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QUESTIONNAIRE DRYING TECHNOLOGY

By a complete filled in questionnaire you will help us to evaluate your application and the execution of pilot trials with product in our test center.
All information submitted will be treated confidentially.

Product / Project : .....

(Key words) .....

Application: ☐ Drying ☐ Concentrate ☐ Recovery

Must your product or application be treated in strict confidence: ☐ yes ☐ no

Company name: .....

Departement: .....

Adress: .....

Person in charge of the project: .....

Phone No.: .....

Fax No.: .....

E-mail: .....

Date: .....

Signature: .....

1. PRODUCT INFORMATION

1.1 Name of product:.....

1.2 Groupe:.....

1.3 Composition and physical data

Component		**Solid matter**	**Solvent**	**Others**
Name				
Chemical formula				
Molecular weight	kg/kmol			
Specific weight	kg/m^3			
Specific heat	kJ/kg °C			
Evaporation heat	kJ/kg			
Boiling temperature at 1 bar	°C			
Boiling temperature at .. mbar	°C			
Boiling temperature at ... mbar	°C			
Melting point	°C			
Decomposition point	°C			
Weight-% in wet product	%			
Weight-% in dry product	%			
Weight-% in vapours	%			

1.4 Properties of wet product

Specific weight: .....kg/m^3 Bulk density: ..... kg/m^3

Viscosity:.....mPas at..... °C

Temperature of wet product at dryer inlet: ..... °C

pH-value of wet product: .....

Form of wet product at dryer inlet:

☐ liquid	☐ solution	☐ slurry	☐ pasty	☐ pumpable
☐ not pumpable	☐ compact	☐ lumpy	☐ crumbly	☐ sticky
☐ scarcely free flowing	☐ readily free flowing	☐ powdery	☐ fibrous	☐ granulated

☐ other form of wet product .....

How is the moisture bound? adherent: ..... % capillary ..... %

Is a part of the moisture water of crystallisation? ..... %

At which temperature becomes this chemically bound water free? ..... °C

What is the necessary heat to remove this water? .....kJ/kg of removed water

1.5 Properties of dried product

Bulk density: ..... kg/m^3 Angle of repose: ..... degree

Mean particle size (enclose sieve analysis, if available) ..... mm

Required dry product temperature after drying: ..... °C

State required form of final product? .....
.....

Is the dry product hycroscopic? ..... (enclose sorption curves!)

2. DRYING

State max. admissible temperature when the dry product is subjected to it during some

seconds: ..... °C minutes: ..... °C hours: .....°C

Does the product harden on the surface during the drying process?	☐ yes	☐ no
Is there a viscous phase during drying?	☐ yes	☐ no
If yes, at what moisture range? Between	..... wt.-% to .....wt.-%	
At what moisture content does the product become free flowing?	.....wt.-%	
Does the product form deposits on the heating surface during drying?	☐ yes	☐ no
Can the product be plastified if shearing is applied?	☐ yes	☐ no
Is the product presently being dried?	☐ yes	☐ no

If yes, how (type of dryer)?
.....
.....

If Contact drying:
Heating temperature: ..... °C Heating surface: ..... m^2 Pressure: ..... mbar

If Convection drying:
Hot gas temperature: ..... °C Hot gas quantity: ..... kg/h Exhaust gas temp.: ... °C

If Continuous drying:
Feed rate of wet product: ..... kg/h approx. residence time: ..... min.

How is the wet product actually metered to the dryer? .....

If Batch drying:

Batch size wet product: ..... kg Batch time/Drying time: ..... h

Which particular problems occur in the drying method pesently applied? .....

.....

.....

.....

3. DESIGN CONDITIONS OF THE DRYING PLANT

What is the process step preceding the drying operation? .....

If continuous operation in previous stage what is the feed rate of wet product.....kg/h

If batch operation in previous stage, what is the amount of wet product per batch.....kg

Time interval at which a batch is supplied to the dryer? ..... h

Daily operating time? ☐ 8 h ☐ 16 h ☐ 24 h ☐ .....h

Working days per week? ☐ 5 d ☐ 7 d ☐ ..... d

Operating hours per year? ..... h

Construction material:
In contact with wet product? .....

In contact with vapours? .....

In contact with dry product? .....

Suitable gasket materials? .....

4. SAFETY

Hazards related to product and vapours:

	toxic	caustic	inflammable	explosive
Product				
Vapours				

Danger of corrosion? ☐ yes ☐ no

Danger of abrasion? ☐ yes ☐ no

Other hazards? .....

.....

.....

Explosion limit in air		**lower**	**Upper**	
Solids	at ..... °C			g/m^3
Solvent	at ..... °C			Vol.-%
	at ..... °C			Vol.-%

Ignition temperature: .....°C Max. explosion pressure:.....bar

Max. rate of pressure increase in a 1 m^3 test vessel:.....bar/sec.

Dust explosion class: ☐ St 1 ☐ St 2 ☐ St 3

Recommended/specific safety measures?.....

Explosion proof class of el. equipment:.....

Safety data sheet No.:.....

5. UTILITIES AVAILABLE

Electrical energy	Volt	Hz	pH
	Volt	Hz	pH
Fuel gas: Type		heating value H_u	kWh/stm^3
Fuel oil: Type		heating value H_u	kWh/kg
Steam: Pressure	bar	temperature:	°C
Steam: Pressure	bar	temperature:	°C
Thermal oil: Supply/reflux	°C	available quantity	t/h
Hot water: Supply/reflux	°C	available quantity	t/h
Is hot gas available?	°C	moisture g/kg	quantity Nm^3/h
Cooling water: Supply/reflux	°C	quantity	m^3/h
Brine: Supply/reflux	°C	quantity	t/h
Compressed air	bar (abs.)	dew point	°C
Instrument air	bar (abs.)	dew point	°C

6. TRIALS / METHODS OF ANALYSIS

Can wet product be made available for pilot tests? ☐ yes ☐ no

Can dried product be rewetted to obtain a representative wet product? ☐ yes ☐ no

How clean should the pilot plant be for the tests (give exact description!): .....

.....

.....

How can the plant be cleaned after the tests? (solvent etc.)? .....

Give full shipping address to which the material is to be returned .....

.....

Moisture analysis:

Atmospheric oven	°C		h/min.	Sample weight	g
Vacuum oven	°C	mbar	h/min.	Sample weight	g
Infrared balance	°C	Sample	g	Layer	mm
Karl-Fischer: Solvent		Sample weight g		Titration time	min.

Other methods: .....

7. ENCLOSURES

☐ Safety data sheet

☐ Sieve analysis

☐ Cleaning specification

☐ Analysis specification

☐ .....