FISH CANNING

Canning involves hermetically sealing the food in a container, sterilizing the sealed unit by heating and then cooling the unit to ambient temperature prior to storage. Sterilizing is the basic method of preserving canned products. The hermetically sealed cans are heated in order to inactivate tissue enzymes, kill micro-organisms and transform the raw fish or intermediate product into edible form. Sterilizing conditions (temperature and process time) are not only aimed to prolong shelf life but also to preserve the organoleptic and nutritive qualities of the product.

Types of canned fishery products:
Cans made of tinplate or aluminium are popular for packing fish for many years. All canned fishery products are divided into the following groups:

**Natural products**: Fish, crabs, shrimps etc., are individually packed into can with only addition of little salt or oil.

**Fish in oil**: Fried or smoked or hot air dried fish in vegetable oil.

**Fish in tomato sauce**: Fried or hot air dried fish in tomato sauce.

**Fish in brine**: cooked/blanched fish in brine.

Dietetic products: These products are prepared for patients requiring a strict diet. Apart from fish, other ingredients are vegetables, butter, vitamins etc.

Processing steps:

**Selection of raw materials**: Fish for canning must be first quality. Major physical damage, autolysis, belly bursting, discoloration, off odours and contamination can all ruing the raw materials for canning. By selecting fish from known grounds and at the proper seasons, fish having a fat content within the required limits can be expected. Frozen, fresh or chilled fish may be used. Since the size and shape of containers is fixed for a given finished products, a mixed batch has to be sorted for species and size.

**Dressing**: it is usual to cut off head, fins and tail, remove all viscera and sometimes also the spinal column and skin. Dressed fish are washed with potable water to remove blood, slime etc.

**Pre-processing operations**: As a result of any of the following methods, the taste, appearance and nutritive value of the canned product is improved through partial extraction of moisture and protein coagulation.

1. Steaming with live steam
2. Frying in vegetable oil.
3. Drying.
4. Hot smoking.

**Filling and sealing**: Fish/fish pieces re still largely packed into cans or other retortable containers with brine/edible oil/sauce. The head space is left in the top of the can to allow for expansion of the content during the heating process. A vacuum is produced in can by heating the content in a steam box immediately before seaming or by mechanical means i.e., exhausting air and seaming can under a
vacuum. Vacuum helps to preserve nutritive value of fish and to reduce pressure inside the can during sterilisation. Seaming is a process which consists of hermetically joining the lid to the body of the can. The seamed cans are carefully washed to remove all sticking materials specially filling medium. The cleansed cans are laded into retort.

**Sterilization:** Despite the fact that the effect of sterilization is greatly enhanced at temperature above 125°C. In order to kill all the heat resistant spores, it would require either a very high temperature or prolonged heating or combination of the both. Under these conditions sterilization produce undesirable change in tissue structure, colour and flavour in addition to loss of vitamins. Consequently fish products are sterilized under conditions at which all the pathogenic micro-organisms and spores those produce spoilage are killed off, and the other micro-organism, which do not spoil fish and do not harm man, are prevented from multiplying. The primary objective is to ensure that the most heat resistant pathogens in the can are killed; *Clostridium botulinum* is one of them and presents potentially a risk of lethal food poisoning in canned foods.

**Retorting time and temperature:** Retorting time and temperature depend on:

(a) The properties and composition of the products and its capacity to preserve its organoleptic and nutritive quality during prolonged heating at high temperature.
(b) The number of heat resistant reference bacteria
(c) Botulinum in product.
(d) The shape and sizes of containers.
(e) The type of filling medium
(f) Heating dynamic of the packed cans in retort.

Correct retorting times, temperatures and procedures to suit different sizes and shapes of containers different products and different types of retorts are available in specialist literature. The pressure in he retort, and hence the retort temperature, is controlled by an automatic steam pressure control value. The time and temperature records should be made with great care.

**Cooling:** After closing the steam inlet valve, retort pressure is maintained by admitting compressed air. Chlorinated cooling water (5-20 ppm free residual chlorine) is then admitted to the retort with slow reduction of air pressure in the retort. When the temperature and the pressure in the retort come down to atmospheric level, the retort is opened and cans are lifted out.

**Storage:** Wet cans are fried labelled and packed into cases. Fish are a low acid food and fish, which are processed to eliminate the chance of *C. botulinum* spore, should be stored at temperature below that at which possible surviving highly heat resistant spores of *Bacillus stearothermophilus* could germinate i.e., below 37°C. Shelf life of fishery products varies from a few months to several years, depending on

(a) Quality of raw materials
(b) Type of product
(c) Processing time and temperature
(d) Storage temperature