



Fudix™ technical properties and quality manual.

Fudix™ calcium chloride pellets for food processing application is produced in accordance with STO 39297743-05-2009 developed due to aims and principals of RF standardizations established by Federal Law № 184-FZ «As to technical regulation» dated 27 December 2002 .

The present standard is designed on the bases of the following Standards:

1. GOST 1.5 – 2001 «State standards, rules and recommendations for state standards system. Common requirements for system of standard issue»
2. GOST 1.4 – 2004 «Standard system in Russian Federation, legal bodies standards»

This standard covers production of calcium chloride food grade manufactured by the method of calcium chloride pure brine thermal drying. Calcium chloride appearance is white colour pellets deliquesced on the air and soluble in water and alcohol, used for food industry for production of cheese, cottage cheese, dried milk, fermented milk food, jelly, marmalade, canned vegetables and others processing.

Calcium chloride food grade **Fudix™** is conformed to the present standard requirements and produced in accordance with the established process procedure.

General chemical properties specification measured for each lot of calcium chloride food grade **Fudix™**:
Table 1

# pos	Parameter	Content
1	Fraction of calcium chloride total mass CaCl_2 , %, min	95
2	Fraction of magnesium total mass, calculated on MgCl_2 , % max	0,5
3	Fraction of insoluble in water residue total mass, % max	0,2
4	Fraction of sulphates, calculated on sulphate-ion (SO_4), %, max	0,05
5	Fraction of Fe total mass, %, max	0,004
6	Fraction of total mass (K+Na), %, max	0,5

Calcium chloride food grade **Fudix™** physical properties:
Таблица 2

# pos	Parameter	Content
1	Fraction	Pellets
2	Colour	White
3	Odour	N/a
4	Hygroscopicity	Hygroscopic
5	Granulometry:	
	more 5 mm, %, max	10
	1,25-5 mm, %, max	75
	less 1,25-5 mm, %	15
6	Bulk density, kg/m^3	750-850

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Heavy metals properties specification measured for each lot of calcium chloride food grade **Fudix™**:

Table 3

# pos	Parameter	Content
1	Mercury, mg/kg, max	1
2	Lead, mg/kg, max	2
3	Cadmium, mg/kg, max	1
4	Arsenic, mg/kg, max	3
5	Total , mg/kg, max:	7

Specification of calcium chloride food grade **Fudix™** conformity in matter of fluorides and bromide content.

Table 4

# pos	Parameter	Content
1	Fraction of soluble in water and common fluorides total mass, mg/kg, max	5
2	Fraction of bromide total mass, mg/kg, max	30

The results of conducted tests for content of general elements calcium chloride food grade **Fudix™**.

Laboratory testings were hold by Russian scientific – investigation institute of mineral raw materials in name of N.Fedorovskiy - VIMS. Federal scientific – methodic centre of laboratory testing and certification of mineral raw materials of the Ministry of natural Resources of RF. Analytical certification testing centre of ACITS VIMS.

Certificate of accreditation of Federal Agency of Inspection for Technical regulation and metrology # RU.000.510091

Table 5

# pos	Parameter	Notation	Content, %, of mass	Method of analysis
1	Calcium	Ca	33,4	Titrimetric
2	Magnesium	Mg	0,66	Atomic absorption
3	Sodium	Na	0,15	Flame-photometric
4	Potassium	K	0,0092	Flame-photometric
5	Chlorine	Cl	59,1	Titrimetric
6	Bromine	Br	0,007	Ion metric
7	Iodine	I	0,0008	Ion metric
8	Fluorine	F	0,006	Ion metric
9	Boron	B	0,013	Photometric

Table 6

# pos	Parameter	Content, %, of mass	Method of analysis
1	Weight losses at 105 ° C (included moisture)	0,11	Gravimetric

The results of calcium chloride food grade **Fudix™** testing under the other chemical elements:

Methods of analysis:

