

APPENDIX A: LOADING TEST

The methods of testing structures of unconventional design referred to in 5.1.3 of this standard should be as follows:

1. Acceptance tests

The structure or structural member under consideration should be loaded with the dead load for as long a time as possible before testing and the tests should be conducted as follows:

- (1) *Stiffness test.* In this test the structure or member should be subjected, in addition to the dead load, to a test load equal to 1.5 times the imposed and wind load, and this loading should be maintained for 24 hours. The maximum deflection attained during this test should not be excessive. If after removal of the test load, the member or structure does not show a recovery of at least 80 per cent of the maximum strain or deflection shown during the 24 hours under load, the test should be repeated. The structure should be considered to have sufficient stiffness, provided that the recovery after this second test is not less than 90 per cent of the maximum increase in strain or deflection shown during the second test. The deflection of a beam under its design loading should comply with 5.6
- (2) *Strength test.* The structure should be subjected, in addition to the dead load, to a test load equal to the sum of the dead load and twice the imposed and wind load, and this load should be maintained for 24 hours.

In the case of wind load, a load corresponding to twice the wind load should be applied and maintained for 24 hours, either with or without the vertical test load, according to which condition is the more severe in the member under consideration or the structure as a whole. Complete tests under both conditions may be necessary to verify the strength of the structure. The structure should be deemed to have adequate strength if during the test no part completely fails, and if on removal of the test load the structure shows a recovery of at least 20 per cent of the maximum deflection or strain shown during the 24 hours under load.

Where several structures are to be built to the same design and it is considered unnecessary to test all of them, one structure, as a prototype, should be fully tested, as described in (i) and (ii), supervised by the Engineer, but in addition, during the first application of the test load, particular note should be taken of the strain or deflection when the test load, at 1.5 times the imposed load, has been maintained for 24 hours. This information is required as a basis of comparison in any check tests carried out on samples of the structures.

When a structure of the same type is selected for a check test it should be subjected, in addition to the dead load, to a imposed test load, equal to 1.5 times the specified imposed load, in a manner and to an extent prescribed by the Engineer carrying out the test. This load should be maintained for 24 hours, during which time the maximum deflection should be noted. The check test should be considered to be satisfactory, provided that the maximum strain or deflection noted in the check test does not exceed by more than 20 per cent the maximum strain or deflection shown at similar load in the test on the prototype.

An actual structure which has satisfied test (ii), "Strength test", and is subsequently to be erected for use, should be considered satisfactory for occupancy after it has been returned to its original condition and has subsequently satisfied test (i), "Stiffness test".

Note: Method of testing. The manner in which the loading is to be applied and the positions at which deflections or strains are to be measured can only be decided with reference to the particular structure to be tested; but as a general guide the following are suggested:

Beams and girders. The deflection should be measured at mid span; and if it is expected that considerable strain or settlement may occur at the supports, the deflection or settlement at the supports should also be recorded.

Cantilevers. The deflections at the end of the cantilever should be measured; and, under the conditions visualized above for the beams, the deflections at the support.

Stanchions. The lateral deflections at the mid-height of the stanchion and at the head of the stanchion should be measured relative to the joint next below and to the bases.

Loading

- (1) *Vertical loading.* Uniformly distributed loading on beams may be represented by two loads, each half the total of the uniformly distributed load, applied at the quarter points.
- (2) *Horizontal loading.* Where the effect of horizontal forces on the structure as a whole has to be tested, the action of the cladding in applying the load to the frame should be taken into account. The horizontal forces would in general be represented by a limited number of point loads.
- (3) *Dead load equivalent.* It has been assumed that the dead load is in place, but when it is convenient to do the test before the dead load is applied, an equivalent load can be used, placed as described in (i). The deflection due to the dead load or its equivalent should not be included in the test measurements.