

PM Formalisation of Micro Food Processing Enterprises Scheme

HANDBOOK OF PROCESSING OF POTATO CHIPS



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CHAPTER 1

INTRODUCTION

1.1 ABOUT POTATO

Potatoes are a versatile vegetable that is a common household staple. It is a root vegetable native to the Americas that comes from the starchy tuber of the plant *Solanum tuberosum*. The plant is a perennial in the nightshade Solanaceae family (Solanaceae). The Spanish brought potatoes from the Americas to Europe in the second half of the 16th century. They are now a staple food in many parts of the world, as well as an essential component of much of the world's food supply. There are now over 5,000 different types of potatoes as a result of millennia of selective breeding.

Potato plants are herbaceous perennials with leaves that die back after flowering, fruiting, and tuber formation. They have flowers that are white, pink, red, blue, or purple with yellow stamens. In general, potatoes are classified into a few major groups based on common characteristics, such as russet (rough brown skin), red, white, yellow (also known as Yukon), and purple potatoes. For culinary purposes, waxiness is often used to distinguish varieties: floury or mealy baking potatoes have more starch (20-22%) than waxy boiling potatoes (16-18%). The difference could also be due to differences in the comparative ratios of two different potato starch compounds: amylose and amylopectin. Potatoes suitable for making potato chips or crisps are sometimes referred to as "chipping potatoes," indicating that they meet the basic requirements of similar varietal characteristics such as firmness, cleanliness, and shape.



Varieties

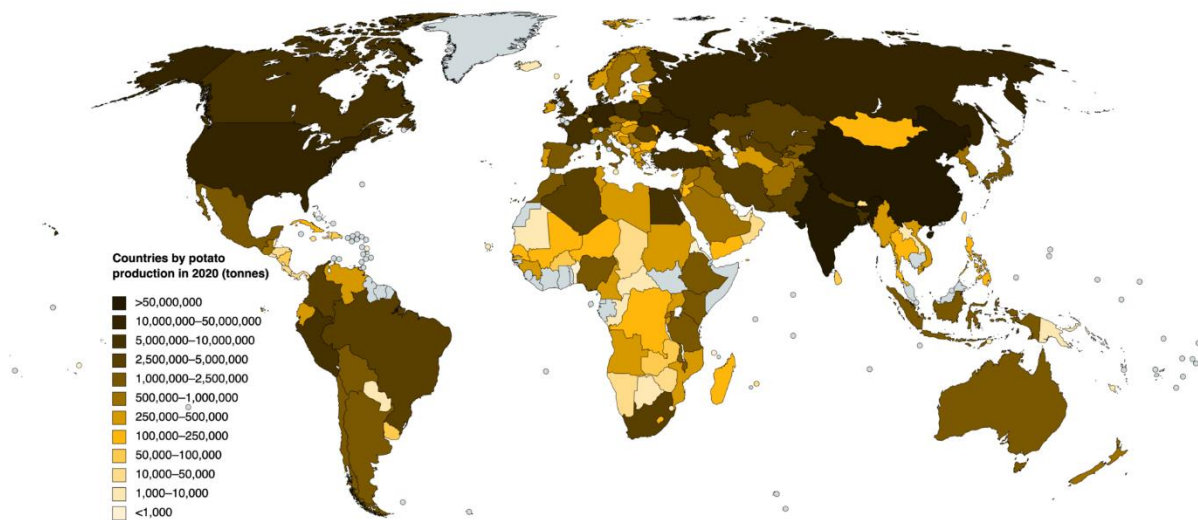
The nutritional value of potatoes is distinctive. Additionally, it is used in a number of industrial processes, such as the production of starch and alcohol. For at least 300 years, and possibly longer, potatoes have been grown in almost all of India's states. Few of the varieties are: Kufri Sindhuri as well as Kufri Jyoti are good for processing. Instant flakes and chips are produced from Kufri Chandramukhi and Kufri Lauvkar, which are grown in Bihar, Gujarat, Haryana, Punjab, Madhya Pradesh, Himachal Pradesh, and Uttar Pradesh. Kufri Badshah, Kufri Bahar, Kufri Lalima, Kufri Jawahar, Kufri Sutlej, Kufri Ashoka, and Kufri Pukhraj are suitable for cooking or table use. To make chips and French fries, Kufri Chipsona-1, Kufri Chipsona-2, and Kufri Anand, which are primarily grown in Bihar and Uttar Pradesh are used.

