Fibersse® Polydextrose

a prebiotics dietary fiber – single ingredient, multiple functions.

Manufactured by Runloy Biotech (Shanghai) Co Ltd.

Catalogue

The Fibersse® Polydextrose

Fibersse® Polydextrose Family

Assay	Description
Polymer	90% min
Monomers	
Glucose and sorbitol	6% max
1,6-anhydro-D-glucose	4% max
5-hydroxymethylfurfural	0.1% max
Average degree of polymerization	12

Items	Fibersse® ST	Fibersse® FP	Fibersse® LP	Fibersse® CP	Fibersse® HP
Taste	Bland	Bland	Bland	Bland	Bland
Flavor	Neutral	Neutral	Neutral	Neutral	Neutral
Color	Cream	Cream	Cream	Cream	Cream
Solubility (g/100g@20°C)	80	80	80	80	80
pH (10% Solution)	4.5-6.0	4.5-6.0	3.0-4.5	4.5-6.0	6.0-7.0
Particle Size	Normal	Finer	Normal	Coarse	Normal

Typical Properties

Viscosity	Similar to sucrose
Humectancy	Hygroscopic
Sweetness	Not sweet
Crystallinity	Amorphous and non-crystallizing
Glass transition (Tg)	Approximately 70°C (158°F)
Maillard browning	Under selected conditions
Stability	Excellent pH,temperature and chemical stability
Formula	$(C_6H_{12}O_6)_x$

Storage and handling

Runloy Group recommends that the Fibersse® polydextrose powder products be stored in closed containers in cool, dry place. Store in airtight containers below 40℃ (104℉) will extend the shefl life.

The Fibersse® polydextrose is designed to provide improved handling characteristics. As a result, clumping, bridging and tunneling in storage equipment are eliminated and higher consistent flow rates are obtained. Dusting is reduced during handling and mixing, and the tendency to absorb water is also significantly reduced.

the Fibersse® Functional Benefits

Lowering Calories

With obesity on the rise worldwide, reduced and low calorie diets are perceived as an effective strategy in assisting with weight management. The Fibersse® Polydextrose is a particularly effective ingredient in the development of reduced and low calorie foods and beverages.

The Fibersse® is only partially metabolised by the body and, as a result, it contributes only 25% of the calories of sugar (1 kcal/g versus 4 kcal/g) and only 11% of the calories of fat (9 kcal/g). As a premium bulking agent, the Fibersse® also serves to provide the texture and mouthfeel that is often lost in the process of removing sugar and fat to reduce calories. While it is sugar-free itself, it can be used in combination with other sweeteners to help balance and/or modify the resulting sweetness of foods and beverages.

Reducing & Replacing Sugar

More and more health-conscious consumers are striving to reduce their sugar intake. Manufacturers in the line of Foods and Beverages find the Fibersse® Polydextrose is an effective ingredient used in the development of sugar free, reduced sugar, and no-sugar-added foods and beverages.

A low glycaemic response makes the Fibersse® Polydextrose safe for the diabetic. Studies submitted to the USA FDA on diabetic subjects have confirmed that Polydextrose has minimal effect on serum glucose and insulin levels compared to the ingestion of glucose. Slowly digested carbohydrates can also help to control blood sugar levels and allow consumers to feel satisfied longer. And studies show that the Fibersse®® Polydextrose does not promote tooth decay and it is ideal for use in sugar free foods and beverages.

Lowering Glycaemic Response

Studies indicate that a diet comprised largely of high glycaemic carbohydrates, such as sugars and starches, contributes to Obesity, overweight, and Type 2 diabetes. The Fibersse® Polydextrose elicits very low glycaemic responses, ranging from 4 to 7 compared to glucose at 100. Fibersse® Polydextrose is ideal for developing low glycaemic foods and beverages as it has a minimal impact on blood glucose levels and insulin demand.

