



# PM Formalisation of Micro Food Processing Enterprises Scheme

## Processing of Frozen-Cut-Vegetables



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## **CHAPTER -1**

### **INTRODUCTION**

#### **1.1. Status and Market Size**

Due to the presence of vitamins, minerals, phytochemical compounds, and dietary fiber content, vegetables are important for human health. In particular, the content of antioxidant vitamins (vitamin A, vitamin C and vitamin E) and dietary fiber plays a significant role in human health. Adequate vegetable intake can protect against some chronic diseases such as diabetes, cancer, obesity, cardiovascular diseases, metabolic syndrome, as well as boost the risk factors associated with these diseases. One of the simplest, fastest, most flexible, and most convenient methods of preserving foods is freezing. Properly frozen foods retain more of their original color, taste, and texture than foods preserved by other processes, and more of their nutrients in general. By this way, vegetables can normally be preserved and can be used for off-season use.

A perfect way to preserve fresh vegetables is to freeze them. Freezing does not sterilize food; the severe cold merely delays microorganisms' growth and slows down changes that affect the quality of food or cause food spoilage. The quality of frozen vegetables depends on the quality of the fresh goods and how they are treated before they are ready to eat; from the moment they are selected.

In 2018, the Indian frozen food market was priced at around Rs. 74 billion and is also expected to hit a price of Rs. 188 billion by 2024, that from 2019 to 2024 at a CAGR of around 17 per cent. In terms of sales value, the largest categories are among these vegetables, amounting to 65 percent of Indian consumers. Urban areas make up 80 percent of the market, including bakeries, dairy, packaged, frozen, ready-to-eat foods, diet snacks, health goods, and drinks, among others. Furthermore, urbanization has given rise to an integrated supermarket sector equipped with cold-chain equipment that allows a choice of available frozen foods. Therefore, shifting psychologies and evolving purchasing patterns, lack of time and hectic lives and rising disposable incomes of the middle class are benefiting significantly from frozen food demand.

## **1.2. Socio-economic importance**

Freezing procedures are simple and easy to apply to food. Since the freezing of invention is one of the few methods that allow food attributes such as flavour, texture to be preserved while preserving the nutritional value. Frozen goods are very similar to the initial fresh products, especially if good handling and safety practices both before and after freezing are used. If frozen foods are stored at maximum temperatures of -18 °C or even lower, retention of consistency and protection is best achieved. Micro-organisms cannot develop at these temperatures and any deteriorating reactions take place at very slow rates. Over long storage periods, frozen agricultural products may maintain their quality if the correct procedures are applied.

Ready-made Frozen Food (RMFF) is viewed by customers as nourishing, healthier, and delicious. Therefore, customers turn to this item of substance and are able to pay the premium price. The investigation was organized to understand the most influential factors influencing the purchasing of ready-made frozen food by consumers. Literature reviews are available showing that people's food preferences are increasingly changing and the way women are active in our society's economic activities. Some socio-demographic variables that affect a customer when purchasing RMFF are individual behaviours, attitudes, beliefs and values, age, education, income, marital status, etc. Results have indicated that consumers are interested in purchasing this food, in addition to these social demographic driving factors, as it is easy to prepare, tasty, easy to find, quality product, low price, etc.

Working people are fundamental consumers of this sustenance. In addition, there is a positive effect on the purchase of RMFF on gender; age; education level; family income; occupation.

## **1.3. Commonly Froze vegetables (Raw material)**

Characteristics for selection vegetables for freezing are as follows:

- Uniform maturity
- Good flavour, uniform colour and desirable texture
- Suitability for mechanical harvesting
- Resistance to diseases
- High yield
- Harvesting

Bread, broccoli, cauliflower, carrots, green beans, squash, and winter greens such as spinach, kale, chard, and collars are the best vegetables to suggest. They can also be frozen with onions, peppers, celery, and herbs. There is not much value to freezing high-moisture veggies such as cucumbers, cabbage, radishes, mushrooms, and lettuce, etc. the brief details of types of frozen vegetable are given below:

### **1.3.1. Cauliflower:**

Cauliflower is some cruciferous vegetable rich in fiber and B-vitamins, naturally. It contains phytonutrients and antioxidants that can protect against cancer. It also contains nutrition, choline, which is vital for learning and memory, and many other valuable nutrients to support weight loss and digestion. Cauliflower can be safely frozen for up to eight months.