1.2 MARKET SITUATION

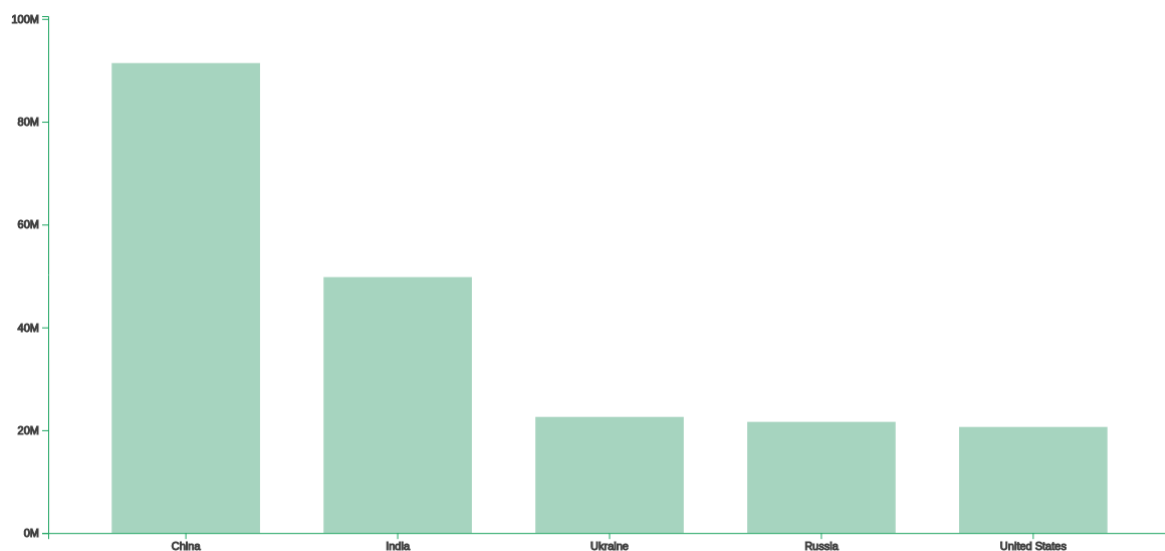
The processed potato market has experienced significant growth globally, owing to increased demand for snack foods, prepared ready meals, and shifting consumer preferences toward convenience foods. Potato processing is a significant sub-segment of the processed foods market, accounting for approximately 2.5% of the total \$3000 billion processed foods market. Global potato consumption as food is rapidly shifting toward value-added processed food products, primarily frozen food. Restaurants and fast-food chains around the world continue to offer more varieties of processed potato items. Potato chips, French fries, and flakes continue to be the most popular processed potato applications.

Global Scenario

The total global potato production in 2020 was estimated to be 359,071,403 metric tonnes, up 1.2% from 354,812,093 tonnes in 2019. China was the leading producer, accounting for 21.8% of global output, followed by India (14.3%) and Ukraine. **(Source: Food and Agriculture Organization Corporate Statistical Database).**



Countries by potato production, 2020



Top 5 Countries in Potatoes Production 2020, FAO

National Scenario

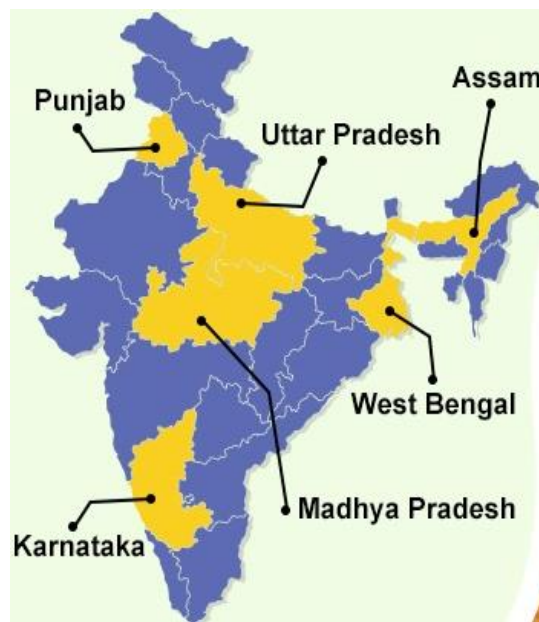
Total Potato production in India was expected to be 53.6 million Tonne in 2021-2022, compared to 56.2 million Tonne in 2020-21 (**Source: NHB**).

Potato Production in '000 MT			
	2019-2020	2020-2021 (Final)	2021-2022 (1st Advance Estimate)
All India Production	48562	56173	53603

Although potato is cultivated all over India but major potato producing states are Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab, Karnataka, Haryana, Jharkhand.

States producing Potato	Area in '000 Ha	Production in '000 MT
Uttar Pradesh	622.50	16161.97
West Bengal	447.45	12403.13
Bihar	330.00	9125.80
Gujarat	127.80	3700.00
Madhya Pradesh	158.40	3587.90

2021-2022 Third Advance Estimates: National Horticulture Board, DA&FW



Major potato producing states

Export

More than 30 nations around the world are recipients of Indian potato (fresh or chilled) exports. According to the data of Directorate General of Commercial Intelligence and Statistics (DGCIS), value of exports of potatoes in 2021-2022 was of ₹614.90 crores. Nepal is India's largest partner for potato exports; in 2021–2022, it recorded ₹ 291.97 crores, or about 45% of India's total potato exports. Indonesia, Oman, Malaysia, Mauritius, Sri Lanka, Bangladesh and other nations are among the major export destinations for Indian potatoes.

Import

Bhutan had a 99% market share in the import of potatoes, fresh or chilled for India in 2021–2022, followed by the Netherlands and Niger.

1.3 HEALTH BENEFITS OF POTATO

1. Packed With Nutrients

Potatoes are high in vitamins and minerals, but the variety and method of preparation can affect the nutritional content. The skin of potatoes contains a high concentration of vitamins and minerals as well.

