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Technical File Sugars

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Approved by Rina Robijns

Data Raffinerie Tirlemontoise • Tiense Suikerraffinaderij

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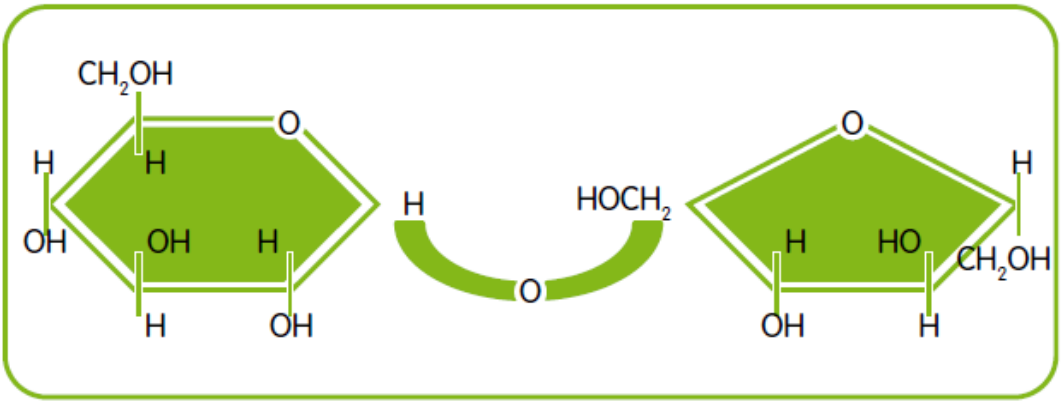
Rue de Meuse 9, B-4520 Wanze tel : +32 85 271 211 – fax : +32 85 271 259

VAT/TVA/BTW BE 436 410 522
NSSO/ONSS/RSZ 848 1558587 26

Product identification

Saccharose C12 H22 O11
Legal name White sugar or Sugar



Organoleptic properties

Properties	Value
Aspect	White crystals
Taste	Sweet / Free from any off taste
Smell	Free from any off odor

Physical & chemical properties

Physical properties	Value
Crystal Density	(D415) : 1,59
Molecular weight	342,30
Specific volume, crystal (at 15°C)	0,63 g/cm³
Bulk Density	800…900 kg/m3 (function of particle size)
Melting- softening point	+/-188 °C
Solubility in water	ca.885 g/l (at 20°C)
Viscosity	15,6 mPa.s @ 20°C (50% solution)
	3,81 mPa.s @ 60°C (50% solution)
Hygroscopicity	Moderate - high for small particle size
Particle size	See below

Chemical properties	*Value*
Polarisation	≥ 99,70
Humidity	≤ 0,06%
Reducing sugars	≤ 0,04%
pH	6,5 – 7,5
Aw	0,35 – 0,45

Specifications per type of sugar

EU1 Sugar (Refined White Sugar - Extra White Sugar)

EU1 Sugar - Analytical characteristics

Parameter	Unit	Norm	Method
Appearance	EC point	**≤ 4,0**	Icumsa
Colour (420 nm)	EC point	**≤ 3,0**	Icumsa
Ash	EC point	**≤ 6,0**	Icumsa
Total	EC point	**≤ 8,0**	
Polarisation	(°Z)	**≥ 99,7**	Icumsa
Reducing sugars	%	**≤ 0,040**	Icumsa
Humidity	%	**≤ 0,060**	Icumsa
SO_2	mg/kg	**≤ 10**	Icumsa
Fe	mg/kg	**≤ 0,5**	
Sediment	mg/kg	**≤ 7,0**	

Icumsa : International Commission for Uniform Methods of Sugar analysis

EU1 Sugar – Particle size						
Type	**Product**	**MA (mm)**	**CV**	**Fines % <0,20mm**	**Others**	**Packaging**
Standard	**RTV**	0,4 – 1,0	≤ 50	≤ 5,0		bulk 1000 kg
Medium	**RG**	0,6 – 1,0	≤ 40	≤ 2,0		bulk
Fine	**RT**	0,50 – 0,65	≤ 20	≤ 2,0		bulk
Fine	**RF**	0,4 – 0,6	≤ 40	≤ 5,0		bulk
Coarse	**BD**	1,4 – 3,15	-	≤ 1,0		25 kg
Fine	**ST**	0,45 – 0,65	≤ 35	≤ 2,0		25 kg 1000 kg
Caster Fine	**S2**	0,35 – 0,55	≤ 35	≤ 3,0		25 kg 1000 kg
Caster Ultra-fine	**S1**				>0,63mm : ≤ 0,2% >0,40mm : ≤ 8,0% <0,125mm : ≤ 5,0%	25 kg 1000 kg
Tri-star standard	**G2 (*)**	0,55 – 0,75	≤ 35	≤ 2,0		25 kg
Tri-star powder	**G0 (*)**				<0,10mm: ≥ 80,0%	25 kg

(*) The product complies with the current “Sucrose” Monograph of the European Pharmacopeia.