Therefore, Fibersse® Polydextrose can be used to replace high glycaemic carbohydrates such as some sugars, starches and maltodextrins in formulations. When used in applications such as confectionery, baked goods, beverages and frozen desserts, Fibersse® Polydextrose can reduce the glycaemic response of these products, and in so doing, it reduces the overall glycaemic load of the finished product.

Preventing Constipation & Diarrhea

The Fibersse® Polydextrose can preserve moisture, accelerate the peristalsis of intestines, soften and enlarge dejecta, and in the end expedite excretion. Obvious curative effect can be seen after 3 days' use.

the Fibersse® Functional Benefits

Prebiotic for digestive health

It is generally accepted that diet and lifestyle play a significant role in mediating digestive disorders which represent a major public health issue. Recent human intervention studies, combined with in vitro and metabolism data, have demonstrated that Fibersse® Polydextrose functions particularly well as a prebiotic, sustaining its impact throughout the length of the colon. This provides food formulators with new options for innovative products targeted at digestive health.

Boosting satiety with less calories

It is well-known that obesity and overweight is caused by an imbalance between energy intake (increasing) and energy expenditure (decreasing). Energy intake is largely determined by satiety (the condition of being full) and satiation (the process of satisfying completely), although social and psychological factors also play a role.

Recent studies show that reduced calorie foods made with Fibersse® Polydextrose impart an increased feeling of fullness — or satiety — allowing consumers to delay the feeling of hunger longer. The same research indicated that these consumers did not overcompensate at their next meal by eating more calories.

Fibersse® Polydextrose is a prebiotic and high in fibre. It is also low calorie, sugar free and low glycaemic. High fibre and low glycaemic foods help to moderate fluctuations in blood sugar levels and suppress hunger for longer. This, in turn, can discourage overeating and may assist with weight management.

This satiating effect represents a new opportunity for food companies to create new reduced calorie products, such as snacks, nutrition bars, baked goods, cereals and beverages, or reformulate existing brands that are also more satisfying to calorie-conscious consumers.

Dietary fiber

Numerous clinical and nutriology studies have demonstrated the health benefits of consuming adequate levels of dietary fibre because fibre does contribute to a balanced gastrointestinal tract and a diet high in fibre may protect against high blood cholesterol, diabetes, heart disease, hypertension, constipation, obesity, diverticulosis, certain forms of cancer, and the growth of intestinal pathogens. But Nutritonists warn that the average daily diet contains less than half of the recommended fibre intake of 25 grams per day.

Fibersse® Polydextrose could significantly boost the fibre content of many foods and beverages, which is a benefit to both consumers and food processors.

Assisting in fat reduction

Many consumers today, leading a healthier lifestyle, learn that obesity and overweight is related to many serious health issues such as heart disease and diabetes. They are striving to control their weight by exercising more and incorporating more nutritious foods into their diets.

As a premium bulking agent, Fibersse® Polydextrose plays an important role in restoring the desirable flavour, texture and mouthfeel that can be lost when reducing or eliminating fat in many foods and beverages. Only 1 kcal per gram and partially metabolised in human digest system, Fibersse® Polydextrose contributes only 11% of the calories of fat and can assist in the development of low fat and reduced fat foods.

the Fibersse® Polydextrose Properties

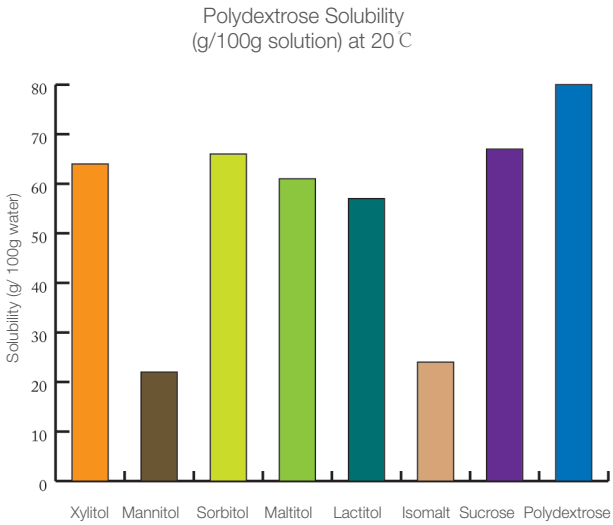
Clean, Neutral Taste

The clean, neutral taste of Fibersse® Polydextrose also helps mask the off-notes that can result from the addition of soy, vitamins, minerals and other supplements found in nutritional products.