2. Contains antioxidants

Compounds like flavonoids, carotenoids, and phenolic acids are abundant in potatoes. Through the neutralisation of potentially harmful molecules known as free radicals, these substances function as antioxidants in the body. Free radicals can raise the risk of developing chronic illnesses like cancer, diabetes, and heart disease when they build up.

3. Potentially Improve Blood Sugar Control

Resistant starch is a unique kind of starch found in potatoes. The body does not fully digest and absorb this starch. Instead, it enters the large intestine, where it provides nutrients to the good bacteria in the gut, potentially reducing insulin resistance. In turn, this could facilitate better blood sugar regulation.

4. Could Enhance Digestive Health

Potato resistant starch serves as a food source for good gut bacteria. They transform it into the short-chain fatty acid butyrate, which has been associated with lowered colorectal cancer risk, improved colon defences, and decreased colon inflammation.

5. Gluten-Free by Nature

Gluten-containing foods can cause severe discomfort in people with celiac disease or non-celiac gluten sensitivity. Potatoes are naturally gluten-free, making them an excellent food choice for people with celiac disease or non-celiac gluten sensitivity.

6. Extremely Filling

Filling foods may aid in weight regulation or loss by alleviating hunger pangs. According to studies, potatoes are one of the most filling foods. They may raise levels of fullness hormones like cholecystokinin (CCK). Some evidence suggests that a potato protein called potato proteinase inhibitor 2 (PI2) can suppress appetite.

7. Highly Versatile

Potatoes are not only flavourful and delicious but also healthy. There are many ways to cook potatoes, including baking, steaming, and boiling. The majority of the nutrients are found in the potato skin, so removal of the skin should be avoided. This will guarantee that the potato contains the most nutrients possible.

Nutritional content

POTATOES, WHITE, FLESH & SKIN, RAW		
Sl. No.	Nutrient	Amount(/100g)
1.	Water	81.6 gm
2.	Energy	69 kcal
3.	Protein	1.68 gm
4.	Fibre, total dietary	2.4 gm
5.	Carbohydrate	15.7 gm
6.	Total lipid (fat)	0.1 gm
7.	Sugars	1.15 gm
8.	Vitamin C, total ascorbic acid	9.1 mg
9.	Calcium	9 mg
10.	Magnesium	21 mg
11.	Potassium	407 mg

(Source: USDA)

1.4 VALUE ADDITION

In addition to being widely consumed as a vegetable, potatoes are also used as animal feed and in a variety of other products, including starch, flour, alcohol, and dextrin. A quarter of the potatoes that spoil for a variety of reasons are thought to be saved by processing and

preserving different kinds of processed goods. The potatoes can be processed into wafers, chips, powder, flakes, granules, canned slices, and other products for preservation and value-adding. Potato granules are used to prepare a variety of recipes, to add to both vegetable and non-vegetable recipes, and to increase both the quantity and the nutritional value of the food. Potato flakes, potato powder, frozen potatoes, frozen French fries, and potato chips/wafers are some of the most widely consumed snack foods in the world, so there is a huge market for processed potato products.

1.5 POTATO CHIPS

A thin slice of potato that has been deep-fried, baked, or air-fried until crunchy is known as a potato chip. They are frequently offered as a side dish, appetiser, or snack. The basic chips are salted and cooked; the additional varieties are made with a variety of flavourings and ingredients, such as cheeses, herbs, spices, and other natural or artificial flavours. They can be consumed either at room temperature or fresh and hot. The potato chip has become a widely consumed food item, and many countries have developed their own distinctive versions of the snack food using local ingredients and seasonings. Potato chips are sold in most markets, and there is frequently an amazing selection. In any case, there are numerous methods for making and consuming potato chips. The potatoes can be fried or baked, the skin can be removed or left on, and the chips can be cut into ruffles or left flat. 2 Some are made in olive oil, while others are made in corn or soy oil. Many individuals enjoy eating potato chips straight up as a snack food. For added flavour, others may dip them in various materials such as dipping sauce.



CHAPTER 2

PROCESSING

2.1 INGREDIENTS USED

- Raw Potatoes-unblemished, freshly harvested
- Anti-browning agent-Citric acid 10mg/litre
- Salt and other flavouring mix

2.2 PROCESSING

1. Potato selection

The potatoes are examined and tested for quality when they arrive at the facility. The potatoes are inspected for imperfections and green edges. They move on a conveyor belt to the various manufacturing stages. It is preferable to buy potatoes that are of good quality, flawless, and free of any apparent microbial infection or mechanical fissures.

2. Washing

In a bubble washer, the chosen potatoes are taken and thoroughly washed with clean water to remove the external impurities. With 100 ppm chlorinated water, it can be cleaned.

3. Peeling and slicing

Potatoes can be peeled by hand or mechanical peelers can be used for large batches. The potatoes are washed in cold water following their peeling. In a rotating slicing machine, potatoes are cut into paper-thin slices that range in thickness from 0.066 to 0.072 inches (1.7 to 1.85 mm). Regular potato chips are produced by straight blades, while ridged chips are produced by rippled blades. The starch released when the potatoes are cut is washed off in a second cold-water wash of the slices. Mechanical slicers are preferred for cutting slices, since it can minimise edible portion loss and offer trouble-free-slicing at higher quality and better efficiency than manual slicing.