Pearl Sugar (produced with EU1) – Particle size										
	% > 16 mm	**% > 10 mm**	**% > 8 mm**	**% > 5,6 mm**	**% > 4 mm**	**% > 2,5 mm**	**% > 1,6 mm**	**% > 1,25 mm**	**% > 0,40 mm**	**% < 0,40 mm**
P1	-	-	-	-	-	≤ 8	≥ 80	≤ 11	≤ 3	≤ 2
P1/2	-	-	-	-	≤ 6	30-60	35-62	≤ 6	≤ 3	≤ 2
P2	-	-	-	-	≤ 15	≥ 75	≤ 15	-	≤ 3	≤ 2
P3	-	-	-	≤ 20	≥ 70	≤ 20	-	-	≤ 3	≤ 2
P4	-	-	≤ 15	≥ 70	≤ 20	-	-	-	≤ 3	≤ 2
P4/5	-	≤ 15	≥ 65	≤ 25	-	-	-	-	≤ 3	≤ 2
P5	≤ 7	≥ 75	≤ 16	-	-	-	-	-	≤ 3	≤ 2

EU2 Sugar (White sugar)

EU2 Sugar - Analytical characteristics

	Unit	Norm	Method
Appearance	EC point	**≤ 9,0**	Icumsa
Colour (420 nm)	EC point	**≤ 6,0**	Icumsa
Ash	E point	**≤ 15,0**	Icumsa
Total	EC point	**≤ 22,0**	
Polarisation	(°Z)	**≥ 99,7**	Icumsa
Reducing sugars	%	**≤ 0,040**	Icumsa
Humidity	%	**≤ 0,060**	Icumsa
SO_2	mg/kg	**≤ 10**	Icumsa
Fe	mg/kg	**≤ 0,7**	

Icumsa : International Commission for Uniform Methods of Sugar analysis

EU2 Sugar - Particle size

Type	Product	MA (mm)	CV	Fines % <0,20mm	Others	Packaging
Standard	**K20**	0,4 – 1,0	≤ 50	≤ 5,0		1000 kg Bulk
Medium	**K2**	0,6 – 1,0	≤ 32	≤ 2,0		20 kg 25 kg 1000 kg Bulk
Fine	**K12**	0,55 – 0,70	≤ 25	≤ 2,0	(*)	Bulk
Fine	**K1**	0,4 – 0,6	≤ 40	≤ 5,0		20 kg 25 kg 1000 kg Bulk
Ultra fine	**K11**	0,2 – 0,4	≤ 40	≤ 15,0	<0,125mm : ≤ 5,0%	1000 kg

(*) Indicative fractions:

Rest on sieve %	0,85 mm	0,60 mm	0,50 mm	0,425 mm	0,30 mm	0,20 mm	% <0,20mm
K12	≤ 2,5	≤ 75,0	≤ 50,0	≤ 20,0	≤ 10,0	≤ 2,0	≤ 2,0

EU2+ Sugar (White Sugar EU2+ – High Grade)

EU2+ Sugar - Analytical characteristics			
Parameter	**Unit**	**Norm**	**Method**
Appearance	EC point	**≤ 5,0**	Icumsa
Colour (420 nm)	EC point	**≤ 4,0**	Icumsa
Ash	EC point	**≤ 8,0**	Icumsa
Total	EC point	**≤ 13,0**	
Polarisation	(°S)	**≥ 99,7**	Icumsa
Turbidity (Icumsa)	Icumsa units	**≤ 20**	Icumsa
Reducing sugars	%	**≤ 0,040**	Icumsa
Humidity	%	**≤ 0,060**	Icumsa
Sediment	mg/kg	**≤ 7**	
SO_2	mg/kg	**≤ 6**	Icumsa
Fe	mg/kg	**≤ 0,7**	
Floc		**negative**	
Filterability	min	**≤ 10**	

Icumsa : International Commission for Uniform Methods of Sugar analysis

EU2+ Sugar - Crystals size				
Type	**MA** (mm)	**CV**	**Fines %** <0,20mm	**Packaging**
Standard	0,4 – 1,0	≤ 50	≤ 5,0	bulk 1000 kg

