

EXECUTIVE SUMMARY

1. Cooling towers have application in almost all industries, power plants and business establishments.
2. There are about twenty-seven suppliers of small cooling towers normally required for air-conditioning plants.
3. There are about nine firms which supply medium and large capacity cooling towers used in industries and power plants. Of these, five firms are basically civil contractors who entered the cooling tower field in the 1980's. Paharpur Cooling Tower Pvt. Ltd., Calcutta and Gammon India Ltd., Bombay are the two leading cooling tower contractors with an experience stretching over three decades.
4. Seven of the cooling tower contractors have collaboration arrangement with foreign firms for the thermal and structural design of cooling towers. Gammon India had collaboration with Hamon Sobelco, Belgium till 1985. Permission was not given to Gammon by the Government of India for the extension of collaboration agreement. Thermopack Engineers does not have any collaboration. They have been designing only induced draft type (ID) cooling towers based on their own. L&T had collaboration arrangement with Film Cooling Towers, U.K. between 1962 and 1967. NPCC had collaboration arrangement with Film Cooling Towers (FCT), U.K. between 1984-89 and are continuing the association with them in further quoting for cooling towers.
5. At present, only wet type cooling towers with mainly splash packing in wood/asbestos/RCC material have been installed in India. The maximum capacities of cooling towers so far installed or being installed in India are 40,800 m³/hr and 37,130 m³/hr for Natural Draft (ND) and Induced Draft (ID) towers respectively. The minimum approach value normally adopted is around 4.5° C. However, recently for some towers an approach of 3° C has been adopted.
6. Cooling towers with PVC fill have been introduced very recently in India but they are yet to gain total acceptance for large towers. For small towers used mainly in air-conditioning plants, however, plastic/PVC film packing has been in wide use.
7. In the international scene, PVC fills have been widely used in addition to wood and RCC fill for wet type cooling towers. The maximum capacity of wet cooling tower installed so far is of 216,000 m³/hr capacity. The minimum approach value is around 4.5° C. In addition, dry cooling towers/air cooled condensers have been in use since early 60's and are now adopted for thermal plants with unit capacity as high as 665 MW.

8. Indian cooling tower contractors have more or less totally indigenised the manufacture of components and construction of cooling towers. With the available manufacturing/construction facilities, Indian cooling tower industry has been able to meet the present demand and is expected to be in a position to meet the future demand of wet cooling ND towers up to 40,800 m³/hr capacity and ID towers with fan diameters up to 10 m and minimum approach value of around 4.5° C
9. One area that could be taken up for immediate indigestion is the thermal/structural design of cooling towers and fan design, for which many cooling tower contractors still depend on their foreign collaborators. Cooling tower contractors should tie-up with premier Indian academic/research institutions or consultants for the same.
10. To assist cooling tower contractors in developing the thermal design and fill designs, it is considered necessary to provide a central cooling tower test cell, which can be utilised by the cooling tower designers and manufacturers for developing fill design and predicting its performance. Location of such a test facility could be in one of the National Laboratories/Research Institutes.
11. The contractors should collect and furnish required back-up data to the users and consultants on the operating experience of cooling towers with PVC fill (particularly film type) for establishing its application in India.
12. Though dry cooling towers have not so far found much application in India due to availability of adequate quantity of make-up water, with the increasing growth of industry and depletion of water resources it may be necessary, in future, to consider adoption of dry cooling towers/air cooled condensers. It would, therefore, be necessary to initiate the following :
 - a) Study on the scope and application of dry cooling tower in India and examining their techno-economic viability.
 - b) If the above study recommends use of dry cooling towers, know-how for design and manufacture of dry cooling towers needs to be developed. For this purpose new collaboration or extension of existing collaboration with foreign firms may be permitted.
 - c) Turbine manufacturers like Bharat Heavy Electricals Ltd. (BHEL) should study suitability of their existing designs and carry out modifications to the turbine to meet higher back pressures resulting from the use of dry cooling towers/air-cooled condensers.
 - d) To help proper design of Cooling Towers following points have to be considered.
 - i) Meteorological centres in India should collect and publish hourly data on ambient conditions such as dry bulb/wet bulb temperature, relative humidity, wind velocity and wind direction.
 - ii) Development of National Standard (BIS) for structural design of cooling towers and testing of cooling towers.