BS 4485 : Part 2 : 1988

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British Standard

Water cooling towers

Part 2. Methods for performance testing

Tours de refroidissement par l'eau
Partie 2. Méthodes d'essai de fonctionnement

Wasserkühltürme
Teil 2. Funktionsprüfung

Confirmed
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Foreword

This Part of BS 4485, which has been prepared under the direction of the Civil Engineering and Building Structures Standards Committee, deals with the performance testing of industrial mechanical draught and natural draught water cooling towers. This Part of BS 4485 is a revision of BS 4485 : Part 2 : 1969 which is withdrawn.

The principal difference between this Part of BS 4485 and the 1969 edition is the introduction of the option of using a computer to do the calculation of thermal performance capability rather than carrying it out manually.

The performance of a cooling tower is dependent upon a number of factors, such as conditions of the atmosphere, conditions of the cooling water flow, conditions of equipment and conditions of the site, and the object of this Part of BS 4485 is to describe methods for the accurate determination of thermal performance. In addition, methods are described for the functional testing of equipment necessary for the satisfactory operation of a cooling tower.

This Part of BS 4485 also includes a description for the performance test procedure, the computation and evaluation of results, and the appendices provide worked examples for establishing the L/G ratio for natural draught cooling towers, and also the cooling tower characteristic KaV/L.

The other Parts of BS 4485 are as follows.

Part 1 Glossary of terms
Part 3 Code of practice for thermal and functional design
Part 4 Code of practice for the structural design of cooling towers

Where necessary, definitions have been included in the revisions of BS 4485 : Parts 2, 3 and 4 so that when they have all been published BS 4485 : Part 1 can be withdrawn.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Contents

Methods

1 Scope

This Part of BS 4485 describes methods for the determination of the performance of industrial mechanical draught and natural draught water cooling towers.

This Part of BS 4485 can also be applied to other forms of cooling towers.

NOTE 1. The matters to be agreed between purchaser and supplier are listed in appendix A.

NOTE 2. The titles of the publications referred to in this standard are listed on page 33.

2 Definitions

For the purposes of this Part of BS 4485 the following definitions apply.

2.1 air flow. Total quantity of air, including associated water vapour flowing through the tower.

2.2 ambient wet (dry) bulb temperature. Wet (dry) bulb temperature of air measured windward of the tower and free from the influence of the tower.

2.3 approach. Difference between recooled water temperature and nominal inlet air wet bulb temperature.

2.4 inlet water flow. Quantity of hot water flowing into the tower.

2.5 cold water basin. Device underlying the tower to receive the cold water from the tower and direct its flow to the suction line or sump.

2.6 cooling range. Difference between the hot water temperature and the recooled water temperature.

NOTE. The term 'range' is also applied to this definition, but is regarded as a non-preferred term.

2.7 drift loss. Water lost from the tower as liquid droplets entrained in the outlet air.

2.8 heat load. Rate of heat removal from the water within the tower.

2.9 hot water temperature. Temperature of inlet water.

2.10 inlet air wet (dry) bulb temperatures. Average wet (dry) bulb temperatures of the inlet air; including any recirculation effect.

NOTE. This is an essential concept for purposes of design, but is difficult to measure.

2.11 make up. Water added to the circulating water system to replace water loss from the system by evaporation, drift, purge and leakage.

2.12 nominal inlet air wet (dry) bulb temperatures. Arithmetical average of the measurements taken within 1.5 m of the air inlets and between 1.5 m and 2.0 m above the basin kerb elevation on both sides of the cooling tower.

NOTE. See **5.2.2**.

2.13 purge. Water discharged from the system to control concentration of salts or other impurities in the circulating water.

2.14 recooled water temperature. Average temperature of the water at the cold water basin discharge excluding the effect of any make-up entering the basin.

2.15 recirculation. Portion of the outlet air that re-enters the tower.

2.16 fan drive assembly. Components for driving the fan, normally comprising driver, drive shaft and transmission unit, and primary supporting members.

2.17 fan power. Power input to the fan drive assembly, excluding power losses in the driver.

2.18 tower pumping head. Total head of water required at the inlet to the tower, measured above the basin kerb, to deliver the inlet water through the distribution system.

2.19 water loading. Inlet water flow expressed in quantity per unit of plan packing area of the tower.

2.20 wet (dry) bulb temperature. The temperature indicated by an adequately ventilated and wetted (non-wetted) thermometer in the shade and (where applicable) protected from strong ground radiation.

3 Symbols and units

For the purposes of this Part of BS 4485, the symbols and units given in table 1 apply.

4 Conditions of validity of tests

4.1 General

In determining the performance and thermal efficiency of mechanical and natural draught cooling towers, the conditions of validity specified in **4.2** to **4.5** shall be fulfilled.

NOTE. These conditions may also form the basis for contractual agreement between the purchaser and the supplier.

4.2 Conditions of site

Any variations in the conditions of the site from those of the design shall be recorded.

4.3 Conditions of equipment

At the time of test all equipment and systems shall be in proper operating condition, and the following checks shall be made.

(a) The water distribution system shall be clear and free from foreign materials which may clog or impede the normal water flow.

(b) Mechanical equipment shall be in good working order and set for the design duty (see **6.1**).