High Solubility

Fibersse® Polydextrose has a higher water solubility than most carbohydrates and polyols, allowing up to 80% w/w solutions at 20°C (68°F). This influences the perceived mouthfeel and texture of a certain food product. Solubility can also influence the flavour release from certain food systems such as hard candy. These properties make Fibersse® Polydextrose be an ingredient that can be readily incorporated into a wide range of food and beverage formulations.

Polydextrose is soluble in ethanol and only partially soluble in glycerin and propylene glycol.



Preparation of Aqueous Solutions

Aqueous solutions can be prepared from powder. The rate of solution of the powder depends on the speed and shear of the mixing equipment and manner in which the powder is added to the water. In perparing concentrated solutions, slowly add polydextrose with efficient mechanical desper-sion in hot water (40-60°C). The addition of a second soluble material as a dispersing agent to the dry powder will also facilitate solution.

However, it is often useful to combine the Polydextrose with other dry ingredients prior to dissolution.

Fibersse® CP (Coarse) will give better dissolution speed due to its coarse particle even in cold water.

Good Toleration

A daily consumption of about 50 g of polydextrose, even if consumed as single does, is unlikely to cause gastrointes-tinal effects. The laxative effects of sugar replaces varies between individuals and depends on other factors such as daily diet, mode and frequency of ingestion. The mean laxative does for polydextrose is 90 g per day.

Polydextrose has been assessed by numerous national regulatory authorities and supranational expert groups. Without exception, it was conducted that polydextrose is safe for human use. Both the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the EU Scientific Committee for Food (SCF) allocated an Accept-able Daily Intake (ADI) of “Not Specific” in 1987 and 1990, respectively.

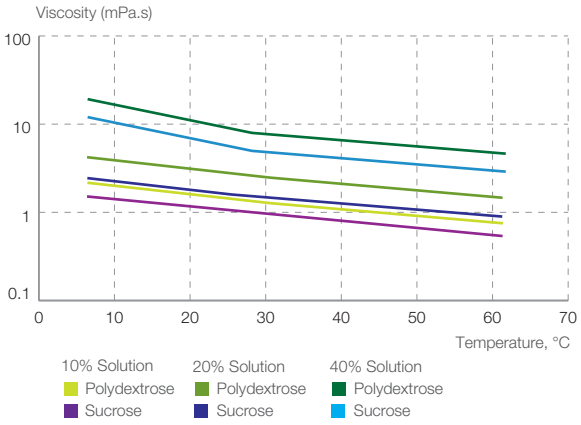
the Fibersse® Polydextrose Properties

Improving Texture & Mouthfeel

In the finished formulation, Fibersse® Polydextrose contributes solids and enhances eating quality.

Fibersse® Polydextrose acts as a humectant to help maintain softness and freshness while also extending shelf life. This is especially important for baked goods. In ice cream and frozen dairy products, the freezing point depression of Fibersse® Polydextrose allows for the correct balance of textural characteristics and serves to create a desirable creaminess and smoothness.

Effect of temperature and concentration on viscosity



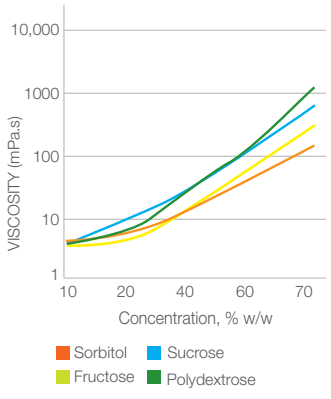
Viscosity

Polydextrose solutions behave as Newtonian fluids. It has a higher viscosity than sucrose or sobitol at equivalent temperatures. This characteristic enables polydextrose to provide the desirable mouthfeel and textural qualities so important when replacing sugars and fats.

