

**File No. Reg/Processing Aid/Ext/FSSAI-2021**  
**Food Safety and Standards Authority of India**  
**(A Statutory body under Ministry of Health and Family Welfare)**  
**(Regulatory Compliance Division)**  
**FDA Bhavan, Kotla Road,**  
**New Delhi-110 002**

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Dated, the...<sup>2<sup>nd</sup></sup> July, 2021


**Subject: Direction under Section 16(5) of FSS Act regarding compliance w.r.t. Processing Aids under Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011-reg.**

FSSAI has notified a list of processing aids permitted in various food products vide gazette notification No. Std/Processing aids/Notification/FSSAI/ 2018 dated 09<sup>th</sup> October, 2020. Subsequently, an amendment to these regulations have also been notified vide notification No. 1-116/Scientific Committee/Notif.27/2010-FSSAI(E) dated 04.03.2021. Further, as per FSSAI's order dated 22.06.2021 (*Copy attached for reference*), the timeline for compliance of the above mentioned notifications dated 09.10.2020 and 04.03.2021 has been extended up to 1<sup>st</sup> January, 2022.

2. Further, in addition to above, some other processing aids are still under consideration by the FSSAI. A final decision on these and their inclusion in the principal regulation through a suitable amendment will require some more time. A list of such processing aids is at Annexure-I. However, considering the fact that these processing aids are already in use by FBOs, it has been decided to allow the use of all such processing aids by the food businesses till the time appropriate amendments on the same are gazette notified.

3. Accordingly, the **Commissioner of Food Safety of all States/UTs** and all central Licensing Authorities are hereby directed not to take any punitive action on FBOs for using the processing aids as listed in Annex-I till the time amendments on the same are brought in place.

4. This issues with the approval of the Competent Authority in exercise of power vested under Section 16(5) of Food Safety and Standards Act, 2006.

  
(Inoshi Sharma)  
Executive Director (CS)

**Encl: As above**

To

1. **Commissioner of Food Safety of all States/UTs,**
2. **All Regional Directors, FSSAI**
3. **All Central Licensing Authorities, FSSAI**

**Copy to:** CITO- For placing on FSSAI's website for information of the public.

**List of processing aids recommended for inclusion under Appendix C of the FSS (Food Product Standards and Food Additives) Regulations**

S.No.	Name of processing aid	INS No. (if any)	Product category (Source in case of enzymes)	Table/Category of Appendix C
1.	Polysorbate sorbitan monolaurate		Sugar	Table 1: Antifoaming agents
2.	Polydimethyl siloxane	900 a	Alcoholic beverages	Table 1: Antifoaming agents
3.	Diatomaceous earth		Honey, non-alcoholic beverages, sharbat, sugar syrups, synthetic syrups and fruit syrups	Table 3: Clarifying agents and Filtration aids
4.	Co-extruded polystyrene and polyvinyl polypyrrolidone		Alcoholic beverages including low alcoholic and alcohol-free counterparts	Table 3: Clarifying agents and Filtration aids
5.	Acid clays of montmorillonite		Oils	Table 3: Clarifying agents and Filtration aids
6.	Calcium oxide	529	Preparation of corn flour	Table 3: Clarifying agents and Filtration aids
7.	Phosphoric acid	338	Sugar	Table 3: Clarifying agents and Filtration aids
8.	Sunflower oil		Salts, spices, sauces, salads, protein products, seasonings, fruits & vegetable products, nuts & nut products, cereal	Table 4: Lubricants, release and antisticking agents
9.	Tricalcium phosphate	341(iii)	Flavourings, Snacks	Table 4: Lubricants, release and antisticking agents
10.	Cocoa powder		Chocolates	Table 4: Lubricants, release and antisticking agents
11.	Talc	553(iii)	Confectionery and gums	Table 4: Lubricants, release and antisticking agents
12.	Cottonseed oil		Fruits and vegetables; Seasonings, Bakery products, Fruits & Vegetable Products, salt, spices and soups, Cereal and cereal products, Nuts & Nut products	Table 4: Lubricants, release and antisticking agents
13.	Magnesium hydrogen carbonate	504(ii)	Snacks	Table 4: Lubricants, release and antisticking agents

				antisticking agents
14.	Calcium oxide	529	Dried Ginger; whole and powder (unbleached or bleached)	Table 7: Bleaching, washing, denuding and peeling agents
15.	Phospholipase A2 (EC 3.1.1.4)		<i>Aspergillus niger</i>	Table 11: Enzymes
16.	Beta-amylase (EC 3.2.1.2)		Soybean	Table 11: Enzymes
17.	Oryzin (EC 3.4.21.63)		<i>Aspergillus melleus</i>	Table 11: Enzymes
18.	Aspergillopepsin I (EC 3.4.23.18)		<i>Aspergillus niger</i> <i>Aspergillus oryzae</i>	Table 11: Enzymes
19.	Aspergillopepsin II (EC 3.4.23.18)		<i>Aspergillus niger</i>	Table 11: Enzymes
20.	Thermolysin (EC 3.4.24.27)		<i>Bacillus stearothermophilus</i> <i>Geobacillus caldoproteolyticus</i>	Table 11: Enzymes
21.	Metalloproteinase (Metalloendopeptidase/ Bacillolysin) (EC 3.4.24.28)		<i>Bacillus subtilis</i>	Table 11: Enzymes
22.	Glutaminase (EC 3.5.1.2)		<i>Bacillus amyloliquefaciens</i>	Table 11: Enzymes
23.	Protein glutaminase (EC 3.5.1.44)		<i>Chryseobacterium proteolyticum</i>	Table 11: Enzymes
24.	Activated carbon		Alcoholic beverages (Adsorbent, decolorizing agent)	Table 12: Generally permitted processing aid
25.	Gibberellic acid		Grain Processing steps for fermentation (alcoholic beverages)	Table 12: Generally permitted processing aid
26.	Calcium Hypochlorite		Water treatment (As disinfectant at 1 mg/kg residual level as available chlorine)	Table 12: Generally permitted processing aid