Microbiological characteristics

Organism	Target
Mesophilic bacteria:	< 200/10 g
Yeasts	< 10/10 g
Moulds	< 10/10 g
Enterobacteriaceae	0/1 g
E. Coli	0/1 g
Staphylococcus Aureus	0/1 g
Salmonella	0/25 g
Bacillus Cereus	0/1 g
Clostridium Perfringeas	0/1 g
Aflatoxines	NA
Ochratoxines	NA
Patulin	NA
DON (trichoticene)	NA
T-2 Toxin (trichoticene)	NA

Nutritional Information (per 100 g)

Total Fats	**0**
Total Animal fat	0
Dairy fat	0
Total Vegetable fat	0
Cholesterol	0
Mono-unsaturated fatty acids	0
Poly-unsaturated fatty acids	0
Total Carbohydrates	**100**
Digestible Carbohydrates	> 99,70
Lactose	0
Glucose and fructose	< 0,04
Saccharose	> 99,70
Starch	0
Non-digestible Carbohydrates	0
Total fibres	**0**
Soluble fibre	0
Insoluble fibre	0
Organic acids	0
Alcohol	**0**
Total Proteins	**0**
Total Vegetable protein	0
Total Animal protein	0
Total Milk protein	0
Whey protein	0
Total Ash	< 0,028
Minerals	
Potassium (K)	Traces
Sodium (Na)	Traces
Salt	-
Calcium (Ca)	Traces
Phosphorus (P)	-
Magnesium (Mg)	-
Chlorine (Cl)	Traces
Vitamins	0
Micro-nutrients	
Copper (Cu)	-
Iron (Fe)	< 0,0005
Zinc (Zn)	-
Iodine (I)	-
Water	< 0,06
Energetical value	
kJ/100 g	1700
kcal/100g	400

Typical nutritional labelling according to EC Directive 1169/2011

Energetic values per 100g		
kJ/100 g	1700	
kcal/100g	400	
Fat		0 g
Of which saturated		0 g
Carbohydrates		100 g
Of which sugars (mono- and disaccharides)		100 g
Proteins		0 g
Salt		0 g

Heavy Metals

The term “heavy metals” in relation to food is typically applied to certain inorganic environmental contaminants, such as arsenic, lead, cadmium, mercury, and sometimes nickel. Not all of which are heavy metals in the chemical sense. In order to reduce their level in foods to the lowest level reasonably achievable, for certain foods known to be a risk, such as crustaceans and molluscs, muscle meat of certain fish, and offal, upper tolerable limits have been set.

For sugar, previously existing limits (national and Codex Alimentarius) have been officially withdrawn as they were unwarranted due to the low detected traces, if any.

Nevertheless, the own product portfolio is monitored by regular monitoring. This confirms that residual heavy metals are below or at determination limit (ppb-range).

Due to the facts as stated above, we generally exclude a risk trough heavy metals for sugar supplied by the Raffinerie Tirlemontoise Group.

Pesticides

Pesticides (plant protection products) are used to protect plants and crops before and after harvest from infestation by pests and plant diseases.

Sugar-crops processed in RT plants must have been grown in compliance with the applicable European legislation concerning the authorization and use of plant protection products (Directive 91/414/EEC). This includes the use of pesticides permitted for the intended usage, application in due consideration of good agricultural practice, and diligent field documentation. This ensures that pesticides coming into direct contact with the sugar-crops and having thus the highest potential for leaving residues comply with applicable maximum residue limits as set in Regulation (EC) No 396/2005.

Sugar production includes several purification steps. Within these, sugar (sucrose) is purified and separated from other plant substances. This further reduces the likelihood of pesticide residues in sugar, also for those of other origin than sugar-crops cultivation.

No need for specific maximum residue levels (MRL) for sugar was deemed necessary. The applicable European legislation on maximum residue levels of pesticides in food (Reg. EC No 396/2005) does not define MRL for sugar, but only for sugar plants. Where MRL are not set out for processed food, the MRL for relevant raw material shall apply (Art. 20(1) of the Regulation). For any active substance not mentioned in the respective annexes, the general default MRL (0,01 mg/kg) applies.

Good agricultural practice and sugar processing ensure that pesticides in sugar do not play a role and sugar complies with applicable European legislation on maximum residue levels of pesticides in food. To accommodate to customer demands, compliance is verified by extensive monitoring analyses. Results in sugar supplied by the Raffinerie Tirlemontoise Group are in general below the respective detection limits.