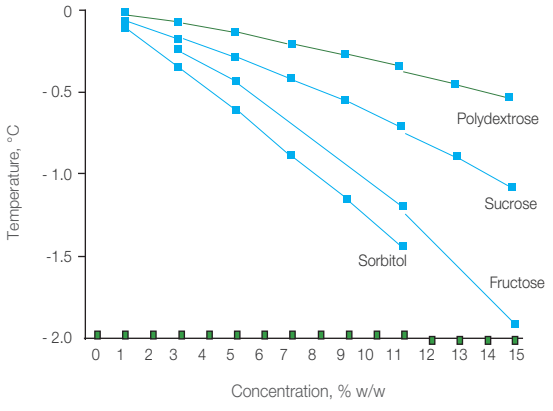
Freezing Point Depression

The freezing point of forzen desserts depends on the soluble constiuents of the mix and will vary with composition. This function is important in achieving creamy, palatable frozen desserts. It enhances scoopability in such as ice cream products, desserts etc..

Viscosity of polydextrose Solution at 25 ℃



Freezing point depression comparison



the Fibersse® Polydextrose Properties

Stability

Fibersse® Polydextrose is stable throughout processing and storage. In various studies, fibre content in a given food was not lost regardless of the heat treatment. In long-term acid-stability testing, Fibersse® Polydextrose has proven to be stable even in low pH systems.

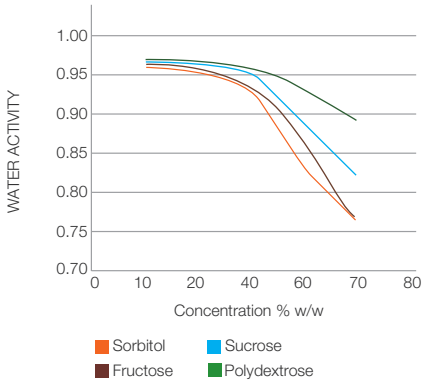
This outstanding stability gives the product a wide variety of potential applications.

Process stability	pH	% Increase in free glucose
Pasteurisation (70℃ for 10 minutes)	3.0-4.5	No significant hydrolysis
UHT (142℃ for 6-10 seconds)	3.0-4.5	No significant hydrolysis
Storage stability- 3 months	pH	% Increase in free glucose
40℃	3.0-4.5	Maximum 1%
20℃	3.0-4.5	Maximum 0.8%
-5℃	3.0-4.5	No significant hydrolysis
-20℃	3.0-4.5	No significant hydrolysis

Water mobility

Lowering water activity reduces microbial growth and is used to manage water migration during product storage. An important function of sucrose or other bulk sweeteners is to control water activity. The below figure shows that the water activity of Fibersse® Polydextrose solutions is similar to the water activity of sweeteners and polyol solutions at concentrations levels up to 20%. At higher concentrations Fibersse® Polydextrose is beneficial to maintain high solids without crystallizing, therefore controlling water effectively. Additionally polymers such as polydextrose immobilise water, thereby lending reduced staling and greater shelf life stability. Fibersse® Polydextrose is particularly functional in many reduced-calorie products where water activity is elevated due to a reduction of other carbohydrates or due to fat reduction. Fibersse® Polydextrose can also reduce the need for other humectants.

Water activity comparison at 25 ℃



the Fibersse® Application Benefits

Functional Property	Benefit
Ice Cream & Frozen desserts	
Freezing point depressant	Reduces ice crystal formation, maintains textural integrity
Bulking agent	Replaces bulk of sugar, part of fat
Increase mix viscosity	Binds water
One calorie per gram	Reduces calories
Replace sugar	Reduces calories
Viscosity increase and water binding	Enhances mouthfeel
Baked goods and bakery mixes	
Humectant	Maintains moisture
Bulking agent	Replaces solids, improves texture
Maillard browning	Develops flavor and color
Replace sugar	Reduces calories
Texturizer	Improves volume, crumb and cell structure
Reduce water activity	Increases microbial stability
Candy and confections	
One calorie per gram	Reduces calories
Non-crystallizing	Soluble replacement for corn syrups and sucrose
Non-cariogenic	Tooth friendly
Humectant	Maintains moisture, improves shelf life
Bulking agent	Replaces solids
Bodying agent	Replaces sweeteners improves texture
Replace sugar	Reduces calories
Yogurts & Dairy Drinks	
Similar rheology to glucose/fructose syrups	Brings smooth texture
Sweetening synergy with regular sugars	Optimizes sweetness profile expression of fruit flavour
No impact on starch gelatinization	No impact on cooking process

