



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Mango RTS



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TABLE OF CONTENTS

Page No.

Chapter 1: Introduction

1.1 Scope of starting Mango Ready to Serve industry	3
1.2 Nutritional Values of Mango	3
1.3 Health Benefits of Mango Fruit	6

Chapter 2: Preparation of Mango RTS

2.1 Materials and Methods	7
2.2 2 Process Flow Chart	8

Chapter 3: Packaging of Mango RTS

3.1 Packaging of Mango Ready to Serve	9
3.2 Importance of Proper Packaging	9
3.3 Reason for Quality Changes in RTS Products	10
3.4 Parameters to Be Considered When Selecting a Packaging	10
3.5 Packaging Classification	11

Chapter 4: Food Safety Regulations & Standards

4.1 Overview	15
4.2 Food Safety	17
4.3 Labelling Standards	20

CHAPTER 1

INTRODUCTION

1.1 Scope of starting Mango Ready to Serve industry

Soft beverage industry has made significant progress during last several years in terms of production, but there is only a limited range of flavors available in India. Many types of syrups, sherbets and soft drinks containing artificial fruit flavors are well known throughout the world. The basic factor considered is the nutritive and therapeutic values, which make them popular and acceptable. At present fruit beverages are generally synthetic flavored, bottled and sold in the market.

The development of nutritionally value added product could therapeutically help on improving the health of consumers. Mango pulp can be utilized to make the product therapeutic, prophylactic and nutritionally rich which may increase its demand in food and beverage industry. Introduction of new types of value added beverages might improve socio-economic status of the country.

Mango (*Mangifera indica* L.) is one of the favored fruits in the tropical and sub-tropical regions. It has an excellent flavor, attractive fragrance, delicious taste and high nutritional value that have made it one of the best fruits.

Originating from India and Malaysia, mango is a common tropical fruit. It looks oval and light yellow. Mango is rich in protein, vitamin, minerals and other nutrients. It has efficacy of anti-oxidation, which can lower the risk of cancer, prevent cardiovascular disease, resolve phlegm, delay senescence, strengthen stomach and anti-depression. Mango pulps taste sweet, which can be eaten directly or made into dried fruits. Usually, mangos are processed into mango juice, brewed wine, mango vinegar, dried mango, and canned mango

Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the

synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate. Fruit juices or pulp used for the preparation of these products are subjected to minimal processing operations like filtration, clarification and pasteurization. The fruit juice or pulp, are mixed with ingredients like sugar, acid, stabilizers, micronutrients and preservative to develop beverages and drinks. There are various categories of fruit juice or pulp based beverages and drinks which are listed below.

Natural fruit juices, sweetened juices, ready-to-serve beverages, nectar, cordial, squash, crush, syrup, fruit juice concentrate and fruit juice powder belong to the category of non-alcoholic and non-carbonated beverages. The principle groups of fruit beverages are as follows:

1. Ready-to-Serve (RTS) pre-packaged Beverages
2. Fruit juice and Nectars
3. Dilutable beverages

The ready-to-serve beverages as per FSSAI specifications should contain at least 10 percent fruit content and not less than 10 percent TSS besides 0.3% acid maximum as citric acid. The levels of permitted preservatives include 70 ppm (maximum) for Sulphur dioxide and 120 ppm (maximum) for benzoic acid. The total plate count and yeast and mold counts should not exceed, to 50.0 cfu/ml and 2.0 cfu/ml, respectively. The Coliform counts should be nil in 100 ml beverage samples.

Since these beverages are consumed as such without dilution, hence are termed as Ready-to-serve beverage. The majority of packaged fruit beverages belong to this category. Wide range of fruits including mango, citrus fruits, berries, litchi, guava, pineapple, grapes etc. are preferred for RTS beverages. Required amount of sugar, acid, stabilizer, coloring and flavoring ingredients are added in juice or pulp along with water and the mixture is blending properly, filtered if desired. The RTS mix is pasteurized (80-90 ° C) in bottle (20-30 min), continuous juice pasteurizer (few seconds

to one minute) and cooled immediately. Nowadays, UHT processing of RTS beverages is quite popular because of longer shelf-life and less loss of nutrients during processing.

The amount of fruit juice or pulp may vary according to fruit and cost effectiveness. The presence of oxygen in headspace often leads to oxidation resulting in off-flavor and loss of nutritive value, hence anti-oxidants such as ascorbic acid is often added in RTS beverages. Besides it, color and flavor ingredients which are stable to heat and oxygen are preferred.