**Table 11A: Enzymes derived from Genetically Modified Microorganisms/Sources**

S.No.	Enzyme Name	Production Organism	Donor Organism	Functional and technological purpose	Indicative food uses
1.	Glucose oxidase (EC No.1.1.3.4)	<i>Aspergillus oryzae</i>	<i>Aspergillus niger</i>	Dough Stabilizer	Baking and other cereal-based processes (bread, pasta, noodles, snacks)
2.	Glucose oxidase (EC No.1.1.3.4)	<i>Aspergillus niger</i>	<i>Penicillium chrysogenum</i>	Dough Stabilizer, food preservative, color stabilizer and for reduced alcohol wine production	Bakery products and other cereal based products (e.g. pasta, noodles, snacks), Egg processing, Fruit and vegetable processing, Production of beer and other cereal based beverages
3.	Peroxidase (EC No. 1.11.1.7)	<i>Aspergillus niger</i>	<i>Marasmius scorodoni.</i>	Preservation of raw milk, yoghurt, and cheese	Dairy processing (whey processing), Production of bakery products
4.	Phosphatidylcholine-sterol O-acyltransferase (EC No. 2.3.1.43)	<i>Bacillus licheniformis</i>	<i>Aeromonas salmonicida</i>	Modification of phospholipids to lyso-phospholipids and cholesterol ester	Baking, Dairy, Egg Processing, Fats and Oils Processing, Meat processing
5.	1,4-alpha-glucan branching (EC No. 2.4.1.18)	<i>Bacillus subtilis</i>	<i>Rhodothermus obamensis</i>	Converts amylose into amylopectin	Starch processing
6.	4- $\alpha$ -glucanotransferase (amylomaltase) (EC No. 2.4.1.25)	<i>Bacillus amyloliquefaciens</i>	<i>Thermus thermophilus</i>	Modification of the structural properties of starch to mimic fat.	Starch processing
7.	Lipase triacylglycerol (EC No. 3.1.1.3)	<i>Aspergillus niger</i>	<i>Fusarium culmorum</i>	Improvement of texture of fat in bakery products, flavour modification,	Production of bakery products Dairy processing

				interesterification of fats, degumming of oils and fats	Oils and fats processing
8.	Lipase triacylglycerol (EC No. 3.1.1.3)	<i>Kluyveromyces lactis</i>	<i>Calf, goat, lamb</i>	Improvement of texture of n bakery products, flavour modification, interesterification of fats, degumming of oils and fats	Production of bakery products Dairy processing Oils and fats processing
9.	Lipase triacylglycerol (EC No. 3.1.1.3)	<i>Hansenula polymorpha</i>	<i>Fusarium heterosporum</i>	Improvement of texture of bakery products, modifying egg yolk for use in cake preparation and degumming of oils and fats	Production of Bakery products, Egg Processing, Fats and Oils Processing
10.	Lipase triacylglycerol (EC No. 3.1.1.3)	<i>Aspergillus niger</i>	<i>Candida antarctica</i>	Degumming of oils and fats	Oils & Fats processing
11.	Lipase triacylglycerol (EC No 3.1.1.3)	<i>Aspergillus oryzae</i>	<i>Humicola lanuginosa and Fusarium oxysporum</i>	Improvement of texture of bakery products, flavour modification, modifying egg yolk for use in cake preparation interesterification of fats, degumming of oils and fats	Bakery and other cereal-based products(bread, pasta, noodles, snacks), Brewing and other cereal-based beverages, Egg processing Oils & Fats processing
12.	Lipase triacylglycerol (EC No 3.1.1.3)	<i>Aspergillus oryzae</i>	<i>Fusarium oxysporum</i>	Improvement of texture of bakery products, flavour modification, modifying egg yolk for use in cake preparation interesterification of fats, degumming of oils and fats	Bakery and other cereal-based products (bread, pasta, noodles, snacks)  Egg processing, Brewing and other cereal-based beverages
13.	Lipase triacylglycerol (EC No 3.1.1.3)	<i>Aspergillus oryzae</i>	<i>Thermomyces lanuginosus</i>	Improvement of texture of bakery products, flavour modification,	Bakery and other cereal-based products (bread, pasta,

				modifying egg yolk for use in cake preparation, interesterification of fats, degumming of oils and fats	noodles, snacks), Brewing and other cereal-based beverages Egg processing Oils & Fats processing
14.	Lipase triacylglycerol (EC No 3.1.1.3)	<i>Aspergillus oryzae</i>	<i>Rhizomucor miehei</i>	Interesterification of fats, degumming of oils and fats	Oils & Fats processing
15.	Phospholipase A2 (EC No 3.1.1.4)	<i>Aspergillus niger</i>	<i>Porcine pancreas</i>	Oil degumming	Production of bakery products , Egg processing, Oils and fats processing ,
16.	Lysophospholipase (EC No 3.1.1.5)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Dough stabilizer, Improvement of texture of bakery products, enhance filtration rate of syrups, Degumming of oils & fats	Bakery and other cereal-based products (bread, pasta, noodles, snacks) Starch based products Oils & Fats processing
17.	Pectin esterase (EC No 3.1.1.11)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Juice extraction, concentration and clarification of fruit juices, gelation of fruit, and to modify texture and rheology of fruit and vegetable-based products	Fruit and vegetable products, Flavouring production
18.	Pectin esterase (EC No 3.1.1.11)	<i>Aspergillus oryzae</i>	<i>Aspergillus aculeatus</i>	Juice extraction, concentration and clarification of fruit juices, gelation of fruit, and to modify texture and rheology of fruit and vegetable-based products	Fruit and Vegetable products
19.	Phospholipase A1 (EC No 3.1.1.32)	<i>Aspergillus oryzae</i>	<i>Fusarium venenatum</i>	To modify the functionality of dairy products and its ingredients	Milk and dairy based products