GMO

Raw material for the production of sugar from the Raffinerie Tirlemontoise Group is the sugar beet. Beets processed by RT are not genetically modified.

- This is guaranteed by contracts with the beet growers, who are obliged to obtain and cultivate seed exclusively supplied by RT. This seed is produced using conventional breeding and thus excludes genetically modified seed.
- This is guaranteed by the fact that Belgian law does not allow the use of GMO-based sugar Beets.
- This is guaranteed by the fact that Belgian law only allows the use of beet varieties that are listed on the ‘positive list’ of varieties which does not contain any GMO-based beet varieties; this is controlled by the Ministry of Agriculture.
- This is guaranteed by the fact that all the planters that grow sugar beets are using our seed distribution services or hold controlled certificates for the absence of GMO seeds.

Furthermore RT assures that a risk trough contamination is exluded, based on:

- The fact that all GMO experiments with sugar beets are extremely strongly regulated and controlled by the Ministry of Health and Agriculture and that all test crops are destroyed before the beet campaign with a guarantee against accidental comingling.
- The fact that we received confirmation of all our suppliers of processing aids about the absence of GMO

Based on the above mentioned elements, the Raffinerie Tirlemontoise Group has decided that it is not useful to confirm the absence of GMO-based material in the sugar supplied by RT by using analytical methods in our standard procedures for Quality Control.

RT can confirm that the sugar produced by RT is not affected by labelling obligations according to Regulation EC No 1829/2003 and 1830/2003.

Ionisation - Irradiation

The Raffinerie Tirlemontoise Group guarantees that the produced sugar is not irradiated nor treated with ionizing radiation.

In Europe, irradiation is authorized only for a few, exeptional foodstuffs for microbial control (Directives 1999/2/EC and 1999/3/EC). As sugar is a microbiologically stable product, such a targeted treatment is not required and consequently not permitted.

We can thus confirm that sugar supplied by the Raffinerie Tirlemontoise Group is not irradiated/treated with ionizing radiation.

Microbiology

The production process of sugar includes several steps with influence on the microbiological status. These are especially higher pH values and temperature, in combination with sufficient application times. These technical conditions ensure that ubiquitous microorganisms as well as pathogens are effectively destroyed.

Due to the high purity of sugar, it does not contain nitrogen sources required for the growth of microorganisms. In addition, crystalline sugar has a very low moisture content (below 0,06%) and corresponding water activity (aw value in the range of 0.35 - 0.45). This aw value is below the growth limit of microorganisms (bacteria, yeasts, and moulds). Therefore, high sugar concentrations have an inhibiting effect on the growth of microorganisms, if any.

The very low microbial count is verified by regular routine and monitoring analyses and evidenced by the specification.

Crystalline sugar is generally accepted as a microbiologically stable foodstuff. It is uncritical in view of microbiological spoilage as well as growth. For the same reasons, crystalline sugar does not permit growth of pathogens.

Due to these facts, there has been no need to establish microbiological limits in sugar in the European and international food law; neither for specific pathogens nor for the total bacterial count.

Due to the technical conditions during sugar production and the above-mentioned product specific properties, we exclude a health risk through microbial spoilage or contamination with pathogenic microorganisms for sugar supplied by RT.

Mycotoxins

Mycotoxins are toxic secondary metabolites produced by moulds, mostly belonging to *Fusarium* and *Aspergillus* species.

Crystalline sugar is regarded as microbiologically uncritical foodstuff; it has in general a low count for bacteria, yeasts and moulds. Due to the very low moisture content (below 0,06%) and corresponding water activity (aw value in the range of 0.35 - 0.45), moulds are not able to grow on sugar, when stored under appropriate conditions. In addition, mycotoxins are not produced at these low a_w values.

It was verified by regular monitoring analyses that mycotoxin levels are throughout below detection limit. This is also supported by the fact that there has been no need to establish mycotoxin limits in sugar in the European and international food law.

Due to the facts as stated above, we conclude that mycotoxins are not relevant for sugar. We exclude a risk through mycotoxins for sugar supplied by RT.