4. Blanching

Prior to drying, the enzymatic activities have to be stopped. Thus, blanching has a positive influence on the product's colour and oil absorption as well. The potato slices are submerged in a solution that has been pH, hardness, and mineral content adjusted. The slices are weighed out and submerged for 10-15 minutes in hot water that is 90°C and contains 0.1% KMS. 2 g of KMS are required for every kg of sliced potatoes. To avoid cooking, the blanched slices are cooled to room temperature by soaking them in cold water for 15 minutes.

5. Dewatering

Potato chips dewatering machine works on centrifugal principle to remove surface water of potato chips before frying. Drying has a significant effect on the deep frying. Potato slices and their nutritional value are not harmed by the drying machine. The most sophisticated type of dehydrator used in the potato chip processing industry is a potato chip dewatering machine. Reducing the food moisture content by drying can reduce oil absorption during frying by up to 54%.

6. Frying

The complex operation of frying involves submerging potato slices in hot vegetable oil. The ideal moisture content for freshly prepared fried chips is 4%, which is reduced from the initial moisture content of dried slices (75%) during the frying process. The slices are fried in refined vegetable oils like sunflower oil or edible oils like soy blended oil.

The dried slices are dropped into oil at a temperature of 170-190°C in a large frying pan and stirred with narrow wooden stick. When the chips transform to a light-yellow colour, they are drained from the frying pan.

Another frying technique that is frequently used in the large-scale production of potato chips is vacuum frying. It takes place under a negative pressure and at a low temperature, which lowers the boiling points of the water and frying oil in the product and preserves its quality. Lower than 100°C temperatures are used when vacuum frying. Since it effectively prevents the oxygen in oil reaction at high temperatures that occurs during standard frying under atmospheric pressure conditions, it is regarded as the best way to obtain high-quality products.

7. Cooling and sorting

The extra oil is removed, and the chips are then left to cool on a wire mesh or can be centrifuged in a separate machine at atmospheric pressure. Slices that are burned or undercooked are removed from the batch manually.

8. Salting & packing

The prepared chips are mixed with salt and spices in a drum mixer. The mixture of salt and other flavouring mix at the ratio of 2:1 @ 8 gm/100 gm is usually added to the fried chips. After salting and spicing, the chips can be packed and stored.

9. Packaging

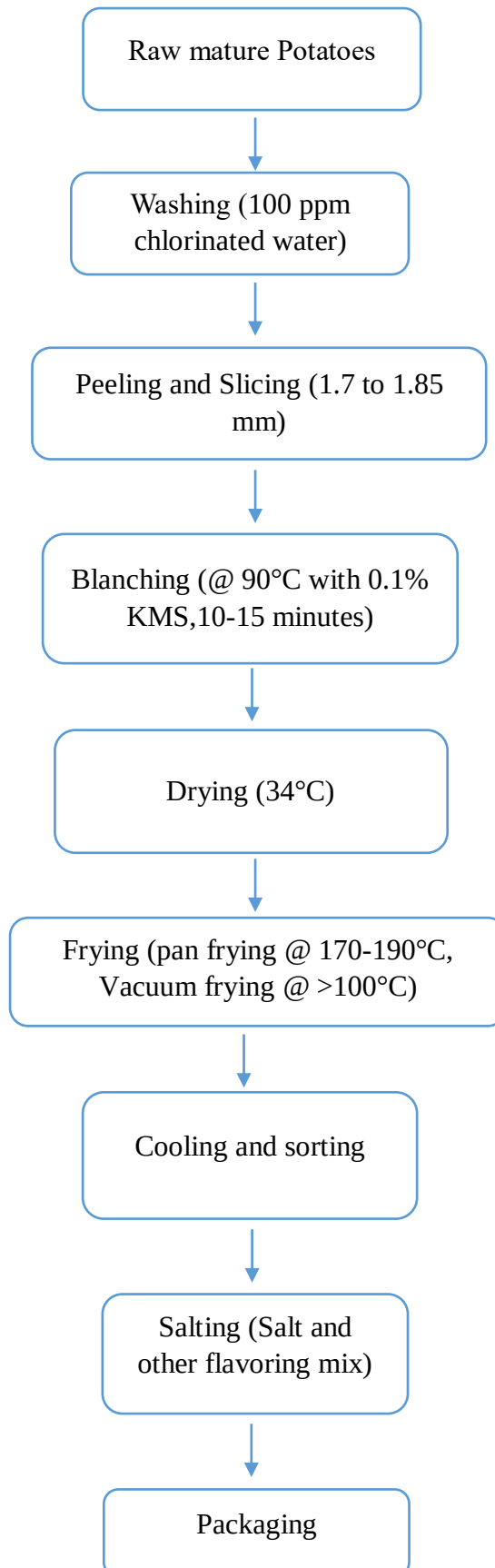
The chips are transferred to an automated packaging unit with a scale. An additional metal detector scans the chips as the predetermined weight of chips is determined to look for any foreign objects, such as metal fragments that might have come with the potatoes or come during the frying process. Filling must be done carefully to avoid filling too much air into the bag and to protect the chips from breaking. To fill the space in the bags, many manufacturers use nitrogen.