20.	Phospholipase A1 (EC No 3.1.1.32)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	De-gumming of oils & fats	Oils and fats processing
21.	Phospholipase A1 (EC No 3.1.1.32)	<i>Aspergillus niger</i>	<i>Talaromyces leycettanus</i>	De-gumming of oils & fats	Oils & Fats processing
22.	3-phytase (EC No 3.1.3.8)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i> ( <i>A. niger</i> also include <i>A. tubingensis</i> )	Phytate reduction in cereals and legumes	Bakery products and other cereal and legume based products (e.g. pasta, noodles, snacks), Soy Sauce
23.	Phospholipase C (EC No 3.1.4.3)	<i>Pichia pastoris</i> now renamed as <i>Komagataella phaffii</i> (see attached explanation)	Soil	De-gumming of oils & fats	Oils and fats processing
24.	Phospholipase C (EC No 3.1.4.3)	<i>Bacillus licheniformis</i>	<i>Bacillus thuringiensis</i>	De-gumming of oils & fats	Oils & Fats processing
25.	Phosphoinositide phospholipase C (EC No 3.1.4.11)	<i>Pseudomonas fluorescens</i>	Soil	De-gumming of oils & fats	Oils and fats processing
26.	Phosphoinositide phospholipase C (EC No 3.1.4.11)	<i>Bacillus licheniformis</i>	<i>Pseudomonas</i> sp-62186	De-gumming of oils & fats	Oils & Fats processing
27.	Alpha - amylase (EC No 3.2.1.1)	<i>Bacillus subtilis</i> .	<i>Alicyclobacillus pohliae</i>	Antistaling agent in combination with lipase	Bakery products
28.	Alpha -amylase (EC No 3.2.1.1)	<i>Bacillus licheniformis</i>	<i>Bacillus licheniformis</i>	Liquefaction and thinning of starch, fermentation,	Brewing, Potable alcohol production, Grain/Carbohydrate, Non-Alcoholic Beverages, and bakery products
29.	Alpha - amylase (EC No 3.2.1.1)	<i>Bacillus licheniformis</i>	<i>Geobacillus stearothermophilus</i>	Liquefaction and thinning of starch, fermentation,	Processing of starch for baking and brewing

					processes
30.	Alpha -amylase (EC No 3.2.1.1)	<i>Bacillus licheniformis</i>	<i>Cytophaga sp.</i>	Liquefaction and thinning of starch, fermentation,	Processing of starch for baking and brewing processes
31.	Alpha -amylase (EC No 3.2.1.1)	<i>Bacillus licheniformis</i>	<i>Bacillus licheniformis</i>	Starch processing into dextrins and of oligosaccharides. High DE-maltodextrin production	Processing of starch for baking and brewing and other processes.
32.	Alpha -amylase (EC No 3.2.1.1)	<i>Pseudomonas fluorescens</i>	<i>Thermococcales</i>	Starch processing into dextrins and oligosaccharides and high DE-maltodextrin.	Processing of starch for baking, brewing and fermentation
33.	Alpha -amylase (EC No 3.2.1.1)	<i>Bacillus licheniformis</i>	<i>Geobacillus stearothermophilus</i>	Starch processing into dextrins and oligosaccharides and high DE-maltodextrin.	Processing of starch for baking, brewing and fermentation
34.	Alpha -amylase (EC No 3.2.1.1)	<i>Aspergillus niger</i>	<i>Rhizomucor pusillus</i>	Starch processing into dextrins and oligosaccharides and high DE-maltodextrin.	Processing of starch for baking, brewing and fermentation and other processes
35.	Beta-amylase (EC No 3.2.1.2)	<i>Bacillus licheniformis</i>	<i>Bacillus flexus</i>	Starch processing into maltose	Starch processing for maltose-based syrups
36.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Trichoderma reesei</i>	<i>Trichoderma reesei</i>	Processing of polysaccharides and oligosaccharides for improved fermentation and liquefaction.	Brewing, fermentation and starch liquefaction and saccharification
37.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Aspergillus niger</i>	<i>Gloeophyllum trabeum</i>	Processing of polysaccharides and oligosaccharides for improved brewing fermentation, clarification and starch liquefaction. , starch liquefaction and	Brewing, fermentation and starch liquefaction and saccharification



				Saccharification	
38.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Processing of polysaccharides and oligosaccharides for improved brewing fermentation, clarification and starch liquefaction	Brewing, fermentation and starch liquefaction and saccharification
39.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Aspergillus niger</i>	<i>Talaromyces emersonii</i>	Processing of polysaccharides and oligosaccharides for improved brewing fermentation, clarification and starch liquefaction	Brewing, fermentation and starch liquefaction and saccharification processes
40.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Aspergillus niger</i>	<i>Trametes cingulata</i>	Processing of polysaccharides and oligosaccharides for improved brewing fermentation, clarification and starch liquefaction and Saccharification	Brewing, fermentation and starch liquefaction and saccharification processes
41.	Glucan 1,4 $\alpha$ glucosidase or (Glucoamylase or Acid maltase) (EC No 3.2.1.3)	<i>Aspergillus niger</i>	<i>Penicillium oxalicum</i>	Processing of polysaccharides and oligosaccharides for improved brewing fermentation, clarification and starch liquefaction and Saccharification	Brewing, fermentation and starch liquefaction and saccharification
42.	Cellulase (EC No 3.2.1.4)	<i>Trichoderma reesei</i>	<i>Aspergillus fumigatus</i>	Hydrolysis of amorphous cellulose,	Brewing
43.	Cellulase (EC No 3.2.1.4)	<i>Trichoderma reesei</i>	<i>Penicillium emersonii</i>	Hydrolysis of amorphous cellulose. Saccharification	Brewing
44.	Beta-glucanase (endo-beta glucanase or	<i>Bacillus subtilis</i>	<i>Bacillus subtilis</i>	Hydrolysis of beta-glucans, to improve the	Brewing processes,