1. Mass-spectrum with inductively coupled plasma – «MS»
2. Atomically-emissive with inductively coupled plasma – «AES»

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Table 7

# pos	Parameter	Notation	Content, %, of mass
1	Lithium	Li	0,13
2	Beryllium	Be	< 0,02
3	Scandium	Sc	< 1
4	Vanadium	V	< 0,4
5	Chrome	Cr	< 0,8
6	Cobalt	Co	0,35
7	Nickel	Ni	6,7
8	Copper	Cu	< 0,9
9	Zinc	Zn	< 1
10	Gallium	Ga	< 0,05
11	Selenium	Se	< 0,6
12	Rubidium	Rb	< 0,07
13	Strontium	Sr	240
14	Yttrium	Y	0,047
15	Zirconium	Zr	< 0,04
16	Niobium	Nb	< 0,03
17	Molybdenum	Mo	1,4
18	Rhodium	Rh	< 0,04
19	Palladium	Pd	< 0,2
20	Silver	Ag	< 0,08
21	Tin	Sn	< 0,4
22	Stibium	Sb	< 0,04
23	Tellurium	Te	< 0,03
24	Cesium	Cs	< 0,007
25	Barium	Ba	3,0
26	Lanthanum	La	0,27
27	Cerium	Ce	< 0,1
28	Praseodymium	Pr	< 0,05
29	Neodymium	Nd	< 0,05
30	Samarium	Sm	< 0,01
31	Europium	Eu	< 0,005
32	Gadolinium	Gd	< 0,01
33	Terbium	Tb	< 0,003
34	Dysprosium	Dy	< 0,008
35	Holmium	Ho	< 0,002
36	Erbium	Er	< 0,008
37	Thulium	Tm	< 0,001
38	Ytterbium	Yb	< 0,006
39	Lutecium	Lu	< 0,001
40	Hafnium	Hf	< 0,006
41	Tantalum	Ta	< 0,003
42	Tungstem	W	0,12
43	Rhenium	Re	< 0,002
44	Iridium	Ir	< 0,001
45	Platinum	Pt	< 0,02
46	Gold	Au	< 0,04
47	Tallium	Tl	< 0,005
48	Bismuth	Bi	< 0,01
49	Thorium	Th	< 0,02
50	Uranium	U	0,035
	Total:		< 258 or 0,000258 % in each gram

Calcium chloride food grade **Fudix™** conformity to EC standards for food additive E – 509, directive **2000/63/EC**.

EC number – 233-140-8

CAS number – 10043-52-4

Table 8

# pos	Parameter	European Directive 2000/63/EC	Content for Fudix	Comment
1	CaCl ₂ , %, min on anhydrous base	93	95	conform
2	Magnesium and alkaline salts, %, max	5	1,5	conform
3	Fluorides, mg/kg, max	40	5	conform
4	Arsenic, mg/kg, max	3	3	
5	Lead, mg/kg, max	10	2	conform
6	Mercury, mg/kg, max	1	1	conform

Chemical properties of calcium chloride food grade **Fudix™** are vastly superior to EC requirements for food additive E – 509.

Conformity of calcium chloride food grade **Fudix™** to the standards of Food Chemical Codex, 5th edition

Table 9

# pos	Parameter	Food Chemical Codex, 5 th edition	Content for Fudix™	Comment
1	Calcium chloride, %, max	93	95	conform
2	Arsenic, mg/kg, max	3	3	conform
3	Fluorides, mg/kg, max	40	5	conform
4	Heavy metals including lead, mg/kg, max	20	7	
5	Lead, , mg/kg, max	5	2	conform
6	Magnesium and alkaline salts, %, max	5	1,5	conform
7	Insoluble in acid, %, max	0,02	0,02	conform
8	Test on sieve:			
9	4 mesh	100%	100%	conform
10	8 mesh	60-100%	60-100%	conform
11	40 mesh	0-6%	0-6%	conform

Calcium chloride food grade **Fudix™** by its technical parameters much exceeds requirements of **Food Chemical Codex, 5th edition** for calcium chloride food grade.

Fudix™ QUALITY MANUAL:

1. Requirements to raw materials

Raw material for calcium chloride food grade **Fudix™** is liquid calcium chloride that is produced in accordance with GOST 450-77 strictly confirming the following specification:

Table 10

# pos	Parameter	Data
1	Appearance	Liquid of yellow – grey or green colour transparent or with a slight turbidity
2	CaCl ₂ total mass, %, minimum	35
3	Impurities total mass, %, maximum	0,15

2. Package

Calcium chloride food grade **Fudix™** total mass no more than 25 kg is packed to polypropylene sacks typ of AD * STAR in accordance with norm regulated document. Package has to be dry, clear, don't let through moisture or spill possibility, to provide integrity of package till the date of expiry.

Expiry date – 6 months from the date of production.

25 kg sacks are formed in 1 ton net weight pallets, 40 sacks per one pallet, pallet is made of of soft types of wood and fumigated in accordance with ISPM 15.



