

**PRODUCT INFO
& DATASHEET**

SICOCHOL[®] *Choline Chlorides*

SICO'S CHOLINE CHLORIDE PRODUCTS.

Choline is an important member of the B-complex group of vitamins. The importance of an adequate supply of dietary Choline for poultry, swine and other animals is universally recognised and Choline Chloride has become a standard additive in formulating rations for poultry and livestock. Additional information on nutritional aspects and physiological action is available upon request.

SICO offers a whole range of first class Choline Chloride products:

- SICOCHOL-C 50, 50 % Choline Chloride on corn cobs carrier.
- SICOCHOL-C 60 60 % Choline Chloride on corn cobs carrier.
- SICOCHOL-C 70, 70 % Choline Chloride on corn cobs carrier.
- SICOCHOL-S 50, 50 % Choline Chloride on silica carrier.
- SICOCHOL-L 70, 70 % Choline Chloride in aqueous solution.
- SICOCHOL-L 75, 75 % Choline Chloride in aqueous solution.

SICOCHOL-C 50 powder feed grade

ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
Carrier	N/A	Vegetable/cereal corn cobs mainly
Appearance	N/A	Yellowish to brown granular powder
Choline chloride %	Min. 50	Min. 50.0
Equivalent choline hydroxide %	43.3	43.3
Equivalent choline ion %	37.3	37.3
Particle size	N/A	< 600 µm > 50% < 850 µm > 85% < 1000 µm > 95%
Bulk density (kg/m ³)	N/A	≥ 0.55
Moisture %	Max. 2.0	Max. 2.0
Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 200
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 10
Dioxins/ppt (parts per trillion)	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	Max. 20

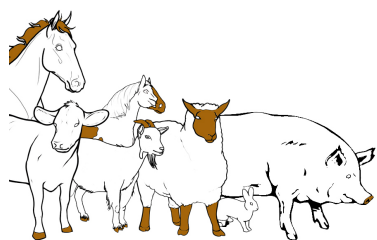
SICOCHOL-C 60 powder feed grade

ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
Carrier	N/A	Vegetable/cereal corn cobs mainly
Appearance	N/A	Yellowish to brown granular powder
Choline chloride %	Min. 60	Min. 60.0
Equivalent choline hydroxide %	52	52.0
Equivalent choline ion %	47.7	47.7
Particle size	N/A	< 600 µm > 50% < 850 µm > 85% < 1000 µm > 95%
Bulk density (kg/m ³)	N/A	≥ 0.56
Moisture %	Max. 2.0	Max. 2.0

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SICO FEEDS
EVERY TIME THE *right* SOLUTION



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Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 200
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 10
Dioxins/ppt	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	Max. 20

SICOCHOL-C 70 powder feed grade

ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
Carrier	N/A	Vegetable/cereal corn cobs mainly
Appearance	N/A	Yellowish to brown granular powder
Choline chloride %	Min. 70	Min. 70.0
Equivalent choline hydroxide %	60.6	60.6
Equivalent choline ion %	52.1	52.1
Particle size	N/A	< 600 µm > 50% < 850 µm > 85% < 1000 µm > 95%
Bulk density (kg/m3)	N/A	≥ 0.56
Moisture %	Max. 2.0	Max. 1.5
Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 200
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 10
Dioxins/ppt	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	Max. 20

SICOCHOL-S 50 Silica feed grade

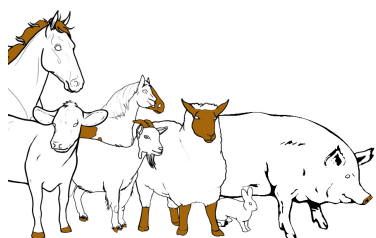
ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
Carrier	N/A	Silica mainly
Appearance	N/A	White color powder
Choline chloride %	Min. 50	Min. 50.0
Equivalent choline hydroxide %	43.3	43.3
Equivalent choline ion %	37.3	37.3
Particle size	N/A	< 600 µm > 599%
Bulk density (kg/m3)	N/A	≥ 0.58
Moisture %	Max. 20	Max. 20
Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 200
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 10
Dioxins/ppt	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	No detected

- Choline Chloride content is based on wet base. Means choline chloride content is 50%, silica content is 30-34%, water content is 16-20%.

