Chapter 12

Dairy Utilities-Steam, Water, Refrigeration, Electricity

Objective

This chapter deals with the utilities required in milk processing plant for processing and manufacture of milk products.

Introduction

Inputs such as steam, water, refrigeration, electricity, compressed air etc required to run any processing plant is known as utilities or services.

Steam

Steam is used in heating operations like pasteurization, sterilization, CIP etc. Generally oil fired boilers are used for generation of steam (Fig.12.1). Few dairy processing plants have coal fired boiler. The steam requirement (kg/hr) depends upon the process operations.

Water

A milk processing plant ideally requires water in the ratio of 1.5-2:1 (1.5 to 2 liters of water for 1 liter of milk processed) for processing, steam generation, cleaning of equipment, etc. There may be 3-4 deep bore tubewells to meet the daily water requirement of the plant. Water requirement in a dairy processing plant can be categorieed as:

- Raw untreated water: cleaning of floor etc.

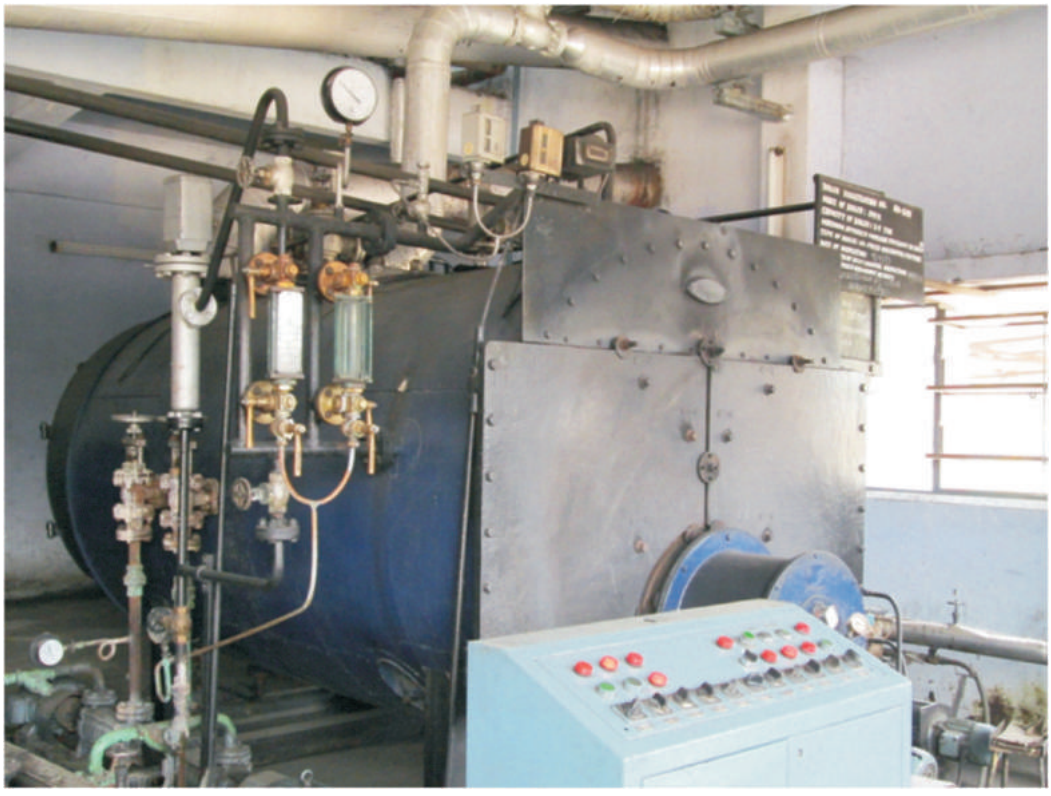

Fig.12.1. Oil fired boiler

Fig.12.2. Oil tanks for boiler

- **Potable water:** Treated water which is used for drinking and in product formulation/ manufacturing.
- **Soft water:** Used in boiler for steam generation.
- **Chilled water:** Temperature of water is around 2-3°C and is used for cooling of milk and milk products.
- **Hot water:** Used in heating and CIP operations.