3. Markings

Transport markings is made with indication of symbol: «Keep of moisture», in case of polymer materials usage «Keep of direct sun rays» and following data:

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- Name of company manufacture and address
- Trade Mark «Fudix»
- Name of product and application
- Quantity of packed places of product in group of package
- Net and gross weight
- Number of batch, date of production and expiry date
- Indication of current technical conditions

Customer markings has to have following data:

- name of manufacture, address and trade mark «Fudix»
- name of product and its application
- net weight
- Indication of current technical conditions
- expiry date
- Number of state registration certificate

Markings related to product has to be indicated at package by stamping or self-adhesive label . Packaging and markings of product for exports has to be in accordance with contract but with keep also above mentioned terms.

4. Safety requirements

Calcium chloride food grade **Fudix™** inflammable, don't lead to formation of toxic substances in air and canalization in absence of other substances. Calcium chloride don't cumulate in a body. Calcium chloride gives irritant affect to skin in case of long contact and medium irritant affect to mucous membranes of eyes and breath ways. In case of contact with skin and eyes to wash with a lot of water. People who works with calcium chloride have to be provided with special clothes , boots and individual means of protection. Production sites and laboratory where are works with calcium chloride take place have to be equipped with high power ventilation system , in places of high dust level local pumping put have to be arranged.

People who are involved in works with calcium chloride have to have preventive and periodical medical examination and also education and knowledge testing as to dangers preventive measurements.

4. Quality control

1. Calcium chloride **Fudix™** is accepted as to quality by each individual batch. Batch is considered as any quantity of product that is homogeneous as to quality characteristics and is accompanied by one quality document.
2. For testing calcium chloride **Fudix™** as to its conformity to minimum chemical parameters of current standard, 3% of product is picked up from batch , there have to be at least 3 such samples.
3. Content of toxic elements (arsenic, lead, cadmium, mercury) in calcium chloride food grade is tested one time per year by attested laboratories. In case of disclosure of toxic substances with a higher then permitted level test as to these toxic elements content has to be made one time per 10 days till the moment when permitted level of these elements reaches permitted level
4. In case of getting not satisfied results as to toxic elements content at least for 1 of them the second test has to be made on 2 times higher quantity sample. Results of the second test are valid for all batch.
5. Quality document for each batch has to include following data:
 - name of manufacture, legal address and postal address
 - name of product and trade mark
 - indication of technical standard of organization for current product
 - number of batch and date of manufacture
 - net and gross weight
 - quantity of items in batch
 - stamp of quality laboratory and signature of responsible for testing person

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- results of testing that confirm conformity of quality to requirements of company standards for food grade calcium chloride

6. Quality control methods

6.1 Samples picking up

Point samples from bags have to be picked up by special probing rod with loading into bag for $\frac{3}{4}$ of its depth. Weight of such point sample picked up from one bag have to be not lower than 0,2 kg.

Picked up point samples have to be collected at common sample, thoroughly mixed and pressed till weight of 0,5 kg.

Got average quality characteristics sample has to be placed into clear and dry retort with stopper, polyethylene bag or can with screw up cover, tank with calcium chloride sample has to be labeled with indication of following data:

- name of product
- number of batch
- date of sample picking up
- signature and name of person which has picked up sample

6.2. Testing of appearance. Checking of appearance of product, package and markings as to conformity to requirements of company quality standards have to be made visually. Revelation of calcium chloride total mass has to be made in accordance with clause 3.4. of GOST 450-77 standard. Revelation of magnesium content recalculated to $MgCl_2$ has to be made in accordance with clause 3.5. of GOST 450-77 standard, impurities level – in accordance with GOST 450-77 clause 3.7, sulphates – clause 3.8., iron – 3.6

7. Transportation and storage

7.1 Calcium chloride is transported by any type of transport in accordance with rules of transportation for each individual mean of transport.

7.2 Calcium chloride has to be storied in covered warehouses exclusionary penetration of atmospheric precipitations and soil waters, in temperature regime from -50 to $+40$ °C. Calcium chloride packed in special bags palletized with film may be storied at open warehouse.

8. Manufacture guarantees

8.1 Manufacture gives guarantee that calcium chloride food grade in accordance with standards mentioned in table 1 & 2 with condition to keep requirements as to transportation and storage.

8.2 Expiry date – 6 months from the date of production. By end of quality guarantee period calcium chloride food grade has to be tested again and in case of its conformity to table 1 2 requirements can be used after expiry date.