#### **Importance of cauliflower**

- Cauliflower is as good a source of fiber and vitamins.
- Its ingredients may help strengthen bones, boost the cardiovascular system, and prevent cancer.
- Tasty ways of eating cauliflower include cauliflower crust pizza and cauliflower and cheese soup.
- People who are using blood thinners should not suddenly start eating a lot of cauliflower because the high levels of vitamin K could react adversely with the drugs.



### **1.3.2. Broccoli**

A good source of fiber and protein, broccoli contains iron, potassium, calcium, selenium, magnesium, vitamins A, C, E, K, and a good variety of B vitamins, including folic acid. Frozen broccoli can be more nutritious than fresh broccoli because it can destroy bacteria, maintain nutritional value, and avoid spoiling by the blanching process it goes through prior to being frozen. Frozen broccoli even contains the same amount of folic acid as fresh broccoli.



### **1.3.3. Carrot**



Vitamins, minerals, and fiber are rich in carrots. Likewise, they are a good source of antioxidants. Nutrients found in plant-based foods are antioxidants. They help the body eliminate free radicals; if too many accumulate in the body, unstable molecules can cause cell damage. Natural processes and environmental forces create free radicals. Many free radicals can be removed naturally by the body, but dietary antioxidants can help, especially when the oxidant load is large. Throughout the growing season, fresh garden carrots are a treat, but garden vegetables need to be stored as fall approaches in order for them to last through the winter months. In order to retain their taste, nutrients and texture, carrots are usually blanched and then frozen. Freezing is a perfect way for carrots to taste great all year long.

#### 1.3.4. Green beans

Green beans also called snap beans or string beans are a staple in many kitchens.

The various beans cultivated in India:

- French beans (*Phaseolus vulgaris*)
- Cow pea (*Vignasinesis*)
- Cluster bean (*Cyamopsistetragonoloba*)
- Broad bean (*Viciafaba*)
- Lima bean (*Phaseoluslunatus*)
- Soya bean (*Glucine max*)
- Garden beans (*Dolichos lab lab*).



At family potlucks, holiday meals, and regular dinners, they are a favorite side dish. Young, tender green beans are a good source of vitamin C, dietary fiber, folate, vitamin K, and silicon. Green beans help maintain a healthy weight. Green beans help maintain a healthy weight. Freezing green beans is a perfect way to enjoy them all year long from your garden or the farmer's market.



#### 1.3.5. Corn

Opt for frozen rather than canned for those long months when sweet corn isn't in season. It is just as sweet as fresh ears, and cooking takes less time. Another added advantage is that frozen maize has less calories and carbs than fresh maize in general.

#### 1.4. Cultivated variety

<b>Vegetables</b>	<b>Suitable variety for freeze</b>
<b>Cauliflower</b>	Early Kunwari, Pusa Early synthetic, Pusa Deepali, Pant Gobhi-2, Improved Japanese, Pusa Hybrid-2, Pusa Hybrid-3, Pusa Sharad, Pant Gobi-4, Pusa Synthetic, Pusa Shubra, Pusa Himjyoti, Punjab Giant-35, Pusa Snowball-1, Pusa Snowball K-1
<b>Broccoli</b>	KTS-I, Solan Green, Lucky, Fiesta, Pushpa, Aishwarya, Palam Vichitra.
<b>Carrot</b>	Pusa Kesar, Pusa Meghali, Selection 223, No. 29, Nantes Half Long, Early Nantes, Chantenay, Imperator, Zeno, Pusa Yamdagini,
<b>Beans ( French beans)</b>	HUR - 137, Malviya, Rajmash - 137, Varun (ACPR - 94040), HPR - 35 3, IPR 96 - 4 (Amber), Ankur, ArkaAnup, GujratRajma - 1, VL Rajmash 125, VL Bean - 2, Hills - YCD 1, Ooty 1, Ooty (FB) 2, ArkaKomal (Sel.9), Premier, Arka Bold, ArkaSampoorna and ArkaKarthik, ArkaKomal, Premier, (Sel.9), ArkaSuvidha, ArkaAnoop, ArkaSamrudhi, ArkaSuman.
<b>Corns</b>	Madhuri, Priya and Almora

#### 1.5. Production status of vegetable in India

The diverse climate of India ensures that all varieties of fresh vegetables are available. It is ranked second in the world in fruit and vegetable production, after China. India produced 169.1 million metric tonnes of vegetables during 2015-16, as per the National Horticulture Database released by the National Horticulture Board. At 10.1 million hectares, the field under vegetable cultivation has been cultivated. Just 2.2% of these amounts are processed out of these sums. Countries such as the USA (65 percent) and China (23 percent) are, on the other hand, well ahead of India in eliminating waste and increasing the added value and shelf life of farm products. The projected losses are higher for fruits and vegetables and range from 30 to 40 percent. Such proportions are not appropriate and have a negative effect on the Indian economy. In order to avoid such losses, various organizations in India have been trying to find solutions to severe post-harvest problems.

