STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TESTING PORTLAND AND BLENDED CEMENTS

AS 2350.11
COMPRESSIVE STRENGTH OF PORTLAND AND BLENDED CEMENTS

PREFACE

This Standard was prepared by the Association's Committee on Cement and will supersede AS 2350.6—1980 one year after its publication. However, during the one-year period before withdrawal of AS 2350.6—1980 both this Standard and AS 2350.6—1980 may be used.

This Standard is based on European Standard EN 196, Methods of Testing Cement, Part 1: Determination of Strength, and it will supersede AS 2350.6—1980 because it provides for a greater precision (based on repeatability and reproducibility) in respect of measuring the compressive strength of cement.

1 SCOPE. This Standard describes the reference method for determining the compressive strength of portland and blended cements. The method allows the use of alternative procedures provided that the alternatives do not significantly affect the results as specified in Appendix B.

NOTE: The precision of the method is discussed in Appendix A.

2 REFERENCE DOCUMENTS. The following documents are referred to in this Standard:

AS
1100 Technical drawing
Part 201: Mechanical drawing (AS 1100.201)
2193 Methods for calibration and grading of force-measuring systems of testing machines
2350 Methods of testing portland and blended cements.
Part 3: Normal consistency of portland and blended cements (AS 2350.3)
Part 6: Compressive strength of portland and blended cements (AS 2350.6)

EN
196 Methods of testing cement
Part 1: Determination of strength (EN 196.1)

Although not referred to in this Standard the following documents are of relevant interest:

Manual for the testing of cement strength—Cembureau, the European Cement Association.

The ISO/CEN Mortar prism test for cement strength—Operator's manual, Cement and Concrete Association of Australia.

3 PRINCIPAL FEATURES OF THE METHOD. The method comprises the determination of the compressive strength of prismatic test specimens 40 × 40 × 160 mm in size.

These specimens are cast from a batch of plastic mortar containing one part by mass of cement and three parts by mass of standard sand with a water-cement ratio of 0.50. Standard sands from various sources and countries may be used provided that they meet the requirements of EN 196.1.

The mortar is prepared by mechanical mixing and is compacted in a mould using a vibrating table.

The specimens in the mould are stored in a moist atmosphere for 24 h and then the demoulded specimens are stored under water until strength testing.

At the required age, the specimens are taken from their wet storage, and each end is tested for strength in compression.

4 APPARATUS.

4.1 Laboratory. The air within the laboratory where preparation of specimens takes place shall be maintained at a temperature of 23 ±2°C and a relative humidity of not less than 50%. The humidity controlled room or cabinet for storage of the specimens in the mould shall be continuously maintained at a temperature of 23 ±2°C and a relative humidity of not less than 90%.

The temperature of water in the storage containers shall be maintained at 23 ±2°C.

4.2 General requirements for the equipment. Tolerances shown on the drawings are important for correct operation of the equipment in the testing procedure. When regular control measurements show that tolerances are not met, the equipment shall be rejected or adjusted or repaired where possible. Records of control measurements shall be kept.

Acceptance measurements on new equipment shall cover mass, volume and dimensions to the extent that these are indicated in the Standard, particular attention being paid to those critical dimensions for which tolerances are specified.

In those cases where the material of the equipment can influence the results, the material is specified and shall be used.

4.3 Mixer. The mixer shall consist of the following:

(a) A stainless steel mixing bowl with a capacity of approximately 5 L and of the general shape and size shown in Figure 1, provided with means by which it can be fixed securely to the mixer frame during mixing and by which the height of the bowl in relation to the mixer blade and, to some extent the gap between blade and bowl, can be finely adjusted and fixed.

(b) A stainless steel mixer blade of the general shape, size and tolerances shown in Figure 1, revolving about its own axis as it is driven in a planetary movement around the axis of the bowl by an electric motor at controlled speeds. The two directions of rotation shall be opposite.

The gap between blade and bowl shown in Figure 1 shall be checked and recorded every month.

The mixer shall operate at the speeds given in Table 4.1.

TABLE 4.1
SPEEDS OF MIXER BLADE

Speed setting	Mixer blade r/min	Planetary movement r/min
Low speed	140 ±5	62 ±5
High speed	285 ±10	125 ±10

4.4 Mould. The mould shall consist of three horizontal compartments so that three prismatic specimens 40 × 40 mm in cross-section and 160 mm in length can be prepared simultaneously.

A typical design is shown in Figure 3.

The mould shall be made of steel with walls of nominal 10 mm thickness. Surface hardness of each internal side face shall be at least HV 200 Vickers hardness.

The mould shall be constructed in a way which will facilitate the removal of moulded specimens without damage. Each mould shall be provided with a machined steel or cast iron baseplate. The mould, when assembled, shall be positively and rigidly held together and fixed to the baseplate. The assembly shall be such that there is no distortion or leakage. The baseplate shall make adequate contact with the table of the compacting apparatus and be rigid enough not to induce secondary vibrations.

NOTE: Each part of the mould should be stamped with identifying marks to facilitate assembly and to ensure compliance with the specified tolerances. Similar parts of separate mould assemblies should not be interchanged.

The assembled mould shall comply with the following requirements:

(a) Internal dimensions and tolerances of each mould compartment shall be as follows:

Length:	160.0 ±0.8 mm
Width:	40.0 ±0.2 mm
Depth:	40.1 ±0.1 mm

A special mould gauge as shown in Figure 4 is most helpful for routine checks.