Potential issues and corrective actions

Problem	Issues	Corrective actions
Poor-quality, green potatoes	• Bruised, blemished and broken potatoes due to poor handling • Immature potatoes • Improper storage • Delayed processing • Delayed harvesting	• Handle potatoes carefully Store harvested potatoes in a cool place • Process potato within a week of harvesting • Harvest potatoes when fully mature and uniformly brown.

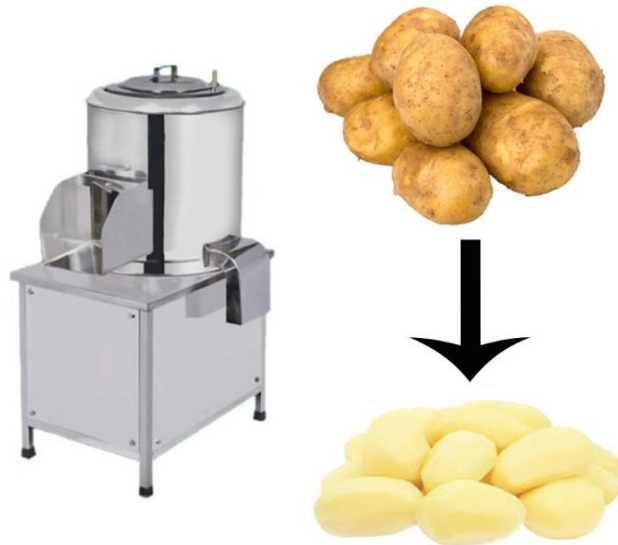
Discoloured chips	• Using mixed potatoes varieties Using different-sized chips • Not using anti-browning agent or not soaking in anti-browning agent for 15 minutes	• Use only one variety • Ensure chips are 1.7 to 1.85 mm thick • Use anti-browning agent as recommended
Decreased shelf life of chips	High moisture content due to • poor drying of chips • absorption of moisture by chips during storage	• Ensure chips are well dried to brittleness • Store in dry conditions • Use new, strong suitable material bags
Mushy potatoes that are difficult to peel, slice and dry	• Overcooking the potatoes • Use of near-rotten potatoes	• Avoid overcooking the potatoes. Use fully mature and not rotten potatoes

2.3 PROCESS FLOW CHART OF POTATO CHIPS



2.4 MACHINES USED

1. Stainless Potato Peeling Machine



2. Automatic Potato slicing machine



3. Vacuum Fryer



4. Automatic Blanching Machine



5. Tray Dryer



6. Automatic chips packaging machine





CHAPTER 3

PACKAGING

3.1. FEATURES OF PACKAGING MATERIAL FOR POTATO CHIPS

a) Grease-proof nature

The presence of fat indicates that the main requirement of snack food packaging is that it should be grease-proof. This requirement is of significance not only in reducing the rancidity but also to prevent unsightly staining of the package, smudging of the printing and to avoid the actual seepage of the oil and the greasy package feel.

b) Anti-Rancidity

Another requirement due to the high fat content is the prevention of the product coming in contact with the oxygen in the air. A packaging material with low oxygen permeability is desirable to be used, to prevent oxidation and rancidity of fat.

c) Retains crispness

One of the major properties of snacks is the crispness, which is achieved during the manufacture of the product by one of the drying methods such as roasting, baking or frying to reduce the level of moisture content. Retention of desirable texture (crispness) is directly related to the moisture level in the product. The moisture content of snack is very low, and any increase due to the hygroscopic nature of the product may lead to loss of crispness of the product. Moreover, added moisture also accelerates other biochemical changes such as oxidative rancidity. Low water vapour permeability of the package is, therefore, another very critical requirement.

d) Machinability



Some of the snacks have recently moved away from manual filling into preformed bags and are packed on automatic form-fill-seal machines which may run on fairly high speeds. Packaging materials must, therefore, be capable of running continuously and efficiently on these machines.

e) Physical strength

Due to the high fat content of the snack food products and the associated problem of rancidity, in some of the packages, where longer shelf-life is the requirement, oxygen inside the package may be replaced by an inert gas like nitrogen. The packaging material must be physically strong to withstand the processes of vacuumizing/ gas flushing. The question of stiffness of the material is also debatable. It is desirable that the package should be able to stand up on the shelf, however, high stiffness leads to problems of machinability.

f) Printability

The packaging material should provide a good printing surface. Attractive printing is the order of the day as a number of brands of similar snack food have to compete in the market.

g) Seal integrity

To ensure protection against environmental conditions and to provide a long shelf life, the seal integrity of the pack must be good enough to prevent leakage and/or prevent entry of the air or moisture through the seal areas.