In the production of potatoes, onions, cauliflowers, brinjal, cabbages, etc., India is the largest producer of ginger and okra among vegetables and ranks second. Bangladesh, the UAE, the Netherlands, Nepal, Malaysia, the UK, Sri Lanka, Oman and Qatar are the main destinations for Indian fruits and vegetables.

India exported vegetables worth Rs. 4,350.13 crores over the period 2019-20. The vegetable export basket is mainly sponsored by onions, mixed vegetables, potatoes, tomatoes, and green chills.

While India's share of the global market is still almost 1%, there is a growing acceptance of the country's horticultural products. In the areas of state-of-the-art cold chain technology and quality assurance measures, this has arisen due to parallel changes. In addition to the significant private sector investment, the public sector has also taken initiatives and, with the assistance of APEDA, many perishable cargo centres and integrated post-harvest handling facilities have been set up in the region. Initiatives to develop capacity at the level of producers, processors, and exporters have also contributed to this initiative.

#### **1.6. Composition and nutritive value of vegetables**

Vegetables, like fruits, are low in calories and fats but contain good amounts of vitamins and minerals. All the Green-Yellow-Orange vegetables are rich sources of calcium, magnesium, potassium, iron, beta-carotene, vitamin B-complex, Vitamin-C, vitamin-A, and vitamin K. As in fruits, vegetables too are home to many antioxidants. These health benefiting phytochemical compounds firstly; help protect the human body from oxidant stress, diseases, and cancers, and secondly; help the body develop the capacity to fight against these by boosting immunity. Additionally, vegetables are packed with soluble as well as insoluble dietary fiber known as non-starch polysaccharides (NSP) such as cellulose, mucilage, hemicellulose, gums, pectin...etc. These substances absorb excess water in the colon, retain a good amount of moisture in the fecal matter, and help its smooth passage out of the body. Thus, sufficient fiber offers protection from conditions like chronic constipation, haemorrhoids, colon cancer, irritable bowel syndrome, and rectal fissures. Vegetarian nutrition has widely drawn the attention of fitness-conscious as well as food scientists alike for their proven health benefits. The majority of day-to-day used vegetables are very low in calories and saturated fats. Just, for example, watercress and Celery hold just 11 and 16 calories per 100 g respectively. There is a long list of vegetables whose calorie is less than 20 per 100 g such as bottle gourd, bitter melon, cabbage, Chinese cabbage, bok-choy, eggplant,



endive, spinach, summer squash, swiss chard (silverbeet), etc. Scientific studies have shown that these low-calorie but nutrient-rich foods help the human body stay fit and free from diseases. Frozen vegetables can often be prepared with minimal effort, making them a quick and convenient alternative to fresh vegetables. They're also typically cheaper than fresh vegetables and tend to have a longer shelf life, adding frozen vegetables to diet is a simple way to increase the intake of important nutrients, including fiber, antioxidants, vitamins, and minerals.

### **1.7. Indian Market Outlook**

The market is expanding, while consumers are becoming more convenience-driven. In this scenario, one segment, which has evolved significantly among all the processed food categories, is frozen food. With many newer brands entering, frozen food market is ready to face an increase in competition.

The variety of packaged frozen food is growing, thus helping the young ones in the quest for novelty. Entry and expansion of international retail chains like McDonald's, Pizza Hut, Dominos, and many more have opened up the market and led new frozen food players to enter the market. The frozen food market in India is prominently driven by the segments namely frozen vegetables and frozen snacks & ready meals. Apart from these dominating segments, preference towards frozen meat and seafood products has increased owing to the freshness of the products along with its growing availability through retail segments. Both of these segments combine have generated revenue of over INR 1200 Crore in the year 2018-19. The improved distribution network is making the products available to a large consumer base and helping residential consumption to grow at a faster rate as compared to commercial consumption.

