specified for the work shall be used. If the maximum size of coarse aggregate is greater than 20 mm, the concrete mix shall be wet-screened over 20 mm IS Sieve before test.

**6.2.3.2** *Proportioning concrete for tests for general evaluation*

The concrete mix may be designed according to any accepted method of mix design, to meet the following requirements:

a) The cement content of the mix shall be 307 ± 3 kg/m$^3$,

b) The concrete mix shall have a slump of 50 ± 10 mm or a compaction factor of 0.85 to 0.90 to facilitate compaction by hand-rodding,

c) The concrete mix shall be compacted according to the requirements given in IS 516, and

d) In case of air-entrained concrete an air content of 6 percent shall be used.

**6.2.3.3** Samples shall be thoroughly mixed as recommended by the manufacturer to ensure uniformity before testing.

**6.2.4** The concrete shall be made in a mechanical power driven mixer in accordance with the procedure specified in IS 516.

## 7 SAMPLING AND TESTING OF FRESH CONCRETE

### 7.1 Sampling

Sampling of fresh concrete shall be done according to the requirements given in IS 1199.

### 7.2 Methods of Tests

Samples of freshly mixed concrete from at least three separate batches for each condition of concrete shall be analysed for the tests described in **7.2.1** to **7.2.5.**

**7.2.1** *Test for Workability*

The workability of freshly mixed concrete in terms of slump or compaction factor shall be determined according to method given in IS 1199.

NOTE — In some cases, it may also be worthwhile to determine the workability of fresh concrete not sooner than 15 min and not later than 20 min after completion

The slump of high workability concrete mixes shall be determined at 45 min and at 2 h, using normal type and retarding type superplasticizers, respectively after the following operations.

After mixing the concrete mixes shall be covered to prevent loss of water by evaporation and kept at a temperature of 27 ± 2°C and relative humidity of 65 ± 5 percent. At 45 min, the concrete shall be remixed by hand using a shovel just enough to counteract any bleeding or segregation and slump of concrete shall be determined. The tested concrete shall be discarded and the remaining concrete shall be covered and tested at 2 h, after mixing by hand using a shovel.

**7.2.2** *Test for Air-content*

Air-content of freshly mixed concrete shall be determined by the pressure method given in IS 1199.

**7.2.3** *Test for Time of Setting*

Time of setting, initial and final, shall be determined as given in IS 8142.

**7.2.4** *Test for Bleeding*

Bleeding shall be computed at a percentage of the net amount of mixing water in the concrete. The net mixing water is the water in excess of that present as absorbed water in the aggregate. Absorbed water in the aggregate shall be determined as given in IS 2386 (Part 3). The test shall be carried out in accordance with the details given in Annex D.

**7.2.5** *Test for Water Content*

**7.2.5.1** The water-cement ratio of the concrete shall be determined to the nearest 0.001, as follows:

a) Net water content of the batch shall be computed by determining the absorption water of aggregate as given in IS 2386 (Part 3).

b) Mass of cement per unit volume of concrete shall be computed as given in IS 1199, and

