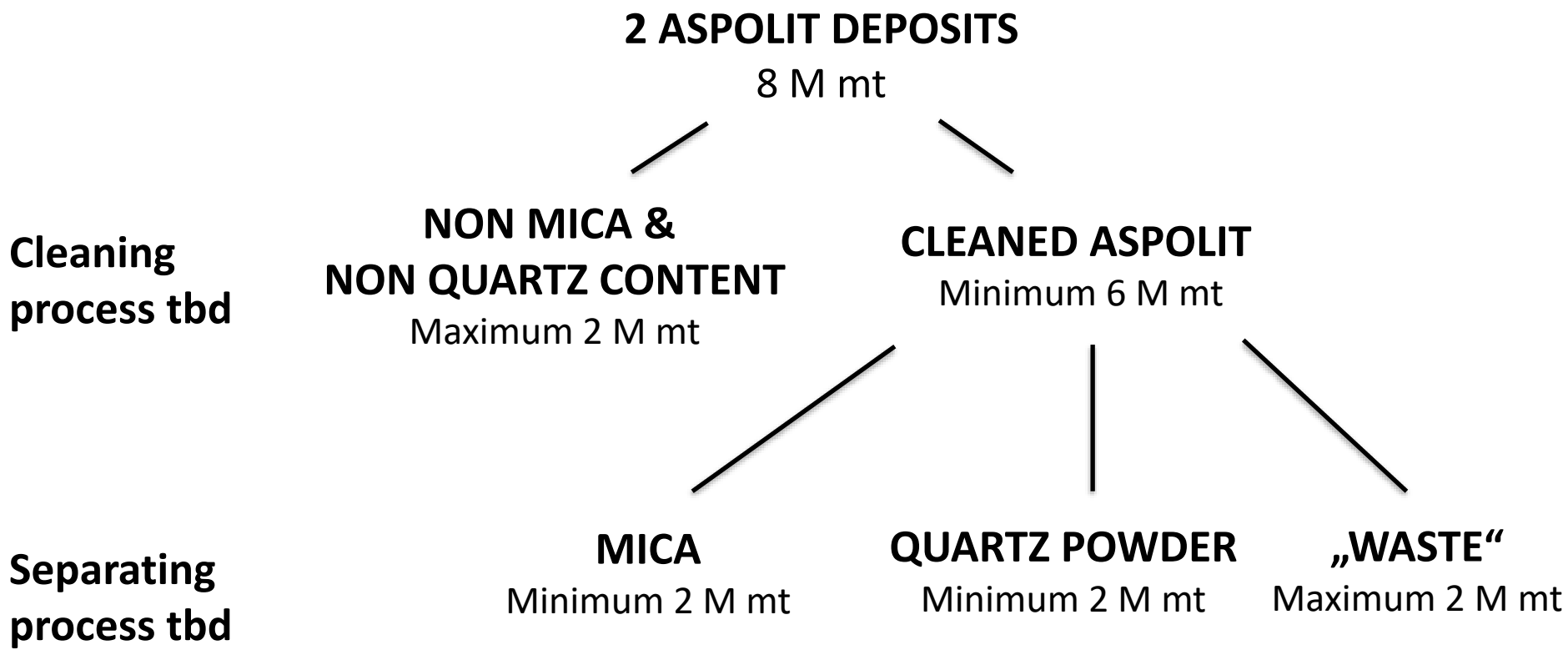
It is the **clear target** to **produce all the future ASPANGER functional fillers (MICA, ASPOLIT and QUARTZ powder) out of the existing two Aspolit deposits** where Aspanger was storing intermediately over the last 165 years the Aspolit.
(Natural combination of > 48% MICA and > 48% QUARTZ and < 4% of non MICA and non QUARTZ minerals)

Both deposits contain about 4 M tons of Aspolit each.
We will produce a pure (better L*a*b*-value) Aspolit by cleaning the input material **of > 3 M tons per deposit.**

Consequently we will be able **to produce about 1 M tons of pure MICA (less quartz content and better L*a*b*-value), and about 1 M tons of QUARTZ powder per deposit**.

The target is to find the right industrial partner to successfully define the future production processes and to start the new production for the recycled functional fillers with lower carbon footprint from 2025 on.

5) FUTURE PROCESSING OF ASPANGER MICA



6) CONCLUSION
SUSTAINABILITY with focus on ESG

- ## Environment

  Due to **much higher future yield**, Aspanger will **conserve the resources** (deposit, water, energy, etc.) dramatically which finally is a **positive contribution to the climate**.

- ## Social

  Replacing the **open quarry** by using the **two Aspolit deposits** has a **positive influence on the workplace** for most of our employees (security, much better working conditions)

- ## Governance

  The future **improved quality** (better L*a*b*-value, higher purity, even less heavy metal content) **opens new markets** (Cosmetics, special premium paints, coatings and Polymer applications) – consequently **better repuation** of Aspanger and **lower risk** for Aspanger in general. Finally, the **deposit will last for even many more decades.**

Advantages for Aspanger clients

- Quick & flexible service (**family owned & managed company**)
- **Product documentation based on clients requirements** done by Aspanger internal laboratory (XRD, Mastersizer PSD, Spectrophotometer, …)
- If needed, even **microbiological & heavy metal analysis** (external laboratories)
- **You are welcome to visit Aspanger mining company personally!**

Thank you for your attention!