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# Thermal comfort study in naturally ventilated school classrooms in composite climate of India

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## Abstract

A field study was carried out during monsoon and winter seasons of 2015-16 to investigate the thermal environment and thermal comfort in naturally ventilated (NV) indoor environment of classrooms of a Government residential school located in composite climatic zone of Ambala, India. A total of 640 responses from 130 students in the age group between 10-18 years belonging to rural background were collected. An indoor operative temperature of 27.1°C was recorded as neutral temperature. The slope of the regression line plotted between thermal sensation and indoor operative temperature was found to be 0.056/°C which varies considerably from earlier similar studies on classrooms across tropics. It has been found that the students feel comfortable within operative temperature range of 15.3–33.7°C for 80% acceptability. This range exceeds beyond the comfort temperature range as specified by Indian and international standards for adult population. The results show that the heat tolerance of the students is quite high. In India, till so far there are no thermal comfort standards for school classrooms in any of the climatic zone. The findings of this study should provide guidelines for India specific thermal comfort standards for schools for the efficient use of energy.

**Keywords:** Thermal comfort, Schools, Naturally ventilated classrooms, Adaptive thermal comfort

## 1. Introduction

ASHRAE Standard 55 defines thermal comfort *as that condition of mind which expresses satisfaction with the thermal environment and is assessed by subjective evaluation*. The thermal comfort of occupants in a given environment depends on various psychological, physiological and behavioural factors. The same thermal environment may be perceived differently by different people or different

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