3.2 TYPES OF PACKAGING FOR POTATO CHIPS

- Primary packing
- Secondary packing
- Tertiary packing

Primary Packaging – is the material that first envelops the product and hold it. This Usually is the smallest unit of distribution or use and is the package which is in direct contact with the contents. For Potato chips primary packaging available in the market are:

1. Flexible Plastics

The majority of snacks today are in flexible bags. For snack food in the Indian market, a range of flexible materials are used depending on the product and the market segment.

Low value, typically traditional snack food and chips may be branded or nonbranded. Non – branded snacks are packed for shorter shelf-life in unprinted low-density polyethylene (LDPE) and polypropylene (PP) pouches. For branded snacks and chips laminated structures are used.

Some of the typical structures are:

- BOPP / LDPE
- BOPP / Polyester / LDPE
- Metallised Polyester / LDPE
- BOPP / Metallised Polyester / LDPE
- Polyester / LDPE
- Polyester / Al foil / LDPE



2. Composite containers

Composite containers are used for packaging of moulded chips and nuts. The containers are round and the body (side walls) is made of PE coated foil laminated spirally wound paper. The top and bottom ends of the containers may be made from metal or plastic. The bottom may also be made from PE coated foil laminated paper. An aluminium pull-tab top and re-closable plastic lid on the container form a complete pack.



3. Tin plate containers

Rigid, round tinplate containers, which are internally lacquered are used for baked salted chips that are packed with an inert gas like nitrogen for extended shelf-life. The containers are provided with ring pull type, easy open tops, fitted with re-closable plastic caps.



4. Paper bag

Paper are sheet materials produced from an interlaced network of cellulose fibres. The fibres are then pulped, bleached, and treated with chemicals and strengthening agents to produce the paper product. However, Potato chips packed in paper bags are more likely to get rancid and may lose their crispness since paper does not provide absolute protection from air and moisture. Also, paper bags are not grease proof.



5. Other packaging materials

Other types of plastic packages less commonly used for Potato chips are PET containers and injection moulded PET or PP trays and cups with peelable lids.



Since the chips has porous nature with very low bulk-density, the head space oxygen normally present in a unit pack is sufficient to cause oxidative rancidity and spoil the product. Further, the sharp edges of the product require puncture resistant packing material.

Thus, Potato chips can effectively be packed in PE pouches/ HDPE pouches/ Aluminium foil laminates/ laminated polyester poly-pouches. For better shelf life, packaging in laminated polyester pouches with nitrogen flushing or air tight containers can be done. Vacuum fried Potato chips can be stored for more than three months under active modified atmosphere packaging using nitrogen flushing.

Secondary Packaging

Secondary packaging is used mainly for logistical and storage purposes, to protect and collect individual units. Sometimes is also referred to as grouped or display packaging as they are made to display multiple units of products for sale. This facilitates resupply from the warehouse to the store and includes shelf-ready packaging (SRP), retail-ready packaging (RRP) or counter display units (CDU).

Secondary Packing Available for Potato Chips in market



- Paper boards
- Cartons

Tertiary packaging

Tertiary packaging is typically not seen by consumers since it is usually removed by retailers before products are displayed for sale. It is one of the three types of wrapping used to protect manufactured goods for shipping or storing. It is used to protect not only the product but also its secondary and primary packaging.



- Used for handling of bulk during storage and transport.



- Carton palletized unit of secondary package. Package for any product is selected based on their characteristics and stability.

CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS

4.1 DEFINITION OF STANDARDS

According to Standard **15.1 Snacks - potato, cereal, flour or starch based (from roots and tubers, pulses and legumes)**

Includes all savoury snacks, with or without added flavourings, [but excludes unsweetened crackers (category 7.1.2). Example includes **potato chips**, popcorn, pretzels, rice crackers, flavoured crackers (e.g. cheese-flavoured crackers), bhujia (namkeen; snack made of a mixture of flours, maize, potatoes, salt, dried fruit, peanuts, spices, colours, flavours, and antioxidants), and papads(prepared from soaked rice flour or from black gram or cow pea flour, mixed with salt and spices, and formed into balls or flat cakes), khari, kara, murukku, namakpara, chiwda, palakayalu, ribbon or thattupakoda, dalmoth or mixtures, soya nuts, nimki, fali (e.g. cholafali), other fried or baked snacks or savouries, uppuseedai, appam, bhel-mix, sev, gathiya, shankarpali, farsan, kurmura, murmura, papadi, crisps, chakli, etc. Also includes sweet snacks e.g., chikki, gajak, murrunda, gudchana, sugar coated dals and other sweet dal snacks (dals coated with jaggery, sugar, honey and other ingredients).

Use of food additives in food products

Food products may contain additives as specified in these regulations and given in the following Table.