	endo-1,3-beta glucanase) (EC No 3.2.1.6)			brewing properties of beer	
45.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Hydrolysis of plant carbohydrates to improve quality of bakery products (firmness, stiffness, consistency and others)	Bakery and other cereal based products
46.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Aspergillus oryzae</i>	<i>Humicola lanuginosus</i>	Dough Stabilizer, Enhancing loaf volume, enhance crumb structure and bloom	Bakery products
47.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Bacillus subtilis</i>	<i>Bacillus subtilis</i>	Dough Stabilizer, Enhancing loaf volume, enhance crumb structure bloom and Loaf softening	Bakery products
48.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Trichoderma reesei</i>	<i>Talaromyces leycettanus</i>	To improve filtration in brewing, Starch liquefaction and enhance oil extraction from grain	Baking, Brewing and oil extraction
49.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Aspergillus niger</i>	<i>Rasamsonia emersonii</i>	Dough Stabilizer, Enhancing loaf volume, crumb structure, bloom and Loaf softening, Improving filtration in brewing, Starch liquefaction	Bakery products, Production of beer and other cereal based beverages
50.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Trichoderma reesei</i>	<i>Aspergillus niger</i>	Dough Stabilizer, Enhancing loaf volume, crumb structure, bloom and Loaf softening, To improve filtration in brewing, Starch liquefaction	Brewing, Baking products  Potable alcohol production, Non-Alcoholic Beverages
51.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Aspergillus oryzae</i>	<i>Aspergillus aculeatus</i>	Dough Stabilizer, Enhance loaf volume, crumb structure, bloom and Loaf	Baking Brewing and other cereal-based beverages,

				softening, To improve filtration in brewing, Starch liquefaction	Starch processing
52.	Endo-1,4-beta-xylanase (EC No 3.2.1.8)	<i>Bacillus licheniformis</i>	<i>Bacillus licheniformis</i>	Dough Stabilizer, Enhancer of loaf volume, enhance crumb structure, bloom and Loaf softening, Starch liquefaction	Baking and Brewing processes, Grain treatment
53.	Endo-Polygalacturonase (Pectinase) (EC No 3.2.1.15)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Extraction and Clarification of juice from fruits and vegetables, Extraction of flavors	Fruit and vegetable processing, Flavouring production
54.	Alpha-glucosidase (EC No 3.2.1.20)	<i>Trichoderma reesei</i>	<i>Aspergillus niger</i>	Aids in fermentation, Hydrolysis of terminal, non-reducing (1 ~4)-linked alpha-D-glucose residues with release of alpha-D-glucose	Brewing and starch processing,
55.	Alpha-glucosidase (EC No 3.2.1.20)	<i>Trichoderma reesei</i>	<i>Aspergillus niger</i>	Fermentation aid, Hydrolysis of terminal, non-reducing (1 ~4)-linked alpha-D-glucose residues with release of alpha-D-glucose	Brewing, and starch processing
56.	Beta-galactosidase (Lactase) (EC No 3.2.1.23)	<i>Kluyveromyces lactis.</i>	<i>Kluyveromyces lactis.</i>	Hydrolysis of lactose content of in whey or milk	Dairy products and processing
57.	Beta-galactosidase (Lactase) (EC No 3.2.1.23)	<i>Bacillus subtilis</i>	<i>Bifidobacterium bifidum</i>	Hydrolysis of lactose content of whey or milk	Dairy products and , production of GOS (galactooligosaccharide)
58.	Beta-galactosidase (Lactase) (EC No 3.2.1.23)	<i>Aspergillus niger</i>	<i>Aspergillus oryzae</i>	Hydrolysis of lactose content of whey or milk	Dairy products and processing
59.	Beta-galactosidase (lactase) (EC No 3.2.1.23)	<i>Bacillus licheniformis</i>	<i>Bifidobacterium bifidum</i>	Hydrolysis of lactose content of whey or milk	Dairy products and processing

60.	Trehalase (EC No 3.2.1.28)	<i>Trichoderma reesei</i>	<i>Trichoderma reesei</i>	Starch processing for fermentation	Brewing process
61.	Trehalase (EC No 3.2.1.28)	<i>Aspergillus niger</i>	<i>Myceliophthora sepedonium</i>	Starch processing for fermentation	Brewing process
62.	Pullulanase (EC No 3.2.1.41)	<i>Bacillus licheniformis</i>	<i>Bacillus deramificans</i>	Hydrolysis of pullulan in starch processing	Brewing processes and production of sweeteners
63.	Pullulanase (EC No 3.2.1.41)	<i>Bacillus subtilis</i>	<i>Bacillus acidopullulyticus</i>	Hydrolysis of pullulan in starch processing	Brewing processes and manufacture of sweeteners
64.	Pullulanase (EC No 3.2.1.41)	<i>Bacillus subtilis</i>	<i>Bacillus deramificans</i>	Hydrolysis of pullulan in grain processing	Brewing and Starch processing
65.	Alpha arabinofuranos idase (EC No 3.2.1.55)	<i>Trichoderma reesei</i>	<i>Talaromyces pinophilus</i>	Separation of soluble and starch/gluten fractions	Potable alcohol production
66.	Maltotetraohy drolase or glucan 1,4- alpha- maltotetraohy drolase  (EC No 3.2.1.60)	<i>Bacillus licheniformis</i>	<i>Pseudomonas stutzeri(saccharoph ila)</i>	Dough stabilizer, Anti-staling agent in baking, antiretrogradation agent to enhance the quality attributes of bakery products	Baking, Carbohydrate/ Grain processing
67.	Mannan endo- 1,4-beta- mannosidase ( $\beta$ -mannanase)  (EC No 3.2.1.78)	<i>Aspergillus niger</i>	<i>Talaromyces leycettanus</i>	Hydrolysis of mannan to inhibit gel formation during freeze- drying of the instant coffee	Coffee processing
68.	Glucan 1,4- alpha- maltohydrolas e (Maltogenic alpha-amylase ) (EC No 3.2.1.133)	<i>Bacillus subtilis</i>	<i>Geobacillus stearothermophilus</i>	Anti-staling agent to prevent retrogradation of starch in baking, industry. Production of tailor-made sweetener syrups with low viscosity, high maltose contents	Bakery products and sweetener syrups