## CHAPTER-2

### PROCESSING OF FROZEN CUT VEGETABLE

#### 2.1. Process Flow chart for frozen cut vegetable

- Harvesting
- Pre-process handling
- Cleaning
- Cutting or slicing
- Blanching
- Freezing
- Detection of metals
- Packaging
- Storage

##### 2.1.1. Harvesting

Since vegetables are harvested in a particular season in India (e.g. broccoli and cauliflower are available in the winter season). It is in the processing plants' interest that the supply is spread to a maximum over this period. To achieve this coverage, sowing is done according to a specific timetable, also called a seed scheme. Moreover, advantages can be taken off early and late varieties of vegetables. The ideal time for harvesting can therefore be determined by maturity indices. The tender vegetables when they are at their harvestable maturity are selected. After harvesting the vegetables must be processed as quickly as possible to prevent them from warming up. Warming up might cause the vegetables to be affected by bacteria, which affect the quality of vegetables. Therefore, the temperature of the vegetables is well monitored.

##### ➤ Pre-process handling:

Vegetables at peak flavour and texture are used for freezing. Post-harvest delays in handling vegetables are known to produce deterioration in flavour, texture, colour and nutrients. Therefore, the delay between harvest and processing should be reduced to retain fresh quality prior to freezing. Cooling vegetables by cold water, air blasting or ice will often reduce the rate of post-harvest losses sufficiently, providing extra hours of high quality retention for transporting raw material to considerable distances from the field to the processing plant.

Vegetables are sorted and graded to discard any diseased, bruised and non-uniform ripened part.

### **2.1.2. Cleaning**

Often, coarse dirt is first removed with shake and drum sieves and a blower. Root vegetables are washed first to remove all field dirt and to allow inspection. Using a strong flow of water, they are pressed to a vibrating sieve screen. Here, the remaining sand is washed away.

#### **➤ Second washing**

Commonly, a second washing is needed after peeling and/or cutting. For example, cauliflower should be washed after cutting in florets, whereas the second washing of carrots should be after slicing. Washing after peeling and cutting removes microbes and tissue fluid, thus reducing microbial growth and enzymatic oxidation during subsequent storage

### **2.1.3. Cutting or slicing**

After proper washing, the vegetables need to be cut into small standard pieces to make them uniform in size easy to handle, and packable.

### **2.1.4. Blanching**

The clean vegetables/ fruits are then passed into the boiling water section where they are boiled for few minutes in order to kill enzymes that affect the taste but it does not cook them. Generally, most of the vegetables are heated up to 75 to 80°C for 2 to 4 minutes. They are then cooled with water after blanching then passed to gravity sorter.

### **2.1.5. Freezing**

After the blanching, the cut vegetable is taken to the cooling section where the temperature of vegetables is reduced, after the cooling steps, the vegetables are frozen on a conveyor belt freezer using cold air (-35°C), which is blown over the belt. In this way, the vegetables are frozen in a short period of time (IQF, individually quick frozen). The peas can be stored in bulk and later packaged using a flow packer. the vegetables are also can be frozen using blast freezers.

### 2.1.6. Detection of metals

This process is also carried out with the grading or sorting simultaneously. It is necessary to identify any other particles of metal or items that may have been collected during harvesting or processing. The vegetables are passed through a metal detector; it is highly recommended as metals could be highly injurious during consumption.

### 2.1.7. Packaging

- The packaging is the most essential operation after processing it is also convenient for handling and marketing. The frozen cut vegetables can be packed in different packaging materials are packed in several types and sizes of packaging on the basis of the nature of the market. 500 g -1 kg or 2 kg volume packaging is commonly used for the local market. On the packaging labels, data such as weight, country of origin, cost, and date of expiry should be mention properly. Vegetables for freezing are packed either as dry pack or tray pack.
- **Dry-pack method:** In the dry pack method, the blanched and drained vegetables are put into meal-sized freezer bags and packed tightly to cut down on the amount of air in the package. Proper headspace (approximately 2 cm) is left at the top of rigid containers before closing. For freezer bags, the headspace is larger. However, provision for headspace is not necessary for vegetables such as broccoli, asparagus and brussels sprouts as they do not pack tightly in containers.
- **Tray-pack method:** In the tray pack method, the chilled, well-drained vegetables are placed in a single layer on shallow trays or pans. Trays are placed in a freezer until the vegetables become firm and then removed.