Functional Property	Benefit
Cereal Bars	
Binding properties	Guarantees cohesion
Glucose syrup replacer	Sugar and calorie reduction
Texturiser	Allows texture adjustment (from soft to hard)
Humectant	Maintains moisture
Bulking agent	Replaces solids, improves texture
Texturizer	Improves volume, crumb and cell structure
Cookies & Biscuits	
Easy sugar replacement	Sugar and calorie reduction
Texturiser	Improves volume, crumb and cell structure
Cooking time and temperature reduction	Decreases processing cost
Hot Instant Drinks	
Positive impact on flavour	Helps to balance flavour
Glucose syrup replacer	Helps to maintain viscosity
Bodying agent	Enhances mouthfeel
Beverages	
Viscosity increase	Keeps beverages transparent
Sweetening synergy with regular sugars and/or high intensity sweeteners	Optimizes sweetness profile
Jams/Ketchup & Red/Brown Sauces	
Texturiser	Maintains texture
Translucent	Preserves visual appearance
Stable in acid conditions	Improves shelf life
Confectionery	
Non crystallizing	Helps to optimize the texture
Non cariogenic	Keeps teeth healthy
Bodying agent	Replaces sweeteners improves texture

* The above applications is to explain how the Fibersse® Polydextrose perform in some applications of almost all kinds of food applications. The next part of this brochure will show more applications for your information. Or contact with Runloy Group by sales@runloy.com

** Please consulate the local regulations for application approvals.

the Fibersse® Applications

Beverages

Fibersse® Polydextrose add value and consumer appeal to beverage products and its nutritional benefits in these products are widely appreciated. It is used to creat fibre enriched products and is a proven prebiotic. Beverages can incorpora Fibersse® Polydextrose as a fibre in order to improve the nutritional profile. In combination with intense sweeteners or caloric sweeteners, it can be used to replace sugar in beverage products to achieve a reduction in calories and glyceamic load.

The viscosity of Fibersse® Polydextrose means that the desired mouthfeel can be achieved that is especially important for non carbonated drinks. It has excellent stability in low pH conditions. The viscosity also means Fibersse® Polydextrose could be used well in clear beverage as fibre source.

Chocolate

Fibersse® Polydextrose can replace sucrose in chocolate yet provide a warm, creamy texture without a mouth-cooling effect or a scratchy aftertaste.

Factors impacting the taste and mouthfeel of chocolate include the sweeteners, melting point, heat of solution and solubility of the sugar substitute. Sweetness can easily be manipulated by the appropriate addition of intense sweeteners. Products with low solubility however will give rise to a gritty mouthfeel, and those with a significant negative heat of solution will give rise to a cooling effect which is not typical in chocolate. The polydextrose may be used in combination with polyols to overcome some of these taste considerations by providing a warm, creamy texture in the chocolate matrix without contributing a mouth cooling effect or scratchy aftertaste.

Fibersse® polydextrose also helps to balance the falvour profile amounts of caramel during processing. Its low residual acidity ensures that the delicate cocoa and sweet flavours are brought forward and maintained.