Allergens - Intolerances

	Present in end-product?	If present, how much?
Milk Proteins	No	
Lactose	No	
Chicken egg	No	
Soy proteins	No	
Soy lecithin	No	
Gluten	No	
Wheat	No	
Rye	No	
Beef	No	
Pork	No	
Chicken	No	
Fish	No	
Shellfish and crustaceans	No	
Maize / Corn	No	
Cacao	No	
Legumes / Pulses	No	
Nuts - Nut oil	No	
Peanuts - Peanuts oil	No	
Sesame - Sesame oil	No	
Sulphite (E220 - E227)	Yes	< 10 ppm
Coriander	No	
Celery	No	
Carrot / Umbel lifer	No	
Lupine	No	
Mustard	No	
Molluscs	No	
Yeast	No	
Gelatine	No	
Saccharose	Yes	~100%
Glucose - Fructose	Yes	< 0,04%
Glutamate (E620 - E625)	No	
BHA/BHT (E320 - E321)	No	
Benzoic acid (E210 - E213)	No	
Parabenes (E214 - E219)	No	
Azo colours	No	
Tartrazin	No	
Orange yellow	No	
Amarant	No	
Sorbic acid	No	
Cinnamon	No	
Vanillin	No	

Our sugars are suitable for	Note
Ovo-Lacto Vegetarians	
Vegans	
Coeliac	
Lactose Intolerant	
Nut Allergies	
Kosher – Passover	Certificate available
Halal	RT guarantees the absence of pork derivate and alcohol in the sugars produced by our company. Some of the RT products are certified (ref. certificate).

Storage and handling

Properties	Value
Shelf life	Unlimited in specified conditions according to EC directive 2011/1169, Annex X,1.d
Temperature	Recommended conditions: temperature: >10 °C Relative humidity below 65 % (at 20°C)
Relative humidity	50-60 %
Hazardous decomposition products	none
Hazardous polymerization	no
Individual protective measures	no special measures

We recommend not to stack pallets with “SO” sugar (Icing sugar).

Sugar should be stored separate from odorous materials.

Toxicological data

Properties	Value
LD50	29700 mg/kg, Method: RTECS
Skin irritation	no
Eye irritation	no

Fire and explosion data

Properties	Value
Kst value (sugar dust < 100 micron)	140 bar m/s
Minimum ignition temp of the dust cloud (MIT)	350°C
Minimum ignition energy (MIE)	See Material Safety Data Sheet
Lower explosion limit (LEL = MEC)	30 g/m^3
Dust category	St 1
Melting point	ca.187-189°C
Self-heating/spontaneous combustion risk	no
Fire extinguishing media	Water, Carbon dioxide (CO_2), Foam, Dry Powder

Working recommendations

Due to the detonating character of sugar dust in certain circumstances, we recommend to work under the following conditions:

- avoid formation of dust cloud;
- work areas where sugar is handled are to be sufficiently ventilated;
- avoid any potential source of fire in those areas (nude fire);
- Special fire protection:
  - no smoking in storage and process areas
  - good earthing of electrical motors
  - avoid electrical sparks
- Follow the legal requirements related to the material used in those areas.

Ecological hazards

Properties	Value
BOD/COD	1 kg saccharose = 1,2 kg BOD/COD
Measures after spillages	clean up with water
Disposal	waste disposal has to be done according legal requirements

Transportation prescriptions

Hazard symbols

H symbols	none
P symbols	none

Intrastat code	17 01 99 10

Legal requirements

Our sugars comply with:

- Belgian Royal Decree of March 19th 2004 concerning sugars
- European Directive No 2001/111/EU relating to certain sugar intended for human consumption
- Regulation (EU) No 178/2002 laying down the general principles and requirements of food law, establishing the food safety authority and laying down procedures in matter of food safety
- European Regulations (EU) No 1829/2003 and (EU) No 1830/2003 on the authorization, labelling and traceability on genetically modified food and feed and is not subject to a labelling obligation according to these regulations.

All packaging materials used for the sugars produced by Raffinerie Tirlemontoise are materials and articles intended to come into contact with food and comply with the relevant legislations (European Regulation (EU) No 1935/2004, (EU) No 2023/2006 and if applicable: (EU) No 10/2011 on plastic materials and articles intended to come into contact with food).