### 2.1.8. Storage

After packaging the storage temperature of frozen vegetables needs to maintain till consumption the standard temperature of frozen vegetables is -18<sup>0</sup>c. When cut vegetables are stored in cans and bottles the peas should be stored dry at a temperature of about 10 to 15°C. Usually, the cans and jars are labelled only after leaving the temporary storage.

## 2.2. Equipment involved

S. No.	Machine and Equipment
1.	Product Feeding Conveyor
2.	Continuous Online Washer
3.	Vegetables slicer
4.	Continuous Online Blancher
5.	Continues Online Pre-Cooler
6.	Sorting / manual inspection conveyor
7.	Product Elevator Conveyor
8.	Linear IQF or Blast freezer
9.	Metal detector
10.	Control Panel (common for all above Equipment's)
11.	Packaging Machine
12.	Storage facility

**Product Feeding Conveyor:** The main purpose of a conveyor system is to move beans from one location to another.



**Continuous Online Washer:** This machine is used for washing vegetables.



**Blancher:** This machine is used for blanching operations to inactivate enzymatic activities and destroy microorganism.



**Sorting / manual inspection conveyor:** The uses of this conveyor is the manually checking of other foreign particle, metals etc.



**Product Elevator Conveyor:** A vertical conveyor is an elevator type lift used to move cut vegetables from one floor to another. It is often referred to as a freight elevator.



**Linear IQF:** This is a technology known as the individually quick-frozen (IQF). IQF is a rapidly frozen technology that does not allow large ice crystals to form in vegetable cells.

Blast freezer can be used instead of IQF.



**Metal detector:** it is used for detecting metals particle from the final product.



**Control panel (For all the Equipments)**



**Packaging Machine:** This machine is used for packaging frozen pea in various packaging capacity according to market demand.



**Cold chamber:** The final product required to store at ambient temperature ( $-18^{\circ}\text{C}$ ). This chamber is necessary for store the final product after packaging.





## CHAPTER 3

### PACKAGING OF FROZEN VEGETABLES

#### 3.1. Deteriorating factors for Vegetables

Spoilage and deterioration is no accident. It is a naturally occurring process. To understand how to maintain the quality prevent spoilage, we need to know what can cause it. Factors that affect food spoilage include:

- **Microorganisms:** Pathogenic microorganisms may grow in foods without any noticeable change in odor, appearance, or taste. Spoilage microorganisms, including some kinds of bacteria, yeasts, and molds, can grow well at temperatures as low as 40°F.
- **Enzymes:** Enzymes, substances naturally present in food, are responsible for the ripening process in fruits and vegetables. Enzymes are responsible for the texture, color, and flavor changes.
- **Air:** Oxidation, a chemical process that produces undesirable changes in color, flavor, and nutrient content, results when air reacts with food components. Vapor-proof packaging that keeps air out helps reduce oxidation problems.
- **Light:** Light exposure could result in color and vitamin loss. Light also may be responsible for the oxidation of fats.
- **Insects, Rodents, Parasites and Other Creatures:** These creatures require food to survive and damage food, making it more vulnerable to further deterioration.
- **Temperature:** Temperature affects storage time, and food deteriorates faster at higher temperatures. Recommended temperatures for storage areas are:
- **Time:** Microorganisms need time to grow and multiply. Other reactions, such as oxidation and enzyme action, also require time to develop. Purchase reasonable quantities, especially of perishable foods, to help avoid long-term storage.

**Freezing** causes negligible changes to pigments, flavours, nutritionally important components, although these may be lost in preparation procedures or deteriorate later during frozen storage. Main changes to frozen foods during storage are degradation of pigments, loss of water-soluble vitamins at sub-freezing temperatures, residual enzyme activity by polyphenol oxidase, lipoxygenase, and off-flavour developed due to oxidation of lipids.