1.2 Nutritional Values of Mango:

Sl. No	Nutrients	Mango Fruit
1	Moisture (%)	81.0
2	Protein (g)	0.6
3	Fat (g)	0.4
4	Minerals (g)	0.4
5	Crude Fiber (g)	0.7
6	Carbohydrates (g)	16.9
7	Energy (kcal)	74
8	Calcium (mg)	14
9	Phosphorous (mg)	16
10	Iron (mg)	1.3

1.3 Health Benefits of Mango Fruit

1. Promotes Eye health - Rich in beta-carotene that helps in the production of Vitamin A
2. Prevent Cancer - antioxidants -quercetin, isoquercitrin Protects against Carcinogens
3. Cholesterol level - high vitamin C, fiber and pectin Helps Maintain the Fat level
4. Cleansing Skin - It cleanses your skin from deep inside your body.
5. Immune System - vitamin C, carotenoids Responsible for Boosting immune
6. Prevents Anemia- iron content in mango is a natural remedy for anemic people.

CHAPTER 2

PREPARATION OF MANGO RTS

2.1 Materials and Methods

Ingredients:

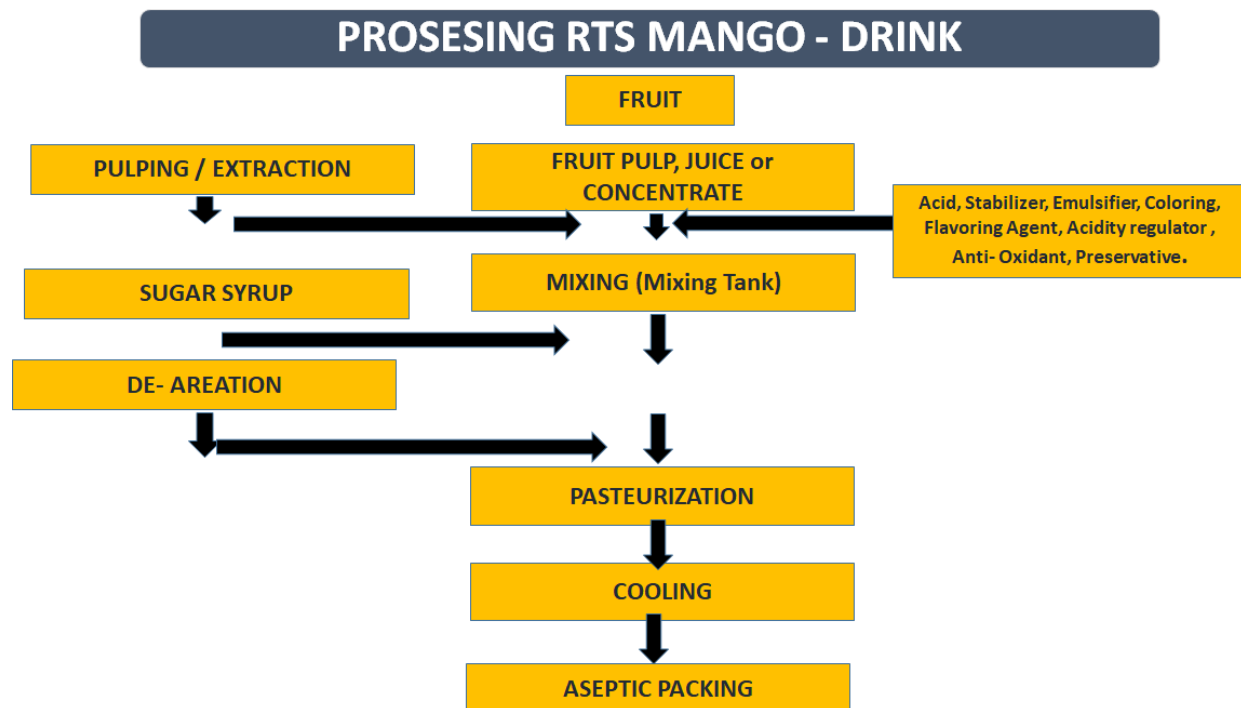
- Liquid Glucose
- Invert Sugar
- Salt
- Milk
- Flavors
- Fruit essences
- Peel oil
- Sugar
- Water

Machines:

- **Cleaner**- To remove adhering dirt, to remove latex strains, to remove surface organism if any, Wash with 50 ppm chlorine to prevent the microbial contamination
- **Peeler/ Pulper** - Graded mangos are washed in the bubble washing machine then transferred through the conveyer belt for peeling and stone removal, fruits passed to pulping machine to get puree.
 - Slice and scoop out flesh from the cheek halves.
 - Peel and scrape the remaining flesh from the seed.
 - Liquefy flesh in a continuous pulping blender. Strain.
- **Homogenizer**
 - The mango juice will be homogenized under 20-25 MPa pressure for 2-3 times in a homogenizer.

