7. Summary and Conclusion

In the preceding chapters, various aspects involved in the analysis and design of Reinforced Concrete Chimneys were looked into. The loads that are to be considered during the analysis phase of the chimney were taken into account. Of these loads the most important were found to be the wind loads. Although there were also earthquake loads and seismic loads these were not found to be critical for design.

The wind loads were of two types – along-winds and across-winds, depending on the type of response. The reasons for both these types of loads were studied. Various codal methods were employed for the purpose of evaluation of these wind loads.

During the calculation for calculation of the along-wing loads calculations were performed to evaluate the wind profiles, the pressures of the incident wind, and the resultant loads and load resultants on the chimney. The dynamic effects were adjusted with the calculation of the gust factor. The reasons for the occurrence of across-wind loads were identified. The concept of bluff body flow and vortex shedding were discussed. The chimney was also modeled using STRAP for the purpose of estimating the dynamic effects.

It was found during a comparative evaluation of the various codes for the calculation of along-wind loads, to have a considerable difference in the reported value for similar chimney and wind conditions. The values of the gust factors too were found o be different.

The across wind loads were also estimated using the provisions in various codes. The two methods suggested by the IS code too were studied. Since the random response method, suggested by the code is more realistic in evaluation of the across-wind loads, it was felt that the simplified method could be done away with completely.

A variational analysis was also done, calculating the moments for different height to base diameter ratios. The conclusions from this analysis were listed.

The occurrence, identification and estimation of loads from seismic action were also studied. Various terms relating to seismic action were also introduced. Estimation of loads was done for an example chimney by estimating the design coefficient for a particular case.

The two methods suggested by the IS code were studied. Calculation was however done using the response spectrum method. The moment profile was calculated and plotted. It was found that the loads due to seismic action were almost half that from the wind velocities, and hence would not be a major consideration in design, given their rare occurrences.

Temperature loads due to a temperature gradient across the chimney shell were noted and expressions to evaluate the same were derived. The resultant stresses for a case were calculated. It was found that they are normally taken care of by good detailing unless the temperature differences were very high.

The design resistance of a cross-section was estimated. The normal force on a cross-section was related to the moment carrying capacity of the section and interaction curves were drawn for the same.

Using the loads obtained earlier and the design principles above a typical chimney was apportioned and detailed. The foundation (raft) to take care of the loads for the chimney was also detailed. A design of a staircase tread was also given. Also all cases for design were not considered. The chimney was assumed to have no openings and designed as such.