- I. Recrystallization:** It is a physical change where small ice crystals combine to form large crystals.
- II. Sublimation:** It is a condition when water goes from solid to gaseous state without passing through liquid phase as opposed to way ice would normally melt if placed in glass of water is called sublimation.
- III. Freezer burn:** One of the most common forms of quality degradation due to moisture migration (sublimation) in frozen foods is freezer burn, a condition defined as the glassy appearance in some frozen products produced by ice crystals evaporating on the surface area of a product. This quality defect can be prevented by using heavyweight, moisture proof packaging during the freezing process.
- IV. Chemical changes:** Maillard and enzymatic browning, flavour deterioration, protein insoluble and degradation of chlorophyll and vitamins. Chemical changes like insolubilization or gelation of proteins, lipid oxidation and degradation of vitamins occurs at fairly slow rate at 0°F (-18°C) but at fast rate as temperature is increased

### 3.2. Packaging requirements for frozen vegetables

The packaging requirements for frozen vegetables, in general, are listed below:

- Packaging materials should be moisture-vapour-proof (e.g. glass and rigid plastic) to prevent evaporation, thus retaining the highest quality in frozen foods.
- Oxygen should also be completely evacuated from the package using a vacuum or gas-flush system to prevent migration of moisture and oxygen.
- Most bags, wrapping materials, and waxed cartons used in freezing packaging are moisture-vapour-resistant.
- The containers should be leakage free while easy to seal.
- The durability of the material is another important factor to consider since the packaging material must not become brittle at low temperatures and crack.
- Glass, plastic, tin and heavily waxed cardboard materials are rigid containers used for packaging liquid food products.
- Non-rigid containers include bags and sheets made of moisture-vapor-resistant heavy aluminium foil, polyethylene or laminated papers.
- Bags are the most commonly used packaging materials for frozen fruits and vegetables due to their flexibility during processing and handling. They can be used with or without outer cardboard cartons to protect against tearing.

### 3.3. Packaging materials used for frozen vegetable packaging

- **Shrink Film:** Shrink film is one of the most popular forms of frozen vegetables packaging. It is used on millions of packaging lines across the globe, including those of the largest food packaging companies in the world.
- **Cardboard Packaging:** Chipboard commonly thought to be cardboard is ubiquitous in the packaging of frozen vegetables. Boxes made from chipboard are often used for packaging pies, veggies, pizza, cakes, and various other types of frozen food products. Chipboard boxes are sturdy, durable, and easy to shrink wrap.
- **IQF Polyethylene:** IQF stands for “individually quick frozen,” an action that freezes food extremely fast, so there is little to no damage to the cell structure of the frozen food. IQF polyethylene wrapped food moves through a blast freezer around 40 degrees under zero Fahrenheit.
- **Wax Coated Cardboard:** Wax coated cardboard is yet another highly popular form of frozen food packaging. Specifically, for frozen foods of which the container itself is to be heated. Now days various wax coated cardboard is used for packaging.
- **Glass:** Glass containers made from specific food-grade glass formulations are used for packaging for peas and other frozen products applications; particularly in Asian countries. it is specifically made to save for future use in glass containers.
- **Flexible Bags:** Flexible bags are a type of flexible packaging supply made for packaging food. When dealing with frozen foods, the most common flexible bags used are pouches made from food-grade plastics, foils, or other food-safe materials.

## **CHAPTER-4**

### **FOOD SAFETY REGULATIONS & STANDARDS**

#### **4.1. FSSAI Standards for Frozen Vegetables: -**

According to the FSSAI standards and additives regulation 2011 Frozen Vegetables come under 2.3.38 and the definition is product frozen in blocks or individually quick frozen and offered for direct consumption, if required. Frozen vegetables are prepared from sound, clean vegetables of suitable maturity, free from insect or fungal infection, which are washed, sufficiently blanched to inactivate enzymes and are subjected to a freezing process in appropriate equipment. Freezing operation shall not be regarded as complete unless and until the product temperature has reached (minus) - 18°C at the thermal centre after thermal stabilization. It may be prepared in any style appropriate for the respective vegetable in normal culinary preparation. It may contain salt, nutritive sweeteners, milk solids, spices and condiments and any other ingredient suitable to the product.

It shall have normal colour characteristic of the individual Vegetable. It shall have taste & flavour characteristic of the kind & variety of the vegetable used & shall be free from sand, grit & other foreign matter. The product shall test negative for peroxidase.

#### **FROZEN BEANS:-**

1. Frozen Beans shall be prepared from fresh, clean, sound, succulent pods of the plants of the species *Phaseolus vulgaris* L. or *Phaseolus coccineus* L. Strings, stems, and stem ends shall be removed, and the pods are washed and sufficiently blanched to ensure inactivation of enzymes and adequate stability of colour and flavour and shall be stored at -18°C or below.
2. The product shall be of reasonably uniform colour and free from foreign flavour or odour, other than those imparted by any added ingredients. It shall be clean, free from sand, grit and other foreign material and shall test negative for Peroxidase. It shall not contain any added colour.
3. The product may contain sugars (Sucrose, invert sugar, dextrose, fructose, glucose syrup, and dried glucose syrup), salt, spices and herbs, edible fats and oils, sauces, milk solids and any other ingredients suitable to the product whose standards are prescribed under Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011.