- Then the big particles in mango juice are crushed to under the size of 1-5 μm .
- Homogenization can unify the particles in fruit juice, regulate sediments and improve drink taste
- **Pasteurizer**
 - Sterilization is necessary to ensure the shelf life of mango juice.
 - The sterilization temperature can be adjusted from 62°C to 85°C for 1 minute.
 - It can eliminate bacteria, yeast and inhibit enzyme activity in fruit juice
- **Packaging machine** (bottling filling and sealing machine, pouch packaging,

2.2 Process Flow Chart



CHAPTER 3

PACKAGING OF MANGO RTS

3.1 Packaging of Mango Ready to Serve

Ready to Serve Beverages means a fruit drink intended for consumption without dilution Prepared from: unfermented but fermentable fruit juice or puree or concentrate with or without some of the pulp and containing any soluble sweetener and portable water.

-Basic Requirement of Ready to Serve (Mango Drink/ Nectar/ Puree)

Chemical Parameter	Thermally Processed Fruit Drink
TSS (%)	15
Acidity (%)	-
Added Nutritive Sweeteners (g/kg)	-
Minimum Fruit Juice content (%)	10

3.2 Importance of Proper Packaging

- Loss of Ascorbic acid
- Change in pH
- Decrease in Acidity
- Change in Color
- Increase in TSS

- High Microbial Load

3.3 Reason for Quality Changes in RTS Products

S. No	Changes during storage	Causes
1.	Change in Color	<ul style="list-style-type: none"> • Due to oxidative and enzymatic degradation of the major pigments / High storage temperature
2.	Decrease in Acidity	<ul style="list-style-type: none"> • hydrolysis of the polysaccharides. /Prolonged Storage Period.
3.	Loss of Ascorbic acid	<ul style="list-style-type: none"> • Due to Oxidation
4.	Increase in TSS	<ul style="list-style-type: none"> • Due to the hydrolysis of polysaccharides into simple sugars
5.	Changes in pH	<ul style="list-style-type: none"> • Due to the storage conditions, which may led to chemical and enzymatic changes.
6.	Reduction in Total Phenolic Content	<ul style="list-style-type: none"> • Due to polymeric oxidation.
7.	Changes in β carotene	<ul style="list-style-type: none"> • Due to enzymatic destruction /Oxidative reactions.
8.	Microbial Load	<ul style="list-style-type: none"> • Fluctuation in holding Temperature and improper Storage leads to high biological load in the end product which leads to unfit for consumption

3.4 Parameters to Be Considered When Selecting a Packaging

- Distribution
- shelf-life
- Legislation

- Composition and quality
- Protection during storage
- Distribution retail sale
- Pack size
- Printing, & display
- Consumer appeal, image of product

3.5 Packaging Classification

- Primary packing
- Secondary packing
- Tertiary packing

3.5.1 Types of Primary Packing Available for RTS in Market

Primary Packing – 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.

1. Glass
2. Plastic
3. Tin
4. Aseptic packing
5. Flexible packing

Types of Packing Options Available for RTS (Mango)

- **Glass Containers**
 - The use of glass bottles for the packaging hot-fill/hold/cool process.

- Glass bottles are preferred packaging medium for high quality fruit beverages
- More care needed to avoid breakage of the containers

Advantages

- Surface coating to increase abrasion resistance
- Use of wide mouth containers fitted with easy-open-caps.

Metal Containers

- Tinplate cans made of low carbon mild steel of 99.75% purity, coated with tin with easy open ends are used.
- These tinplate containers are either 3 piece or 2 piece containers.
- They are lacquered internally to prevent corrosion.

Advantages

- Light weight
- Metals like aluminum are very easy to sterilize
- The durability and high barrier protection.
- Convenience.

Plastic Containers

- Packaging of such products is done through hot filling, to achieve extended shelf-life, PET bottles are usually used for hot filling applications.

Advantages

- Cost-effective to produce and require less energy to transport.
- Do not shatter and cause a hazard if broken or damaged

- safe and lightweight, they are also convenient for on-the-go consumption.
- Re-sealable: Suitable for multi-serve packs.

Flexible packaging

- flexible package that minimizes the permeability to oxygen.
- Flexible laminated pouches like metallized polyester/polyester/polyethylene are used for hot fill packaging method without retorting for acidic fruit juices.
- These are used either as flat pouches or stand-up pouches.

Advantages

- Provides resistance to moisture, vapors, dust, and even UV light.
- Modern printing techniques that create crisp, clear imagery.
- Promotes recycling and helps keep used pouches or bags out of landfills

Aseptic packaging

- The aseptic packaging is very well accepted in food service applications as a safe packaging option by destroying the harmful bacteria and pathogenic micro-organisms through thermal process.
- The use of plastics in the aseptic packaging significantly increases the non-refrigerated shelf life and availability of many perishable products.