69.	Carboxypeptidase (EC No 3.4.16.5)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Used to accelerate the development of flavors and the de-bittering during the ripening process of cheese. Debitting agent in cheese manufacture.	Cheese, Enzyme Modified Cheese, cheese powders and Fermented Meat
70.	Chymotrypsin (EC No 3.4.21.1)	<i>Bacillus licheniformis</i>	<i>Nocardiopsis prasina</i>	Increased digestibility of protein and reduce allergenicity	Protein hydrolysis, Yeast processing
71.	Serine protease with trypsin specificity Or (Trypsin)  (EC No 3.4.21.4)	<i>Fusarium venenatum</i>	<i>Fusarium oxysporum</i>	Increased digestibility of protein and reduce allergenicity	Dairy processing Protein hydrolysis
72.	Serine protease (Subtilisin)  (EC No 3.4.21.62)	<i>Bacillus subtilis</i>	<i>Bacillus amyloliquefaciens</i>	Facilitates protein hydrolysis during processing	Protein Processing
73.	Serine protease (Subtilisin) (EC No 3.4.21.62)	<i>Bacillus licheniformis</i>	<i>Pyrococcus furiosus</i>	Hydrolysis of proteins	Protein hydrolysis and protein hydrolysates
74.	Acid prolylendopeptidase (EC No 3.4.21.26)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Degradation of cereal storage proteins to smaller peptides for optimal fermentation Beer stability, prevention of chill haze without loss of foam properties	Beer and other cereal based beverages,
75.	Chymosin (EC No 3.4.23.4)	<i>Trichoderma reesei</i>	<i>Bostaurus (bovine)</i>	Milk Coagulant	Milk processing
76.	Chymosin ( EC No 3.4.23.4)	<i>Kluyveromyces lactis.</i>	<i>bovine pro-chymosin</i>	Milk Coagulant	Milk processing
77.	Aspergillopepsin I, aspartic protease)  ( EC No 3.4.23.18)	<i>Trichoderma reesei</i>	<i>Trichoderma reesei</i>	Catalyses hydrolysis of proteins with broad specificity	Processing of proteins, Clarification of fruit and vegetable juices and

					alcoholic drinks, modification of wheat gluten in bakery products
78.	Mucorpepsin (Mucor rennin) (EC No 3.4.23.23)	<i>Aspergillus oryzae</i>	<i>Rhizomucor miehei</i>	Milk coagulation in cheese making.	Dairy processing
79.	Bacillolysin (Bacillus metalloendopeptidase) ( ) (EC No 3.4.24.28)	<i>Bacillus amyloliquefaciens</i>	<i>Bacillus amyloliquefaciens</i>	Protein processing into peptides and hydrolysate	Production of bakery products and other cereal based products (e.g. pasta, noodles, snacks), Production of beer and other cereal based beverages, Dairy processing, Flavouring production, Production of cereal based distilled alcoholic beverages, Protein processing, Yeast processing
80.	Bacillolysin (Bacillus metalloendopeptidase) (EC No 3.4.24.28)	<i>Bacillus subtilis</i>	<i>Bacillus amyloliquefaciens</i>	Protein processing into peptides and hydrolysate	Production of bakery products and other cereal based products (e.g. pasta, noodles, snacks), Production of beer and other cereal based beverages, Dairy processing, Flavouring production, Production of cereal based distilled alcoholic beverages,

					Protein processing, Yeast processing
81.	Asparaginase (EC No 3.5.1.1)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Reduce acrylamide levels	Production of bakery products and other cereal based products (e.g. pasta, noodles, snacks) Potato processing Coffee processing
82.	Asparaginase (EC No 3.5.1.1)	<i>Aspergillus oryzae</i>	<i>Aspergillus oryzae</i>	Reduce acrylamide levels	Baking and other cereal-based processes (bread, pasta, noodles, snacks) Coffee processing, Potato processing
83.	Asparaginase (EC No 3.5.1.1)	<i>Bacillus subtilis</i>	<i>Pyrococcus furiosus</i>	Reduce acrylamide levels	Baking and other cereal-based processes (bread, pasta, noodles, snacks) Coffee and cocoa processing Fruit and Vegetable processing
84.	Glutaminase (EC No 3.5.1.2)	<i>Bacillus licheniformis</i>	<i>Bacillus licheniformis</i>	In controlling the taste and flavor of fermented foods containing ingredients such as; casein, whey protein, soy and wheat protein	Dairy processing Egg processing Protein processing Yeast processing
85.	Alpha - acetolactate decarboxylase ( EC No 4.1.1.5)	<i>Bacillus licheniformis</i>	<i>Bacillus brevis</i>	In brewing beverage processes and beverage alcohol (distilling) processes 1) Reduces formation of	Brewing and other production of cereal based alcoholic beverages

				diacetyl during fermentation and thereby a reduction of the off-flavours 2) Enhances maturation process and thereby reduces production time.	
86.	Pectin lyase (EC No 4.2.2.10)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	Enhances juice extraction from vegetables and fruits and for juice clarification	Fruit and vegetable processing Production of wine Flavouring production Coffee processing
87.	Glucose oxidase (EC No. 1.1.3.4)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	For conversion of glucose to gluconic acid in presence of dissolved oxygen	In food processing to remove glucose and oxygen and in bakery application
88.	Hexose oxidase (EC No. 1.1.3.5)	<i>Hansenula polymorpha</i>	<i>Chondrus crispus</i>	To catalyze the oxidation of C6 sugars into their corresponding lactones and hydrogen peroxide	In food processing of wide range of products for dough-strengthening, oxygen scavenging, curd formation and to reduce the occurrence of excessive maillard reactions
89.	Catalase (EC No. 1.11.1.6)	<i>Aspergillus niger</i>	<i>Aspergillus niger</i>	<u>Catalyzes</u> the decomposition of <u>hydrogen peroxide</u> to <u>water</u> and <u>oxygen</u>	In food processing for enzymatic production of gluconic acid, removal of hydrogen peroxide and/or generation of oxygen in foods & beverages
90.	Catalase (EC No.	<i>Trichoderma reesei</i>	<i>Aspergillus niger</i>	<u>Catalyzes</u> the decomposition of <u>hydrogen peroxide</u> to <u>wat</u>	For egg processing