4. Frozen beans may be of the following styles and shall be labelled accordingly:- (i) Whole; (ii) Cut; (iii) Short cut; (iv) Sliced; and (v) Other- Any other style of presentation is permitted provided that it is sufficiently distinctive from other forms of presentation laid down in this standard and is adequately described on the label to avoid confusing or misleading the consumer.
5. The product shall not exceed the tolerance for visual defects as given in table below. The maximum number of defects in each category shall not exceed the tolerance given in column (3). The combined total of each category shall not exceed the limits indicated in S.No.10 of the Table. The standard sample size shall be 1kg for Category 1 defects and 300gm for other defect categories.

S.No.	Defects	Total allowable numbers of defects for each Category (Maximum)	
(1)	(2)	(3)	
		Category 1 (For all styles except whole style)	Category 2 For whole style
1.	Extraneous Vegetable Material (EVM) (i) Bean Leaf (each piece) (ii) Other Extraneous Vegetable Material (EVM) (each piece)	15	15
2.	Stem end		
3.	Major and Minor blemish	30	20
4.	Mechanical Damage(Whole and cut style)	20	10
5.	Undeveloped (whole style)		
6.	Tough strings		
7.	Fibrous unit	10	6
8.	Combined total Allowable number of defects (Maximum)	60	40

9.	Small pieces(Whole, cut and slices styles)	Not more than 20 per cent. mm
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### **FROZEN CAULIFLOWER:**

1. Frozen cauliflower shall be prepared from fresh, clean, sound heads of the cauliflower plant of the species ***Brassica oleracea**L. var. botrytis* L., from which heads may be trimmed and separated into parts, are washed and sufficiently blanched to ensure inactivation of enzymes and stability of colour and flavour and shall be stored at -18°C or below. The product may contain salt, spices and herbs, sugars, edible fats and oils, sauces, milk solids and any other ingredients suitable to the product whose standards are prescribed under Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011.
2. The product shall be of reasonably uniform white to dark cream colour which may be slightly dull and have a tinge of green, yellow or pink over the flower surface. The stem or branch portions may be light green or have a tinge of blue. It shall be free from foreign flavours or odours, other than those imparted by any added ingredients. The product shall be clean, free from sand, grit and other foreign material and shall test negative for peroxidase. It shall not contain any added colour.
3. The product may be presented in one of the following styles and shall be labelled accordingly: - (i)Whole: the whole, intact head, which is trimmed at the base and which may have attached small, tender, modified leaves. (ii)Split: the whole head, cut vertically into two or more sections. (iii)Florets: segments of the head, which may have a portion of the secondary stem attached. Small, tender modified leaves may be present or attached to the units. (iv) Others: any other presentation of the product is permitted provided that it is sufficiently distinctive from other forms of presentation laid down in this standard and is adequately described on the label to avoid confusing or misleading the consumer.
4. The product shall not exceed the tolerance for visual defects as given in Table below. The maximum number of defects shall not exceed the tolerance given in column (3) (4) and (5) of the following Tables. The combined total of all categories shall not exceed the limits indicated in below table for split, florets and other styles. The standard sample size shall be 500gm

### **Split, Florets and Other Styles**

S.No.	Defects	Total allowable numbers of defects for each Category (Maximum)		
(1)	(2)	(3)	(4)	(5)
		Category 1 (Minor)	Category 2 For whole style	Category 3 (Serious)
1.	Discolouration(each unit)- Light and Dark	25	16	4
2.	Blemished (each head)- Minor, Major and Serious			
3.	Mechanical Damaged (each unit)			
4.	Fibrous (each unit)- Fibrous Major and Fibrous Serious			
5.	Poorly trimmed (each unit )			
6.	Leaves (each 2cm <sup>2</sup> )			
7.	Fragments (each 3per cent. m/m)			
8.	Not compact (Each area or combined area of 12 cm <sup>2</sup> )			
9.	Loose stem (each piece)	25		

#### **FROZEN PEAS:**

1. Frozen peas shall be prepared from fresh, clean, sound, whole, immature seeds of peas plant of the species *Pisum sativum L* which have been washed, sufficiently blanched to ensure inactivation of enzymes and adequate stability of colour and flavour. It shall be stored at - 18°C or below.
2. The product may contain sugars (Sucrose, invert sugar, dextrose, fructose, glucose syrup, dried glucose syrup), salt, spices and herbs, edible fats and oils, sauces, milk solids and

any other ingredients suitable to the product whose standards are prescribed under Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011.