Fruits and Vegetables				
Food Category System	Food Category Name	Food Additive	INS No	Recommended maximum level
15.1	Snacks and savouries –potato, cereal,	THIODIPROPIONATES		
		TBHQ	319	200mg/kg
		ASCORBYL ESTERS		200 mg/kg
		Allura red AC	129	100 mg/kg
		Brilliant blue FCF	133	100 mg/kg

	flour or starch based (From roots and tubers, pulses and legumes)	Butylated hydroxyanisole (BHA)	320	200 mg/kg
		CAROTENOIDS		100 mg/kg
		CHLOROPHYLLS AND CHLOROPHYLLINS, COPPER COMPLEXES		
		Canthaxanthin	161g	45 mg/kg
		beta-Carotenes, vegetable	160a(ii)	100 mg/kg
		Cyclodextrin, beta-	459	500 mg/kg
		Diacetyltartaric and fatty acid esters of glycerol	472e	20,000 mg/kg
		Grape skin extract	163(ii)	500 mg/kg
		HYDROXYBENZOATES, PARA-		300 mg/kg
		IRON OXIDES		500 mg/kg
		Indigotine (Indigo carmine)	132	100 mg/kg
		Ponceau 4R	124	100 mg/kg
		Propyl gallate	310	200 mg/kg
		RIBOFLAVINS		300 mg/kg
		BENZOATES		1,000 mg/kg
		SORBATES		1,000 mg/kg
		SULFITES		50 mg/kg
		TOCOPHEROLS		GMP
		Sunset yellow FCF	110	100 mg/kg

4.2 FOOD SAFETY AND STANDARDS (CONTAMINANTS, TOXINS AND RESIDUES) REGULATIONS, 2011

CONTAMINANTS, TOXINS AND RESIDUES

- METAL CONTAMINANTS

1. Chemicals described in monographs of the Indian Pharmacopoeia when used in foods, shall not contain metal contaminants beyond the limits specified in the appropriate monographs of the Indian Pharmacopoeia for the time being in force.
2. Notwithstanding anything contained in clause (1) above, no article of food specified in column (2) of the table below shall contain any metal specified in excess of the quantity specified in column (3) of the said table:

Name of Metal Contaminant	Article of food	Parts per Million (mg/kg or mg/L)
(1)	(2)	(3)
Cadmium	Potato, Peeled	0.1

- RESIDUES

Restriction on the use of insecticides:

- (1) The expression “insecticide” shall have the meaning assigned to it in the Insecticide Act, 1968 (46 of 1968).
- (2) Subject to the provisions of clause (3), no insecticides shall be used directly on articles of food: Provided that nothing in this regulation shall apply to the fumigants which are registered and recommended for use as such on articles of food by the Registration Committee, constituted under section 5 of the Insecticides Act, 1968 (46 of 1968).

Food	Name of the Insecticide	Maximum Residue Limit (MRL) in mg/kg
Potato	2,4-Dichlorophenoxy Acetic Acid	0.2
	Ametroctadin	0.05
	Azoxystrobin	7
	Carbaryl	0.2
	Carbendazim	0.01
	Chlormequat Chloride (CCC)	0.1
	Chlorothalonil	0.1
	Chlorpropham	30
	Chlorpyrifos	2
	Cyazofamid	0.02
	Cymoxanil	0.01
	Dimethomorph	0.05
	Dithiocarbamates(the residue tolerance limit are determined and expressed as mg/CS ₂ /kg and refer separately to the residues arising from any or each group of dithiocarbamates)	0.2
	Metiram as CS ₂	0.2
	Kresoxim Methyl	0.02
	Fenamidone	0.02
	Hexaconazole	0.02
	Mandipropamid	0.05
	Mepiquat Chloride	0.1
	Metalaxyl-M	0.05
	Metribuzin	0.05
	Oxyfluorfen	0.01
	Paraquat dichloride (Determined as Paraquatcations)	0.2
	Propineb	0.5
	Pyraclostrobin	0.05
	Thiamethoxam	0.30

	Thiometon(Residues determined as thiometon its sulfoxide and sulphone expressed as thiometon)	0.05
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4.3 FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, 2011

FSSAI 2.1: Packaging

2.1.1: General Requirements

1. A utensil or container made of the following materials or metals, when used in the preparation, packaging and storing of food shall be deemed to render it unfit for human consumption:— (a) containers which are rusty; (b) enamelled containers which have become chipped and rusty; (c) copper or brass containers which are not properly tinned (d) containers made of aluminium not conforming in chemical composition to IS:20 specification for Cast Aluminium & Aluminium Alloy for utensils or IS:21 specification for Wrought Aluminium and Aluminium Alloy for utensils.

2. Containers made of plastic materials should conform to the following Indian Standards Specification, used as appliances or receptacles for packing or storing whether partly or wholly, food articles namely: —

- (i) IS: 10146 (Specification for Polyethylene in contact with foodstuffs);
- (ii) IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs);
- (iii) IS: 10151 (Specification for Polyvinyl Chloride (PVC), in contact with foodstuffs);
- (iv) IS: 10910 (Specification for Polypropylene in contact with foodstuffs);
- (v) IS: 11434 (Specification for Ionomer Resins in contact with foodstuffs);
- (vi) IS: 11704 Specification for Ethylene Acrylic Acid (EAA) copolymer.
- (vii) IS: 12252 - Specification for Poly alkylene terephthalates (PET).
- (viii) IS: 12247 - Specification for Nylon 6 Polymer;
- (ix) IS: 13601 - Ethylene Vinyl Acetate (EVA);
- (x) IS: 13576 - Ethylene Metha Acrylic Acid (EMAA);

(xi) Tin and plastic containers once used, shall not be re-used for packaging of edible oils and fats; Provided that utensils or containers made of copper though not properly tinned, may be used for the preparation of sugar confectionery or essential oils and mere use of such utensils or containers shall not be deemed to render sugar confectionery or essential oils unfit for human consumption.

