Comparison between Natural Draft Cooling Tower and Induced Draft Cooling Tower

S. No	Natural Draft Cooling Tower	Induced Draft Cooling Tower
1	Works on the principle of chimney effect. Air flow is natural and based on exit and inlet conditions of air.	Cooling is accomplished by draught of air created by a fan.
2	No power required apart from pumping of water to the tower	Power for fan operation is additional requirement.
3	Maintenance free as far as rotary equipment are concerned	Regular maintenance of rotary equipment required
4	Generally operates on very low water loading about 7.5 m3/hr/m2 max for film fill and generally upto 6 0 m3/hr/m2 for splash fills. As generally applicable to tropical conditions.	Can operate at very high water loading upto 25 m3/hr/m2 for film and 19m3/hr/m2 for splash film.
5	Low operating fill velocities	Higher operating fill velocities.
6	Generally operates where the load available is very near to the design heat load since at low loads the density difference becomes very low	Can operate at various load conditions.
7	Since there is only one enclosure and number of risers are generally two with one or two main ducts, the possibility of part shut down operation of water is not logical.	Since there are individual risers to each cell, each cell can be considered as independent of the others. Towers with number of pumps can be operated at optimum pumping cost by shutting down pumps and cells when atmospheric conditions are suitable for the same
8	Tower requires greater area due to lower water loading	Tower requires smaller area due to higher water loading
9	Larger pumping head is required to cater to large diameters at the bottom to enable proper air flow through the system	Requires smaller pumping head for the same application
10	Generally suitable for large water flows	Suitable for all water flows
11	Generally suitable for larger ranges and bigger approaches than IDCT. Generally greater than 4.5 deg c	Suitable for lower approaches also
12	Longer construction period	Much shorter construction period especially since work can be carried out simultaneously on 2 or more towers.
13	Mainly built of concrete	FRP Pultruded, Timber, Steel and Concrete can be used as construction material
14	Capacity cannot be enhanced once the tower is built.	Additional cells can be added or fan can be operated at higher pitch to increase capacity

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15	Natural draught towers performance are affected greatly by wind both at discharge and inlet.	Effect of wind is far less than that of NDCT
16	Tower sizing is directly affected by relative humidity of the inlet air	RH of inlet air has very negligible effect on the tower performance once the inlet WBT is taken into consideration.
17	Difficult to dismantle due to the large size of the tower and affect on the nearest structures.	Easier to dismantle than an NDCT
18	Difficult to repair concrete at great heights due access related issues and safety aspects	Easier to repair concrete due to lower heights.
19	Possibility of unequal water and air loadings due to very large size and huge diameter of the tower (eg. towers are being built with diameters upto 130m or higher). Such towers could malfunction because of unequal air and water loadings due to large path of the air from periphery upto the centre of the tower	Generally 20 to 22m dimensions are largest in a IDCT and hence unequal water distribution is not a problem
20	Necessity for providing unequal fill distribution or unequal water distribution to try and ensure uniformity in air and water loadings	Not necessary as above
21	There is requirement of major equipment like tower cranes and jump form which are expensive	Project can be carried out with minimal equipment since it is a column / beam structure encased with walls.
22	Cleaning and Maintenance of water distribution system is quite difficult due to the size of the structure	Comparatively easier especially if envisaged properly during engineering stage.
23	NDCTs are not affected by recirculation and less effected by drift losses	IDCT need to be oriented correctly, designed suitably to minimize the recirculation and need to provide proper drift eliminators to avoid drift.
24	With increasing cost of construction the NDCT is at least 1.6-1.8 times in construction cost and operating cost due to higher pump head could also be substantial depending upon the design of the tower.	Initial cost is much lower although cost of power needs to be considered as of today and forecast for the future for evaluation of the total cost.
25	Not very suitable for very dry climates with high dry bulb and low relative humidity since tower becomes extremely large with decreasing RH.	Suitable for all weather conditions