103	Lactase (Beta - galactosidase)  (EC No. 3.2.1.23)	<i>Aspergillus oryzae</i>	<i>Aspergillus oryzae</i>	Hydrolysis of lactose content of in whey or milk	In dairy processing, GOS (galacto-oligosaccharide) production, production of low lactose products
104	Pullulanase  (EC 3.2.1.41)	<i>Bacillus licheniformis</i>	<i>Bacillus deramificans</i>	As processing aid in efficient starch hydrolysis & saccharification.	As processing aid in manufacture of starch/Carbohydrate processing
105	Maltogenic Alpha-amylase  (EC No. 3.2.1.133)	<i>Bacillus licheniformis</i>	<i>Geobacillus stearothermophilus</i>	Anti-staling agent to prevent retro-degradation of starch in baking, industry.  Production of tailor-made sweetener syrups with low viscosity, high maltose contents	As processing aid in bakery, starch processing, brewing and potable alcohol
106	Protease (incl. milkclotting enzymes)  (EC No. 3.4.21.62)	<i>Bacillus subtilis</i>	<i>Bacillus lentus</i>	To catalyze protein hydrolysis	As processing aid in plant protein processing, fish and seafood protein processing, yeast processing, animal protein processing, xanthan gum processing, and microalgae processing
107	Chymosin  (EC No. 3.4.23.4)	<i>Trichoderma reesei</i>	<i>Bos Taurus</i>	As processing aid in cheese manufacturing. Chymosin helps in coagulating milk by hydrolyzing milk protein	In dairy processing, production of cheese, whey and lactose
108	Acetolactate decarboxylase  (EC No. 4.1.1.5)	<i>Bacillus subtilis</i>	<i>Brevibacillus brevis</i>	Butanoate metabolism and C-5 branched dibasic acid metabolism	In brewing and potable alcohol production

	(EC No. 3.2.1.3)			oligosaccharides for improved fermentation and liquefaction.	Processing, brewing and potable alcohol production
98.	Glucoamylase (Amyloglucosidase) (EC No. 3.2.1.3)	<i>Trichoderma reesei</i>	<i>Fusarium verticillioides</i>	Processing of polysaccharides and oligosaccharides for improved fermentation and liquefaction.	For Carbohydrate/ Grain Processing, brewing and potable alcohol production
99.	Cellulase (EC No. 3.2.1.4)	<i>Trichoderma reesei</i>	<i>Trichoderma reesei</i>	As processing aid in food manufacturing or breakdown of cellulose	For Carbohydrate processing, potable alcohol production, maceration in fruit and vegetable processing, brewing & wine production and in food processing of other wide range of products like coffee
100	Xylanase (EC No. 3.2.1.8)	<i>Trichoderma reesei</i>	<i>Fusarium verticillioides</i>	Hydrolysis of plant carbohydrates to improve quality of bakery products (firmness, stiffness, consistency and others)	As processing aid in Carbohydrate/ Starch processing and Potable alcohol production
101	Xylanase (EC No. 3.2.1.8)	<i>Bacillus subtilis</i>	<i>Bacillus subtilis</i>	Hydrolysis of plant carbohydrates to improve quality of bakery products (firmness, stiffness, consistency and others)	In Carbohydrate/ Starch processing, Brewing, Baking, Potable alcohol production, Non-Alcoholic Beverages processing
102	Lactase (Beta - galactosidase) (EC No. 3.2.1.23)	<i>Bacillus subtilis</i>	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i>	Hydrolysis of lactose content of in whey or milk	In dairy processing, GOS (galacto-oligosaccharide) production, production of low lactose products

	1.11.1.6)			er and oxygen.	
91.	Triacylglycerol lipase (EC No. 3.1.1.3)	<i>Trichoderma reesei</i>	<i>Aspergillus niger</i>	As a processing aid in food manufacturing. To catalyze the hydrolysis of ester bonds in triglycerides primarily in 1 and 3 positions of fatty acids in triglycerides with release of fatty acids and glycerol	For use in baking and brewing process, in the manufacture of cereal beverage, in pasta production, and in potable alcohol production
92.	Phytase (EC No. 3.1.3.26)	<i>Trichoderma reesei</i>	<i>Buttiauxella sp.</i>	Hydrolysis of phytic acid	In potable alcohol production and in animal feed
93.	Amylase (Alpha-amylase) (EC No. 3.2.1.1)	<i>Trichoderma reesei</i>	<i>Aspergillus clavatus</i>	Starch processing into dextrins and of oligosaccharides. High DE-maltodextrin production	In Carbohydrate/Starch Processing, brewing and potable alcohol production
94.	Amylase (Alpha-amylase) (EC No. 3.2.1.1)	<i>Trichoderma reesei</i>	<i>Aspergillus kawachii</i>	Starch processing into dextrins and of oligosaccharides. High DE-maltodextrin production	In Carbohydrate/Starch Processing, brewing and potable alcohol production
95.	Amylase (Alpha-amylase) (EC No. 3.2.1.1)	<i>Bacillus amyloliquefaciens</i>	<i>Bacillus amyloliquefaciens</i>	As processing aid in food manufacturing to hydrolyze polysaccharides	Carbohydrate/Grain processing, Potable alcohol production, brewing, cereal processes, Non-Alcoholic Beverages
96.	Amylase (Alpha-amylase) (EC No. 3.2.1.1)	<i>Trichoderma reesei</i>	<i>Aspergillus terreus</i>	Starch processing into dextrins and of oligosaccharides. High DE-maltodextrin production	Brewing, Potable alcohol production, Grain / Carbohydrate, Non-Alcoholic Beverages, Cereal processes
97.	Glucoamylase (Amyloglucosidase)	<i>Trichoderma reesei</i>	<i>Aspergillus fumigatus</i>	Processing of polysaccharides and	For Carbohydrate/Grain

109	Glucose isomerase (EC No. 5.3.1.5)	<i>Streptomyces rubiginosus</i>	<i>Streptomyces rubiginosus</i>	Reversible isomerisation of glucose to fructose	Production of high fructose corn syrup
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Note: Blends of enzymes shall only contain enzymes listed under Table 11A