3. The product shall be of reasonably uniform green colour according to type, whole, clean, free from foreign matter and damage by insects or diseases. It shall be free from any foreign taste or smell and shall have a normal flavour, taking into consideration any ingredients added. It shall not contain any added colour.
4. The Alcohol-insoluble solid content (m/m) of the product shall not be more than 23 per cent. for the sample size of 500 gm of product tolerance limits of defects shall not exceed the following:

S.No.	Defects	Tolerance limits
1.	Blond Peas, m/m	Not more than 10 per cent
2.	Blemished Peas, m/m	Not more than 8 per cent.
3.	Seriously Blemished Peas, m/m	Not more than 4 per cent.
4.	Pea Fragments, m/m	Not more than 15 per cent.
5.	Extraneous Vegetable Matter, m/m	Not more than 1 per cent.

#### 4.2. Food Safety

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration

#### **SANITARY AND HYGIENIC REQUIREMENTS FOR FOOD MANUFACTURER/PROCESSOR/HANDLER**

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
3. The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.



4. Floors, Ceilings and walls must be maintained in a sound condition. They should be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects. No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free The water used in the manufacturing shall be potable and if required chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.
6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.
7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.
8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).
9. All equipment's shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
10. All equipment's shall be placed well away from the walls to allow proper inspection.
11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.
12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.

14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet. Scratching of body parts, hair shall be avoided during food handling processes.
15. All food handlers should avoid wearing, false nails or other items or loose jewellery that might fall into food and also avoid touching their face or hair.
16. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
17. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.
18. The vehicles used to transport foods must be maintained in good repair and kept clean.
19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Insecticides / disinfectants shall be kept and stored separately and away from food manufacturing / storing/ handling areas.

#### **4.3. Labelling Standards**

Labelling requirements for packaged food products as laid down in the Part VII of the Prevention of Food Adulteration (PFA) Rules, 1955, and the Standards of Weights and Measures (Packaged Commodities) Rules of 1977, require that the labels contain the following information:

1. Name, trade name or description
2. Name of ingredients used in the product in descending order of their composition by weight or volume
3. Name and complete address of manufacturer/packer, importer, country of origin of the imported food (if the food article is manufactured outside India, but packed in India)
4. Nutritional Information
5. Information Relating to Food Additives, Colors and Flavors
6. Instructions for Use

7. Veg or Non-Veg Symbol
8. Net weight, number or volume of contents
9. Distinctive batch, lot or code number
10. Month and year of manufacture and packaging
11. Month and year by which the product is best consumed
12. Maximum retail price
13. Fssai Logo

#### **4.3.1. Wherever applicable, the product label also must contain the following**

The purpose of irradiation and license number in case of irradiated food. Extraneous addition of colouring material. Non-vegetarian food – any food which contains whole or part of any animal including birds, fresh water or marine animals, eggs or product of any animal origin as an ingredient, not including milk or milk products – must have a symbol of a brown color-filled circle inside a brown square outline prominently displayed on the package, contrasting against the background on the display label in close proximity to the name or brand name of the food.

Vegetarian food must have a similar symbol of green color-filled circle inside a square with a green outline prominently displayed.

All declarations may be: Printed in English or Hindi on a label securely affixed to the package, or Made on an additional wrapper containing the imported package, or Printed on the package itself, or May be made on a card or tape affixed firmly to the package and bearing the required information prior to customs clearance.

Exporters should review the Chapter 2 of the “FSS (Packaging and Labelling) Regulation 2011” and the Compendium of Food Safety and Standards (Packaging and Labelling) Regulation before designing labels for products to be exported to India. FSSAI revised the labelling Regulation and a draft notification to that effect was published on April 11, 2018, inviting comments from WTO member countries and the comments received are under review and the publication date remains unknown.

According to the FSS Packaging and Labelling Regulation 2011, “pre-packaged” or “pre packed food” including multi-piece packages, should carry mandatory information on the label.



## Contact Us

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