Ice cream & Frozen desserts

A high viscosity and freezing point depression allow Fibersse® Polydextrose to replace sugar and fat and still provide creamy, smooth and highly palatable desserts. When used in combination with other ingredients it is possible to produce no added sugar, fat-free formulations to a very high quality. It exhibits a flavourable effects in lowering the freezing point of a mix, and modification of textual qualities such as hardness and softness may be achieved by using combination of polydextrose with other sugars or polyols. In combination with intense or bulk sweeteners, polydextrose may be used to impact the correct degree of sweetness or allow sweetness to be adjusted over a wide range.

the Fibersse® Applications

Baked Goods

Fibersse® Polydextrose replaces sugars and some of fat in baked goods applications. Its humectant properties and water activity allow shelf life to be maintained or extended, either by sustaining a moisture level or preventing moisture migration. that can extend the shelf life of baked goods. In the baking process, Fibersse® Polydextrose undergoes Maillard browning similarly to sucrose under selected conditions.

Nutrition Bars and Cereals

Fibersse® Polydextrose is widely used to improve the nutritional profile of nutrition bars and cereals, such as reducing the sugar, fat and caloric content and lowering the product's glycaemic response. The typical applications are light or diet bars.

Low Calories Chewing Gums

High stability and viscosity of Fibersse® Polydextrose provides chewing gums manufacturers a new opportunity to produce low calories chewing gums. But studies show that too much Fibersse® will contribute fragile eating quality.

Fruit Spreads & Fillings

High water solubility and viscosity mean that Fibersse® Polydextrose can be used to replace sugar and build solids in fruit spreads and fillings.

Confectionery

A combination of high water solubility and high viscosity means that Fibersse® Polydextrose can be used to make hard or chewy candies that are sugar free yet good to eat.

Cultured Dairy

Even at low usage levels, Fibersse® Polydextrose lends thickness and viscosity to yoghurts and soft cheeses without gumminess, contributing to a pleasant body and creamy mouthfeel.

Fibre Enriched Wine & Beer

High stability, water solubility, clean taste and multiple health functions mean that Fibersse® Polydextrose can be used in various kinds of fibre enriched wine or beer. Fibersse® Polydextrose could enhance the soluble fibre in wine or beer, contributing to multiple health functions and enhancing the mouth-feel.

Health Care Products

High water solubility, clean taste and multiple health functions mean that Fibersse® Polydextrose powder can be made into many health care products, such as instant drink and/or solid granule drink - 100% pure or mixed with other nutrition ingredients and sweeteners.

Pharmaceuticals

Although Polydextrose is used in a wide range of pharmaceutical formulations, its primary use is in solid dosage forms. In tableting, Polydextrose solutions can be used as binders in wet granulation processes and may also be used in conjunction with other materials as a film and tablet coating agent. Polydextrose is used in the manufacture of directly compressible tableting excipients.

Besides above applications, Fibersse® Polydextrose can be used in almost all foods, such as instant noodles, soup, salad dressing etc., to enhance health functions, texture, mouth-feel etc..*

* On August 21, 2007, the FDA amended 21 CFR 172.841 and expanded its approval of Polydextrose for use as a bulking agent, formulation aid, humectant, and texturizer in all foods with the exceptions of meat, poultry, baby foods and infant formula.

Polydextrose Regulatory Status

Status as a food additive

USA: Food and Drug Administration (FDA regulation 21 CFR 172.841) approved polydextrose for use in the following applications: Frozen dairy desserts, sweet baked goods and mixes, confections and frostings, salad dressings, gelatins, puddings and fillings, hard and soft candy, chewing gum, fruit spreads, peanut spread, sweet sauces, toppings and syrups. An energy value of 1 kcal/g is allowed under NLEA (Nutrition Labeling and Education Act).

Europe: In the European Union, polydextrose is approved for use as a food additive under Annex I of the Miscellaneous Additives Directive. This approval permits polydextrose in almost all food and beverage categories to be used according to Good Manufacturing Practices (GMP) with no specified maximum daily use. In the EU, polydextrose may be labelled as "polydextrose" or "E1200". Whilst a single caloric value for polydextrose is not currently published/approved at the EU level, the value of 1 kcal/g is accepted throughout the EU.