**List of processing aids under consideration of Working Group on Processing Aids/Scientific Panel on Food Additives**

S.No.	Name of processing aid	INS No. (if any)	Product category (& functional use in case of Table 12)	Table/Category of Appendix C
1.	Poly Alkylene Glycols and Esters		Oils & fried foods	Table 1: Antifoaming agents
2.	Polydimethyl siloxane	900a	Sugar processing	Table 1: Antifoaming agents
3.	Sulphated castor oil		Sugar processing	Table 1: Antifoaming agents
4.	Sodium Dioctyl Sulphosuccinate Salt		Sugar processing	Table 1: Antifoaming agents
5.	Diatomaceous earth		Clear liquid sauce, liquid seasoning, non-alcoholic beverages, Sugar processing, All foods in general	Table 3: Clarifying agents and Filtration aids
6.	Calcium Oxide	529	Sugar processing/treatment	Table 3: Clarifying agents and Filtration aids
7.	Sulphur Dioxide	220	Sugar processing/treatment	Table 3: Clarifying agents and Filtration aids
8.	Calcium, Magnesium, Sodium salts of stearic acid		All Foods	Table 4: Lubricants, release and antisticking agents
9.	Sodium Dimethyl Dithiocarbamate		Sugar processing/treatment	Table 5- Microbial Control Agents
10.	Potassium Ethylene Bisthiocarbamate		Sugar processing/treatment	Table 5- Microbial Control Agents
11.	Benzene Konium Chloride		Sugar processing/treatment	Table 5- Microbial Control Agents
12.	Urea		Alcoholic beverages	Table 5-, Microbial Nutrients And Microbial Nutrient Adjuncts
13.	Diammonium phosphate	342 (ii)	Alcoholic beverages	Table 5- Microbial Nutrients And Microbial Nutrient Adjuncts
14.	Dichloromethane (methylene chloride)		Colours	Table 6: Solvent for extraction and processing
15.	Ethyl acetate		Colours	Table 6: Solvent for extraction and processing

16.	Isopropyl alcohol (propane-2-ol, isopropanol)		Colours	Table 6: Solvent for extraction and processing
17.	Propan-1-ol		Other Foods	Table 6: Solvent for extraction and processing
18.	Isobutyl acetate (Methylpropyl Acetate)		Colours	Table 6: Solvent for extraction and processing
19.	Methanol (Methyl alcohol)		Colours	Table 6: Solvent for extraction and processing
20.	Acetone		Colours, Herbs and Botanicals	Table 6: Solvent for extraction and processing
21.	n-Butanol		Colours, Herbs and Botanicals	Table 6: Solvent for extraction and processing
22.	Butan-2-ol		Herbs & Botanicals	Table 6: Solvent for extraction and processing
23.	Carbon dioxide		Colours	Table 6: Solvent for extraction and processing
24.	Hexane		Colours	Table 6: Solvent for extraction and processing
25.	Cyclohexane		Herbs & Botanicals	Table 6: Solvent for extraction and processing
26.	Diethyl ether		Herbs & Botanicals	Table 6: Solvent for extraction and processing
27.	Methyl ethyl ketone (2-Butanone)		Colours	Table 6: Solvent for extraction and processing
28.	Propane		Colours	Table 6: Solvent for extraction and processing
29.	Water		Colours	Table 6: Solvent for extraction and processing
30.	1-1-2 trichloroethane		All Foods	Table 6: Solvent for extraction and processing
31.	Ethyl methyl ketone		All foods	Table 6: Solvent for extraction and processing
32.	Glycerine		All foods	Table 6: Solvent for extraction and processing
33.	Methyl acetate		All foods	Table 6: Solvent for extraction and processing

34.	Nitrous Oxide		All foods	Table 6: Solvent for extraction and processing
35.	1,1,1,2-tetrafluoroethane		All foods	Table 6: Solvent for extraction and processing
36.	Benzalkonium Chloride		Eggs	Table 7- Bleaching, Washing, Denuding and Peeling Agents
37.	Epichlorohydrin		Sugar processing/ treatment	Table 7- Bleaching, Washing, Denuding and Peeling Agents
38.	Hydrogen Peroxide		Instant Tea processing	Table 7- Bleaching, Washing, Denuding and Peeling Agents
39.	Trisodium Phosphate	339 (iii)	Oils	Table 8: Flocculating agents
40.	Copolymer of Acrylamide and Sodium Acrylate		Sugar Treatment/ processing	Table 8- Flocculating Agents
41.	Acrylamide Acrylic Copolymer		Sugar Treatment/ processing	Table 8- Flocculating Agents
42.	Calcium Hydroxide	524 - 528	Water Treatment, Non-alcoholic beverages	Table 8- Flocculating Agents
43.	Ferrous sulfate		Water Treatment, Non-alcoholic beverages	Table 8- Flocculating Agents
44.	Polyacrylamide		Sugar treatment	Table 8- Flocculating Agents
45.	Liquid Nitrogen	941	All foods	Table 9: Contact Freezing and cooling agents
46.	Chymosin from <i>Aspergillus niger</i> var. <i>Awamori</i> (Genetically Modified Source)*		Milk coagulating enzyme for paneer manufacturing	Table 11: Enzymes
47.	Carbon Dioxide	290	Water Treatment, Non-alcoholic beverages (pH control agent)	Table 12: Generally permitted processing aid
48.	Carbon Dioxide	291	All foods (Packaging and propelling gas/aerating agent)	Table 12: Generally permitted processing aid
49.	Calcium chloride	509	Water Treatment, Non-alcoholic beverages, instant Tea processing (Flocculating agent, Buffering agent)	Table 12: Generally permitted processing aid
50.	Calcium chloride	509	Extruded foods (Stabilizer)	Table 12: Generally permitted processing aid
51.	Sodium Meta-Bi Sulphite	223	Water Treatment, Non-alcoholic beverages	Table 12: Generally permitted processing aid