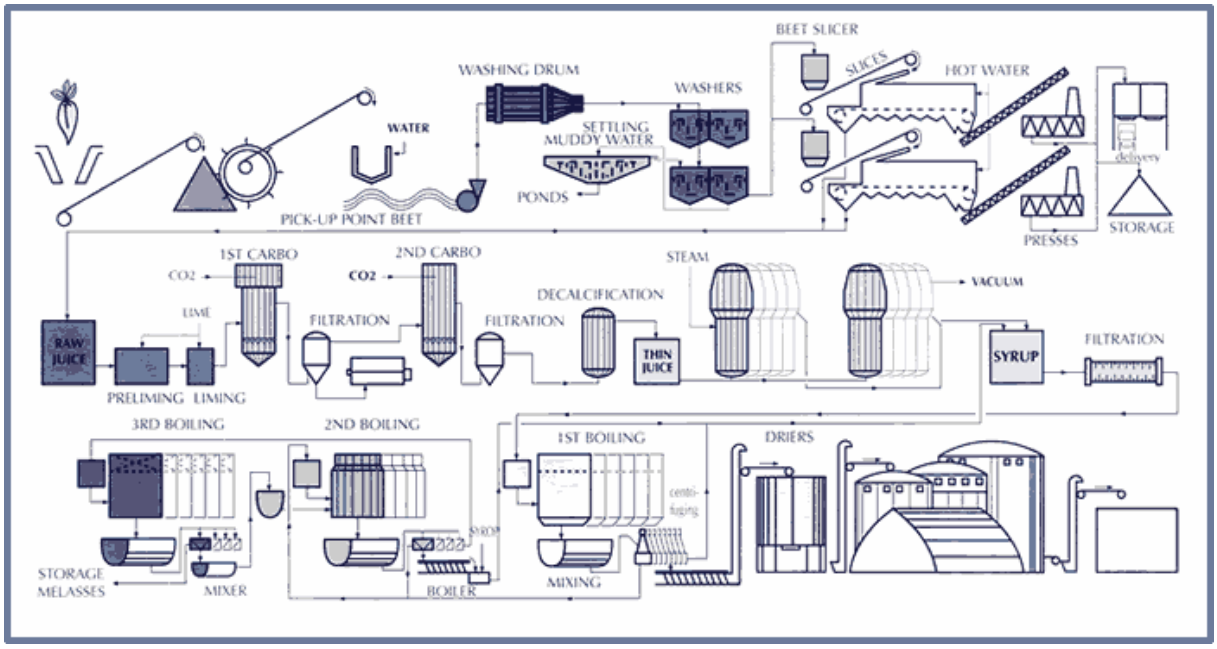
Quality & Food safety Standards

The sugar factories (Tienen and Wanze) of RT are certified by DQS according to the IFS version 6.1 (high level).

Origin

All sugars (white sugar and specialties thereof) produced by the Raffinerie Tirlemontoise Group are produced from sugar beets grown in Europe.

Sugar Production Process



Data production plants

Crisis number: +32 (0) 16 801 393

Data	Tienen	Wanze
Address	Aandorenstraat 1 B-3300 Tienen	Chemin de Meuse 9 B-4520 Wanze
Foundation of plant	1838	1880
TVA/BTW	436.410.522	
Number of employees	>100	>100
AFSCA-FAVV-FASFC registration number	AER/VBR/002015	AER/LIE/002269
Size of sieve opening	**RTV/K20:** 2,5 mm **RF/K1**: 0,8 mm **RT**: 1,12 mm **RG/K2**: 2,5 mm **EU2+:** 2,5 mm **Unsieved sugar**: 4mm **Pearl:** 10x10mm	**K1** : 0,71 x 2,1 mm **K2** : 3x3 + 1,9x5,7mm **K20** : 3x3 mm **K12:** 0,4x1,18 mm **K11:** 0,4x1,18 mm **RTV/EU2+**: 3x3 mm
Pest control frequency	1X/month insects 1X/2months rodents	1X/month insects 1X/2months rodents
Sensitivity of metal detection	**Bags and Bulk** Fe : 2,0 mm Non Fe : 2,0 mm Inox 304L : 2,5 mm **BB** Fe : 2,5 mm Non Fe : 3,0 mm Inox : 3,0 mm	**Bags** Fe : 3,0 mm Non Fe : 3,0 mm Inox 304L : 3,0 mm **BB** Fe : 2,0 mm Non Fe : 2,0 mm Inox: 2,0 mm
Frequency of MD check	Min. 1x/shift	Min. 1x/shift
Magnets	Bulk	Bulk
Frequency of check	1x/shift	1x/shift
Batch number on bags/ pallets	L220yddd00 y = year d = day (001-366)	L222yddd00 + bag number y = year d = day (001-366)
Type of sugar produced	EU1 , EU2, EU2+, Pearl	EU2, EU2+
Type of packaging	Bulk / big bags / bags	Bulk / big bags/ bags

Note: All the above mentioned sugars are produced in these 3 plants, except the G0 and S0 (in 250, 2kg bags and in 25kg with starch), made in Germany.