Labelling Requirements

All food products sold in India that are pre-packaged are required to comply with the Food Safety and Standards (Packaging and labelling) Regulations, 2011. The Food Safety and Standards Regulation, 2011 is a notification issued by the Food Safety and Standards Authority of India under the Ministry of Health and Family Welfare.

Applicability of Food Labelling Regulations

The food labelling regulations require all “Pre-packaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, pre-packaged food means food, which is placed in a package of any nature, in such a manner that the contents cannot be changed without tampering it and which is ready for sale to the consumer.

General Labelling Requirements

The following labelling requirements must be complied with by all pre-packaged food sold in India:

- The label must be in English or Hindi or Devnagri language. In addition to the above, the label can contain information in any other language, as required.
- The label must not contain information about the food that could be deemed to be false, misleading, deceptive or otherwise create an erroneous impression regarding the product.
- The label must be affixed to the container in such a manner that it would not easily be separated from the container.
- The contents or information presented in the label should be clear, prominent, indelible and readily legible by the consumer.
- If the container is covered by a wrapper, then the wrapper must contain necessary information or make the label of the product inside readily legible by not obscuring.

- The name of the food must be mentioned along with the trade name and description of the food contained. In case the food contains more than one ingredient, then a list of ingredients must be presented in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture;

Nutritional Information

- Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product must be given on the label along with the following information:
 - energy value in kcal;
 - the amounts of protein, carbohydrate (specify the quantity of sugar) and fat in gram (g) or ml;
 - the amount of any other nutrient for which a nutrition or health claim is made:

It is important to note that any “health claim” or “nutrition claim” or “risk reduction” claim made in the label will be thoroughly scrutinized by the FSSAI authorities. Hence, any such claim must be validated by test data. As per the rules, the following is the definition for “health claim”, “nutrition claim” and “risk reduction” claim:

- **“Health claims”** means any representation that states, suggests or implies that a relationship exists between a food or a constituent of that food and health and include nutrition claims which describe the physiological role of the nutrient in growth, development and normal functions of the body, other functional claims concerning specific beneficial effect of the consumption of food or its constituents, in the context of the total diet, on normal functions or biological activities of the body and such claims relate to a positive contribution to health or to the improvement of function or to modifying or preserving health, or disease, risk reduction claim relating to the consumption of a food or food constituents, in the context of the total diet, to the reduced risk of developing a disease or health-related condition;
- **“Nutrition claim”** means any representation which states, suggests or implies that a food has particular nutritional properties which are not limited to the energy value but include protein, fat carbohydrates, vitamins and minerals;
- **“Risk reduction”** in the context of health claims means significantly altering a major risk factor for a disease or health-related condition

Veg or Non-Veg Symbol

All packaged food that is “Non-Vegetarian” must have a symbol that is a brown colour filled circle inside a square with a brown outline. If a food contains only egg as a non-vegetarian ingredient, then the manufacturer may provide a declaration that the product contains only egg and add the non-vegetarian symbol.



Non-Veg Symbol

Packaged vegetarian food should have a symbol that consist of green colour filled circle inside a green square.



Vegetarian Symbol

Information Relating to Food Additives, Colours and Flavours

Food additives contained in the food product must be mentioned along with class titles along with the specific names or recognized international numerical identifications. Addition of colouring matter should be mentioned on the label along with certain statements like “CONTAINS PERMITTED NATURAL COLOUR(S)”, just beneath the list of the ingredients on the label. In case of addition of extraneous flavouring agent, then it should be mentioned in a statement like “CONTAINS ADDED FLAVOUR” just beneath the list of ingredients on the label.

Name and Complete Address of the Manufacturer

The name and complete address of the manufacturer must be mentioned on every package of food. In the case of imported food, the package must contain the name and complete address of the importer in India.

Net Quantity

All packaged food must carry the net quantity by weight or volume or number, as the case may be. The net quantity of the commodity contained in the package must exclude the weight of the wrappers and packaging materials.

Lot Number of Batch Identification



A lot number or batch number or code number must be mentioned on all packaged food so that it can be traced while manufacturing and distribution. Only bread and milk including sterilised milk are not required to comply with this regulation.

Date of Manufacture or Packing

The date, month and year in which the commodity is manufactured, packed or pre-packed must be mentioned on the label. In the case of food products having a shelf life of more than three months, then the month and the year of manufacture can be given with the “Best Before Date”. In case of products having a shelf life of fewer than three months, the date, month and year in which the commodity is manufactured or prepared or pre-packed must be mentioned on the label with best before date.

Country of Origin for Imported Food

For imported food, the country of origin of the food should be declared on the label of the food. In case a food product undergoes processing in a second country which changes its nature, the country in which the processing is performed should be considered to be the country of origin for the purposes of labelling.

Instructions for Use

Instructions for use, including reconstitution, should be included on the label, if necessary, to ensure correct utilization of the food.



4.4 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 equipments 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 equipments 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.



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