			(pH control agent, pH regulation for water treatment)	
52.	Citric Acid	330	Instant Tea processing (Sequestrant)	Table 12: Generally permitted processing aid
53.	Citric acid	330	All foods (pH standardization)	Table 12: Generally permitted processing aid
54.	Citric acid	330	Sugar syrups (Catalyst in inversion of sugar)	Table 12: Generally permitted processing aid
55.	Nitrogen	941	All foods (Particularly Milk & Milk Products and Coffee) (Drying agent)	Table 12: Generally permitted processing aid
56.	Nitrogen	941	All foods (Packaging gas)	Table 12: Generally permitted processing aid
57.	Liquid Nitrogen	941	Water Treatment, Non-alcoholic beverages (creating inert atmosphere/ packaging)	Table 12: Generally permitted processing aid
58.	Gaseous Nitrogen		Water Treatment, Non-alcoholic beverages (creating inert atmosphere/ packaging)	Table 12: Generally permitted processing aid
59.	Hydrochloric acid	507	Water Treatment, Non-alcoholic beverages (pH control agent, pH regulation for water treatment)	Table 12: Generally permitted processing aid
60.	Hydrochloric acid	507	All foods (pH control agent)	Table 12: Generally permitted processing aid
61.	Hydrochloric acid	507	Confectionery (pH regulator)	Table 12: Generally permitted processing aid
62.	Calcium hydroxide	526	Soybean products (Alkalizing agent)	Table 12: Generally permitted processing aid
63.	Potassium carbonate	501(i)	Cocoa products (Alkalizing agent)	Table 12: Generally permitted processing aid
64.	Activated carbon		Non-alcoholic beverages, Sugar syrup treatment	Table 12: Generally permitted processing aid

			(Adsorbent, decolourizing agent)	
65.	Sodium Chloride		Unripened Cheese- Paneer; Water treatment  (Texturising agents)	Table 12: Generally permitted processing aid
66.	Ammonium bicarbonate	503(ii)	Flour Mix and its products  (Raising agent)	Table 12: Generally permitted processing aid
67.	Sodium Hydroxide	524	All foods  (ph control agent)	Table 12: Generally permitted processing aid
68.	Calcium Chloride	509	All foods  (Catalyst)	Table 12: Generally permitted processing aid
69.	Sodium acid pyrophosphate	450(i)	Flour Mix and its products  (Raising agent)	Table 12: Generally permitted processing aid
70.	Sodium bicarbonate	500 (ii)	Flour Mix and its products  (Raising agent)	Table 12: Generally permitted processing aid
71.	Alanine		All foods  (Microbial nutrient)	Table 12: Generally permitted processing aid
72.	Potassium chloride		All foods  (Microbial nutrient)	Table 12: Generally permitted processing aid
73.	Magnesium sulfate		All foods  (Microbial nutrient)	Table 12: Generally permitted processing aid
74.	Plant polypeptides		All foods  (Microbial nutrient)	Table 12: Generally permitted processing aid
75.	Disodium ortho phosphate	339(ii)	Flour Mix and its products; Malt based beverages  (Raising agent)	Table 12: Generally permitted processing aid
76.	Trisodium Citrate; Sodium Citrate	331(iii)	Flavourings  (ph control agent)	Table 12: Generally permitted processing aid
77.	Trisodium Citrate; Sodium Citrate	331(iii)	All Foods  (ph control agent)	Table 12: Generally permitted processing aid
78.	Ammonium chloride	510	Flavourings  (ph control agent)	Table 12: Generally permitted processing aid
79.	Maltodextrin		Flavourings  (Carrier)	Table 12: Generally permitted processing aid
80.	Lactic acid	270	Seasonings	Table 12: Generally



			(pH control agent)	permitted processing aid
81.	Guar gum	412	Seasonings (Binding agent)	Table 12: Generally permitted processing aid
82.	Xanthan gum	415	Seasonings (Binding agent)	Table 12: Generally permitted processing aid
83.	Polyoxyethylene (20) sorbitan monooleate	433	Flavourings (Emulsifier)	Table 12: Generally permitted processing aid
84.	Modified starches		Flavourings (Binding agent)	Table 12: Generally permitted processing aid
85.	Sodium aluminium phosphate	541(i)	Flour Mixes and its products (Raising agent)	Table 12: Generally permitted processing aid
86.	Monocalcium phosphate	341(i)	Flour Mixes and its products (Raising agent)	Table 12: Generally permitted processing aid
87.	Triacetin	1518	Flavourings (solvent/binding agent)	Table 12: Generally permitted processing aid
88.	Gum Arabic	414	Flavourings (Binding agent)	Table 12: Generally permitted processing aid
89.	Trisodium Phosphate	339(iii)	Malt Based Beverages (pH control agent)	Table 12: Generally permitted processing aid
90.	Tribasic Magnesium Phosphate	343(iii)	Malt Based Beverages (pH control agent)	Table 12: Generally permitted processing aid
91.	Dibasic Magnesium Phosphate	343(ii)	Malt Based Beverages (pH control agent)	Table 12: Generally permitted processing aid
92.	Starches		Flavourings (Binding agent)	Table 12: Generally permitted processing aid
93.	Corn Steep Liquor		All foods (Anti sticking agent)	Table 12: Generally permitted processing aid
94.	Tertiary Butyl Hydro Quinone	319	Oils & fried foods (Antioxidant)	Table 12: Generally permitted processing aid
95.	Yeast		All foods (Fermenting agent)	Table 12: Generally permitted processing aid
96.	Chitosan		Potato treatment (Reduction in potato defect)	Table 12: Generally permitted processing aid
97.	Calcium Magnesium carbonate		Water treatment	Table 12: Generally permitted processing

			(to remove hardness)	aid
98.	Dextrose		Potato Processing (colour stabilizer)	Table 12: Generally permitted processing aid
99.	Cellulose	460	Removal of insoluble waxes from liquid product during filtration  (extraction manufacturing process)	Table 12: Generally permitted processing aid
100	Vegetable fatty acid esters		Sugar treatment	Table 12: Generally permitted processing aid
101	Sodium Hypochlorite		Water treatment, all foods  (Disinfectant)	Table 12: Generally permitted processing aid