# 6
# MORTAR AND GROUT

Although mortar may account for as little as 7% of the volume of a masonry wall, it influences performance far more than the percentage indicates. Aesthetically, mortar adds color and texture to the masonry. Functionally, it binds the individual units together, seals against air and moisture penetration, and bonds with anchors, ties, and reinforcing to join the building components structurally. For engineered construction and loadbearing applications, mortar strength and performance are as critical as unit strength and workmanship.

## 6.1 MORTAR PROPERTIES

Although concrete, masonry mortar, and masonry grout share some common ingredients (*see Fig. 6-1*), these three materials are quite distinct from one another. The methods and materials used to produce strong, durable concrete do not apply to masonry mortar and grout. The most important physical property of concrete is compressive strength, but compressive strength is only one of several properties important to mortar and grout, such as bond strength and durability. These qualities are influenced by three distinct sets of properties, which interact to affect overall performance: (1) *properties of the plastic mortar,* including workability, water retention, initial flow, and flow after suction; (2) *properties of the hardened mortar,* including bond strength, durability, and extensibility, as well as compressive strength; and (3) *mortar / unit assembly properties.*

### 6.1.1 Workability

Workability significantly influences most other mortar characteristics. Workability is not precisely definable in quantitative terms because there are no definitive tests or standards for measurement. Workability is recognized as a complex rheological property including adhesion, cohesion, density, flowability, plasticity, and viscosity, which no single test method can measure. A "workable" mortar has a smooth, plastic consistency, is easily spread with a trowel, and readily adheres to vertical surfaces. Well-graded, smooth aggregates enhance workability, as do lime, air entrainment, and proper amounts of mixing water. The lime imparts plasticity and increases the water-carrying capacity of the mix. Air entrainment introduces minute bubbles which act as

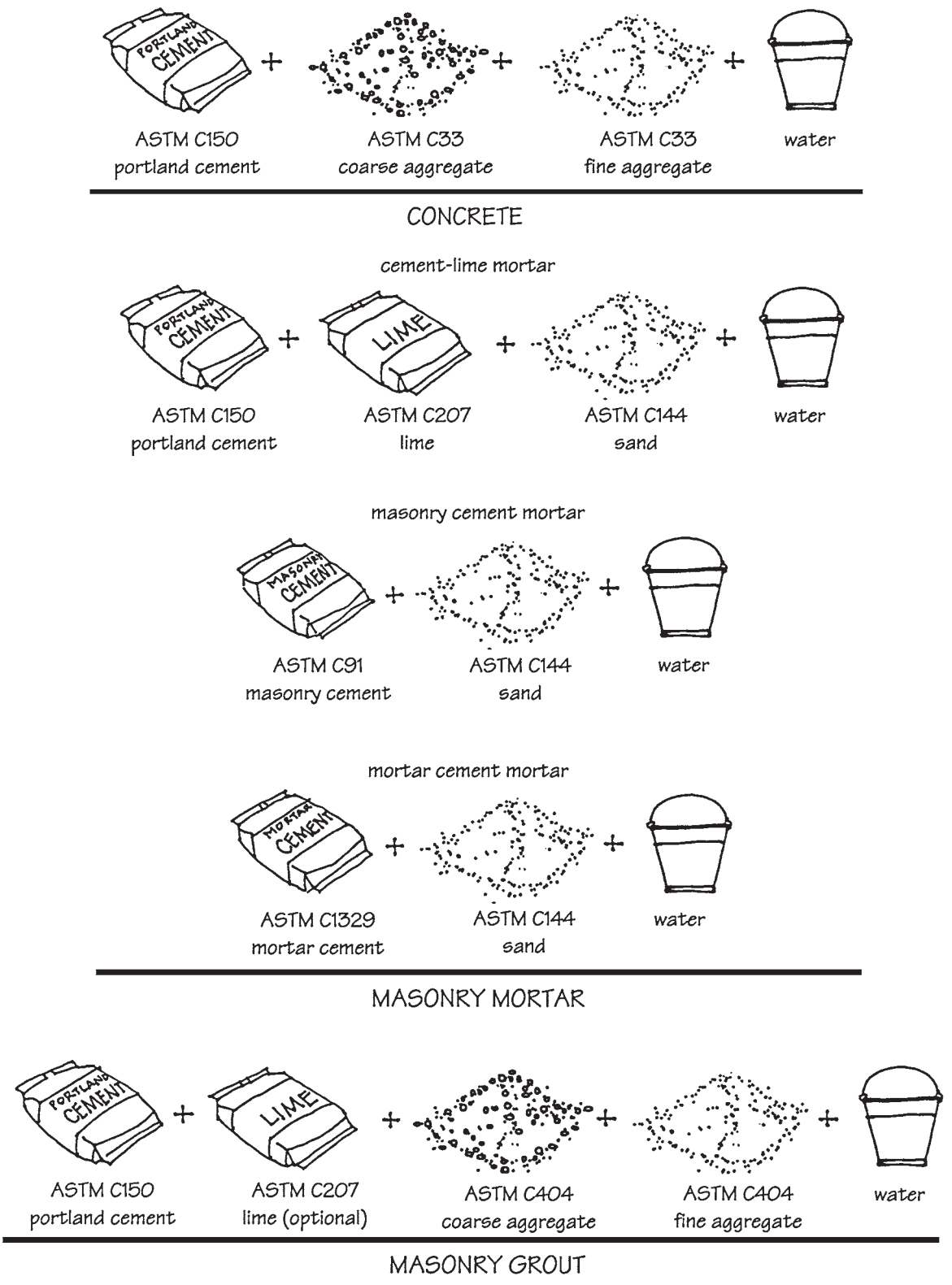


**Figure 6-1** Comparison of ingredients used to make concrete, mortar, and grout. (*From Beall and Jaffe,* Concrete and Masonry Databook, *McGraw-Hill, New York, 2003.*)