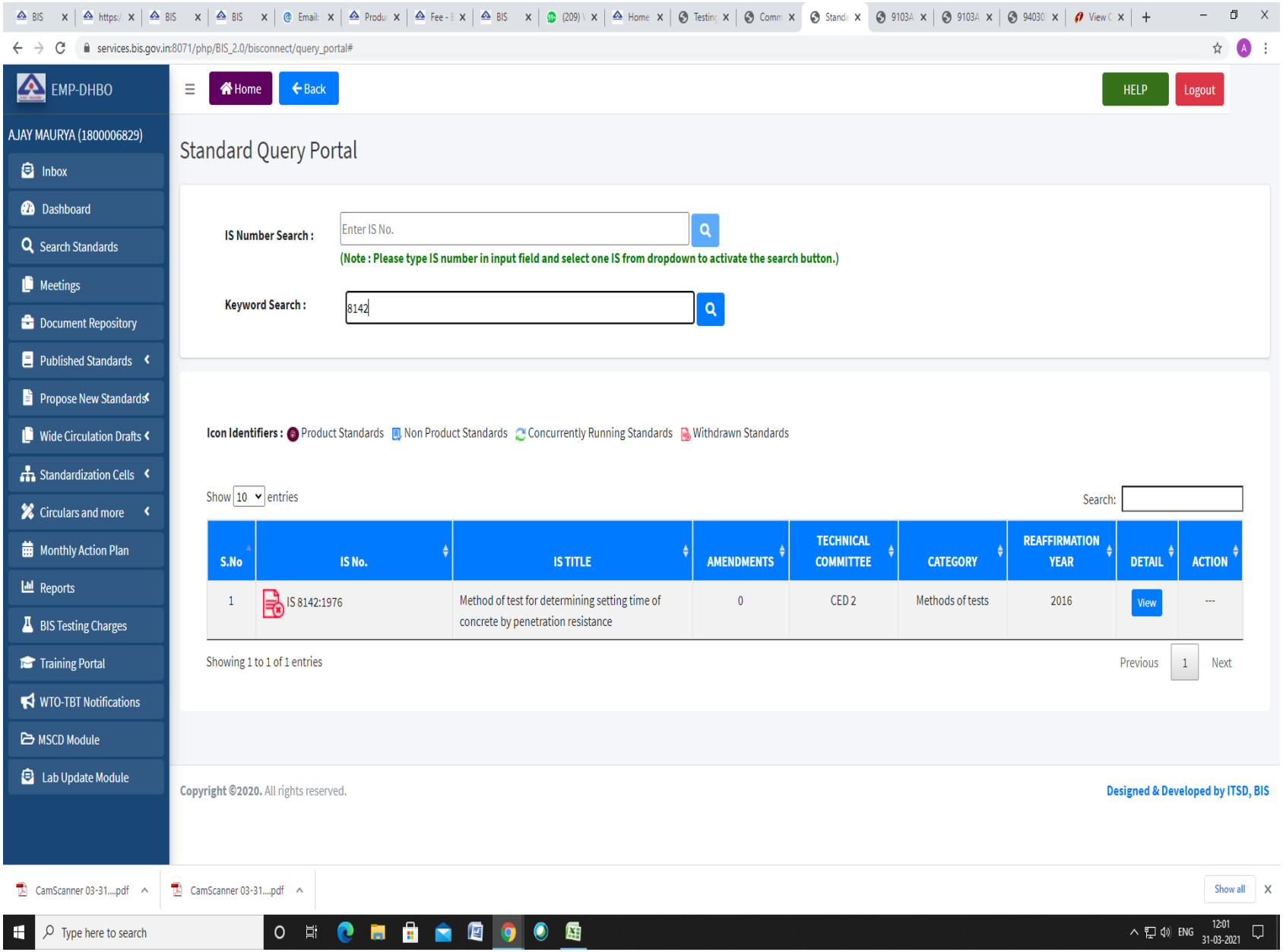
c) Water-cement ratio shall be determined by dividing the net mass of water by the mass of cement in batch.

**7.2.5.2** The relative water content for the concrete containing admixture shall be expressed as a

**Table 1A Physical Requirements**

*(Clause 4)*

| Sl No. | Requirements | Accelerating Admixture | Retarding Admixture | Water Reducing Admixture | Air-Entraining Admixture | Superplasticizing Admixture (for Water-Reduced Concrete Mix) | | Test Ref |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Normal | Retarding Type | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| i) | Water content, percent of control sample, *Max* | — | — | 95 | — | 80 | 80 | 7.2.5 |
| ii) | Slump | — | — | — | — | Not more than 15 mm below that of the control mix concrete | | 7.2.1 |
| iii) | Time of setting, allowable deviation from control sample hours: | | | | | | | 7.2.3 |
| | Initial | | | | | | | |
| | *Max* | −3 | +3 | ±1 | — | — | +4 | |
| | *Min* | −1 | +1 | | | +1.5 | +1 | |
| | Final | | | | | | | |
| | *Max* | −2 | +3 | ±1 | — | ±1.5 | ±3 | |
| | *Min* | −1 | +1 | — | — | — | — | |
| iv) | Compressive strength, percent of control sample, *Min* | | | | | | | 8.2.1 |
| | 1 day | — | — | — | — | 140 | — | |
| | 3 days | 125 | 90 | 110 | 90 | 125 | 125 | |
| | 7 days | 100 | 90 | 110 | 90 | 125 | 125 | |
| | 28 days | 100 | 90 | 110 | 90 | 115 | 115 | |
| | 6 months | 90 | 90 | 100 | 90 | 100 | 100 | |
| | 1 year | 90 | 90 | 100 | 90 | 100 | 100 | |
| v) | Flexural strength, percent of control sample, *Min* | | | | | | | 8.2.2 |
| | 3 days | 110 | 90 | 100 | 90 | 110 | 110 | |
| | 7 days | 100 | 90 | 100 | 90 | 100 | 100 | |
| | 28 days | 90 | 90 | 100 | 90 | 100 | 100 | |
| vi) | Length change, percent increase over control sample, *Max* | | | | | | | 8.2.3 |
| | 28 days | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | |
| | 6 months | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | |
| | 1 year | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | |
| vii) | Bleeding, percent increase over control sample, *Max* | 5 | 5 | 5 | 5 | 5 | 5 | 7.2.4 |
| viii) | Loss of workability | — | — | — | — | At 45 min the slump shall be not less than that of control | At 2 h, the slump shall be not less than that of control | 7.2.1.2 |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