3.5.2 Types of Secondary Packing Available for RTS In Market

- Secondary Packing- is outside the primary packaging perhaps used to group primary packages together.
- Provides extra protection and transport strength

- Paper boards
- Cartons
- Reusable Plastic Crates

3.5.3 Packaging Requirement by FSSAI for Fruits Products

FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, 2011 under this 2.1.3 packaging requirement for fruit and vegetables products

- Fruit product is packed shall be so sealed that it cannot be opened without destroying the licensing number and the Lot number to be displayed on the top or neck of the bottle.
- For Canned fruits, juices and vegetables- sanitary top cans made up of suitable kind of tin plates shall be used.
- For Bottled fruits, juices and vegetables, only bottles/ jars capable of giving hermetic seal shall be used.

LABELING REQUIREMENT OF RTS (MANGO)

- In India, it's the Food Safety and Standards Authority of India (FSSAI) that dictates food packaging norms.
- FSSAI Regulations are a complete set of guidelines that all food product manufacturers and brands should follow.
- Brand Name with Trade Mark Symbol
- Product Name
- Country of Origin
- Veg Logo
- Net contents

- Manufacturing Unit address
- FSSAI license number and Logo
- Serving instruction
- Customer care details
- Manufacturing date, Lot number, Best before.

CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS

4.1 Overview


The Food Safety Standard Authority of India (Fssai) has been Established under food safety and standard Act 2006, which consolidates various acts and orders that have hitherto handled food related issues in various ministries.

Fssai Has been created for laying down science based standards for articles of food and regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption and departments Every food business operator involved in the manufacturing, processing, storage distribution and sale of food products must compulsorily obtain FSSAI Registration or License. It is a 14-digit registration or a license number which is printed on all the food packages. The 14-digit registration number gives details about the assembling state, producer's permit.


4.1.1 Process of Registration: -

Registration Link : <https://foscos.fssai.gov.in/>



A+ | A | A-



**FOOD SAFETY AND STANDARDS
AUTHORITY OF INDIA**
Ministry of Health and Family Welfare, Government of India




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Food Safety Compliance System


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FEE STRUCTURE			
Types/Category	Registration - 1 year	Central – 1 year	Railways – 1 year
New Application	Rs. 100	Rs. 7500	Rs. 2000
Renewal Application	Rs. 100	Rs. 7500	Rs. 2000
License/Certificate Modification	Rs. 100	Rs. 7500	Rs. 2000
Duplicate Certificate/License	10% of the applicable certificate fee	10% of the applicable license fee	10% of the applicable certificate fee

4.1.2 Categorization of RTS in FSSAI

FOOD SAFETY AND STANDARDS (FOOD PRODUCTS STANDARDS AND FOOD ADDITIVES) REGULATIONS, 2011, 2.3.10: Thermally Processed Fruit Beverages / Fruit Drink/ Ready to Serve Fruit Beverages

1. Thermally Processed Fruit Beverages / Fruit Drink/ Ready to Serve Fruit Beverages (Canned, Bottled, Flexible Pack and/ Or Aseptically Packed) means an unfermented but fermentable product which is prepared from juice or Pulp/Puree or concentrated juice or pulp of sound mature fruit. The substances that may be added to fruit juice or pulp are water, peel oil, fruit essences and flavors, salt, sugar, invert sugar, liquid glucose, milk and other ingredients appropriate to the product and processed by heat, in an appropriate manner, before or after being sealed in a container, so as to prevent spoilage.

2. The product shall meet the following requirements: –

(i) Total Soluble solid (m/m) Not less than 10.0 percent

(ii) Fruit juice content (m/m) (a) Lime/Lemon ready to serve beverage Not less than 5.0 percent (b) All other beverage/drink Not less than 10.0 percent.

3. The container shall be well filled with the product and shall occupy not less than 90.0 percent of the water capacity of the container, when packed in the rigid containers. The water capacity of the container is the volume of distilled water at 20°C which the sealed container is capable of holding when completely filled.

4.2 Food Safety

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration (See Regulation 2.1.1(2))

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.

4.3 LABELLING

Labeling Requirements

All food products sold in India that are prepackaged 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. In this article, we look at the regulations pertaining to food labelling in India.

Applicability of Food Labelling Regulations

The food labelling regulations require all “Prepackaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, prepackaged 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 prepackaged 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:

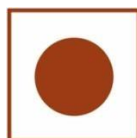
- energy value in kcal;
- the amounts of protein, carbohydrate (specify the quantity of sugar) and fat in gram (g) or ml;
- the amount of any other nutrient for which a nutrition or health claim is made:
- It is important to note that any “health claim” or “nutrition claim” or “risk reduction” claim 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;

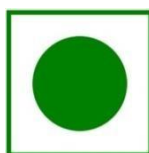
Veg or Non-Veg Symbol

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 square with green.



Veg 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 or 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.

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 Product.



Contact Us

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