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Remarks:

- No un-allowed materials according to 'Catalogue of feed materials' (Commission Regulation EU no. 68/2013).
- Choline Chloride content is based on dry base. Drying process (105 °C at 2 hours) is needed.
- Test results may be influenced by different methods of analysis (IC Method or Reinecke Salt Method).

As regards vegetable carrier: We also add a small percentage of Wheat bran which purpose is to optimize the structure of carrier.

SICOCHOL-L 70 liquid

ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
pH Value (20 °C)	N/A	7.0 – 9.0
Crystallizing point °C	N/A	-10 ~ -5
Appearance	N/A	Colourless & transparent aqueous liquid
Specific gravity	N/A	1.01 ~ 1.02
Choline chloride %	Min. 70	Min. 70.0
Equivalent choline hydroxide %	60.7	60.7
Equivalent choline ion %	52.1	52.1
Ash %	Max. 0.2	Max. 0.2
Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 150
Ethylene Glycol %	N/A	Max. 0.05
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 4
Dioxins/ppt	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	No detected

SICOCHOL-L 75 liquid

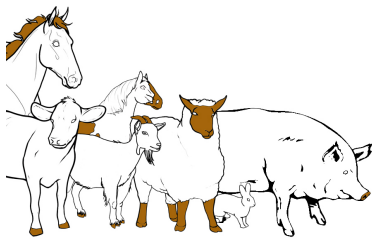
ITEM	EURO STANDARD 2002/32/EC	OUR STANDARD
pH Value (20 °C)	N/A	7.0 – 9.0
Crystallizing point °C	N/A	-5 ~ 5
Appearance	N/A	Colourless & transparent aqueous liquid
Specific gravity	N/A	1.09 ~ 1.10
Choline chloride %	Min. 75	Min. 75.0
Equivalent choline hydroxide %	65	65.0
Equivalent choline ion %	55.9	55.9
Ash %	Max. 0.2	Max. 0.2
Trimethylamine residual/ppm free amine (as TMA)/ppm	Max. 300	Max. 150
Ethylene Glycol %	N/A	Max. 0.05
Urotropine	N/A	No detected
Heavy metal		
- Lead (Pb)/ppm	max. 100	max. 10
- Cadmium (Cd)/ppm	max. 10	max. 1
- Mercury (Hg)/ppm	max. 0.1	max. 0.05
- Arsenic (As)/ppm	max. 30	max. 4
Dioxins/ppt	Max. 1.5	Max. 1
Aflatoxin B1/ppm	Max. 20	No detected

Remarks:

- No un-allowed materials according to 'Catalogue of feed materials' (Commission Regulation EU no. 68/2013).
- Test results may be influenced by different methods of analysis (IC Method or Reinecke Salt Method).

As regards vegetable carrier: We also add a small percentage of Wheat bran which purpose is to optimize the structure of carrier.

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PACKING

- in 25 kg kraft paperbags with transparent pe bag inside
- in 230 lt plastic drums

QUALITY APPROVED BY:

- ISO 9001-2000
- HACCP
- FAMI-QS

Exported worldwide over more than 50 countries.

USED TEST METHODS

- REINECKE SALT GRAVIMETRIC TEST
- ION CHROMATOGRAPHY TEST
- Trimethylamine-HCl (TMA) ASSAY

To be effective against adulteration or lower contents choline chloride, such as adding zeolite, anti-caking material, sodium chloride, potassium chloride, urea, hexamethylenetetramine, which cause high TMA (trimethylamine) content, we recommend Ion Chromatography test, as it can recognize the impurity more accurately than Reinecke Salt gravimetric, Non-Aqueous Titration or Sodium Tetraphenylborate method.

In regard to the quality of choline chloride, the content of trimethylamine cannot be ignored. It is prescribed in Europe that trimethylamine ought to be less than 300 ppm. Here we guarantee that the content of trimethylamine is less than 200 ppm.

Moreover we can guarantee product is:

- Dioxin free
- BSE free
- GMO free
- Urotropine free
- Foot-and-mouth disease free
- Radiation free