INSTRUCTIONS TO OBSERVERS.

As the chief use of a standard is to test other thermometers, its range should extend each way as far as those of any thermometers to be compared with it; and as these are wanted sometimes for very cold climates, it is better to extend the graduations to the point where mercury becomes solid $(-37^{\circ}.9)$.

Thermometers for meteorological purposes commonly have their graduations extending not much higher than 100°, unless they are designed for very hot climates.

(65) Change in the Position of the Freezing Point.—If a thermometer is graduated soon after filling, *i.e.*, soon after the glass has been subjected to a very strong heat, and has been thus unduly expanded, it will afterwards, by its contraction, force the mercury up the tube, it may be from 1° to 2°, and cause the *true* freezing point to rise by that amount above the mark 32°. For this reason a thermometer ought not to be graduated until several months after it has been filled; but even when this precaution has been used, there will often, in the course of several years, be a slow progressive contraction of the bulb, and a consequent rise of the freezing point, necessitating the subtraction of a correction throughout the scale, which will increase from time to time, and finally become constant.

(66) Index Corrections and Rules for applying them.— Owing to the difficulty of making tubes of equable bores, and the loss sustained by rejecting those whose bores are not equable, thermometers are often sold having not only large errors, but errors varying considerably at different parts of their scales. On this account thermometers should not be used until their "index corrections," or the corrections to be applied at different parts of their scales, have been ascertained by comparison with a standard.

It is a practice among English makers to supply to purchasers certified copies of the index corrections of their thermometers.

Of late years thermometers certified by the Observatory of the Royal Society at Kew, are examined as low as the freezing point of mercury $(-37^{\circ}.9)$. Those which have not been thus tested ought not to be accepted, however correct they may be at ordinary temperatures, as it not unfrequently happens that thermometers, whose errors above 32° do not exceed $0^{\circ}.2$, are in error 4° or more at or below zero.

The thermometers employed in the Meteorological Service of the Dominion of Canada are first compared at Kew; they are again com-

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