Japan: Ministry and Health and Welfare (MOHW) recognises polydextrose conform the generally accepted Japanese definition of dietary fibre (DF), and are widely used in fibre enriched health beverages and other functional foods. As dietary fibre is excluded for the calculation of the caloric value of foods, the caloric value of polydextrose is regarded as 1 kcal/g (75% DF).

Australia/New Zealand: Approved for use in the following applications: Confectionery and chewing gum, baked goods, custard powder/mix, dairy based desserts, dairy ice mix, dessert mix, frozen/ice confection, reduced/low fat ice cream and yogurt. An energy value of 1 kcal/g is accepted.

JECFA: Polydextrose has evaluated by the FAO/WHO's Joint Expert Committee on Food Additives (JECFA) which allocated an ADI "not specified".

China: As per GB2760 the food additive hygiene standard (1997-2006 supplementary category inclusive) issued by the Secretariat of National Food Additive standardized technology Bureau, the Nutrition and Food Safety Department of China Disease Prevention and Control Centre, Polydextrose is approved for use in bakery, confectionary, salad dressing, cake, ice cream, ice lolly, pectin, gum base in accordance to the production need. Polydextrose is also approved for use in beverage (liquid or solid base) with maximum usage as 25-50g/kg.

Labeling as Dietary Fibre

It is important for individual food manufacturers to satisfy the consumers on the regulatory status of polydextrose as a dietary fiber and the appropriateness of the food labels. We provide the following summary for your information only:

Australia: Polydextrose is approved as dietary fiber.

China: Approved by GB2760 the food additive hygiene standard (1997-2006 supplementary category inclusive) as soluble fiber in beverage (liquid or solid base).

EU: There is no formal definition of fiber. Provisions at national level will apply. We believe that polydextrose can be declared as dietary fiber in the following countries: Austria, Belgium, Czech Republic, Finland, France, Germany, Italy, Netherlands, Poland, Spain and the United Kingdom.

Japan: Polydextrose is widely used in fiber-fortified foods and approved under the Japanese Food for Specified Health Use (FOSHU) regulations for the claim 'provides improved intestinal function'.

US: The US permits the declaration of soluble fiber in the nutrition facts, however the FDA has not definitively issued guidelines on soluble fiber.

Due to its minimal digestibility polydextrose also functions as a dietary fibre. Polydextrose is recognised as a dietary fibre in the following countries and regions: Argentina, Australia, Austria, Belgium, Brazil, Brunei, Czech Republic, Finland, France, Indonesia, Italy, Japan, Malaysia, Mexico, New Zealand, Norway, Peoples Republic of China, Philippines, Poland, Russia, Singapore, South Korea, Taiwan, Thailand, United Kingdom, USA, Vietnam and India. Broader approval is currently being sought Worldwide.

Polydextrose Regulatory Status

Labeling and laxative statements

EU: When used as a food additive polydextrose should be declared in the ingredients list by its category name (bulking agent, thickener/texturizer, stabilizer, humectant) accompanied by the product name or E number (polydextrose or E1200). It can be declared as dietary fiber in the nutrition panel in most European countries (see page 13).
US: It simply needs to be declared in the ingredients list as polydextrose and the fiber content added to the nutrition panel.

Mean laxative levels for polydextrose: A sufficiently high level of polydextrose may have a laxative effect for some individuals. The mean threshold for polydextrose as agreed by the Joint Expert Committee on Food Additives (JEFCA) and by the former European Scientific Committee for Food (SCF) is 90g per day or 50g as a single dose for adults.

Some jurisdictions require a laxative warning statement when certain levels are exceeded and manufacturers are advised to check. The following applies to the EU and the US only:

EU: There is no legal requirement for a laxative warning statement for polydextrose. Notwithstanding this the polydextrose threshold quoted above still applies.

US: When a single serving of food contains more than 15 grams polydextrose, the food label must bear the following statement: 'Sensitive individuals may experience a laxative effect from excessive consumption of this product'.

This brochure is only for your internal information. Any kinds of external distribution or busienss purpose is forbidden. And Winway does not invloved in any issues caused by any distribution and/or business purpose.

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