Refrigeration

The major refrigeration requirement in a milk plant may be listed as raw milk chilling, pasteurized milk cooling, product cooling, cold store, deep freezer etc. Ammonia based vapour compression refrigeration system are generally used in a processing plant. A refrigeration system consists of following components:

- Compressor
- Condenser
- Expansion valve
- Evaporator

Fig.12.3. Compressor of the refrigeration system

Fig.12.4. Ammonia reservoir/tank for the refrigeration system

Fig.12.5. Water cooled condensor

Electricity

A three phase electricity supply is required to run heavy equipments in milk processing plants. Diesel generator sets are required in for operating plant during power cuts.

Fig.12.6. Diesel generator set

Compressed Air

It will be required for various pneumatic operations flow control operations as well as for cleaning purposes.

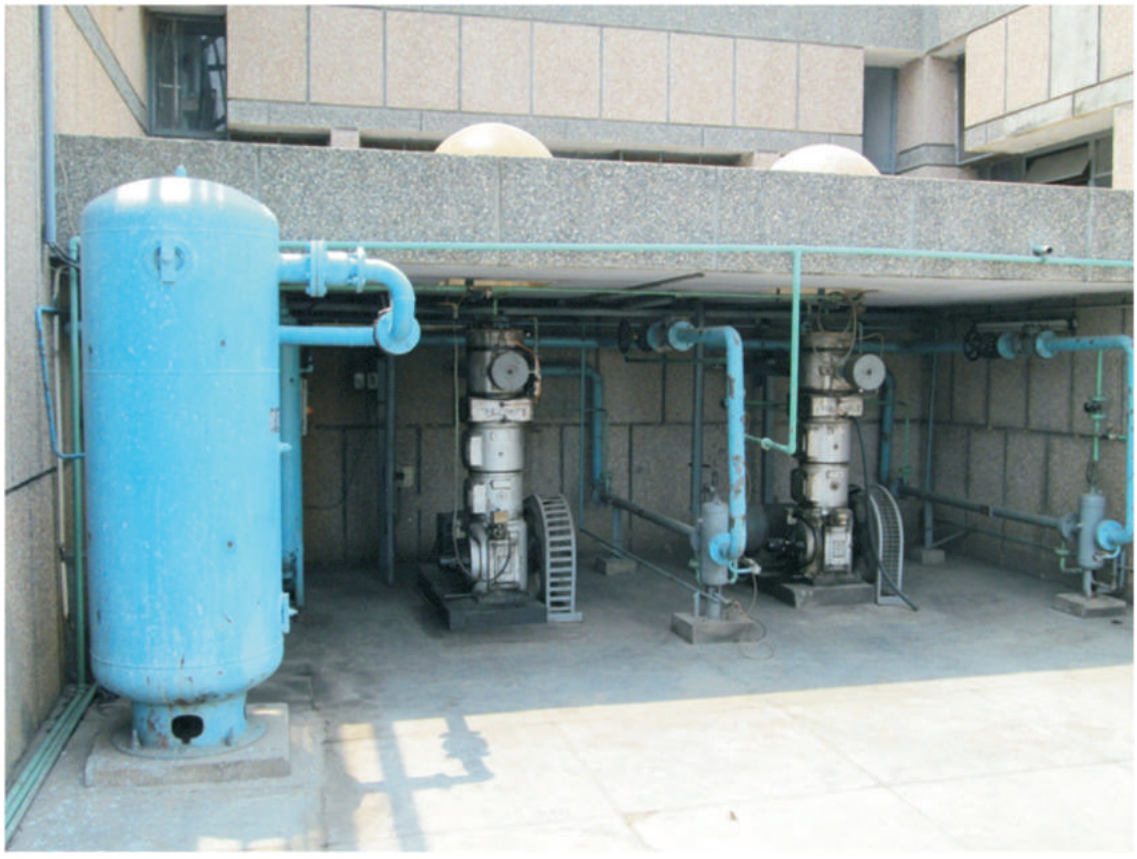

Fig.12.7. Equipment for producing compressed air

REVIEW QUESTIONS

1. Briefly describe type of services/utilities are required in a milk processing plant.
2. What is the ideal water requirement in a dairy processing unit?
3. Why refrigeration system is required?
4. List various water requirement in a milk processing plant.
5. List various section in a milk plant where steam is used.