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# SURFACE VEHICLE STANDARD

An American National Standard

SAE J67

REAF. JUL1998

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## Shovel Dipper, Clam Bucket, and Dragline Bucket Rating

***Foreword***—This Reaffirmed Document has been changed only to comply with the new SAE Technical Standards Board Format. Definitions have been changed to Section 3. Other section numbers have been renumbered.

***1. Scope***—This SAE Standard applies to all machines with shovel, clam, or dragline attachment.

**1.1 Purpose**—The purpose of this document is to provide a uniform method for determining the SAE rated capacity and SAE struck capacity for shovel dippers and clam buckets, and the SAE rated capacity for dragline buckets.

***2. References***—There are no references specified herein.

***3. Definitions***

**3.1 Shovel Dipper**—SAE struck capacity is the volume of the dipper after it has been struck at the strike plane. The strike plane shall pass through the top edge of the dipper and the cutting edge (see Figure 1).



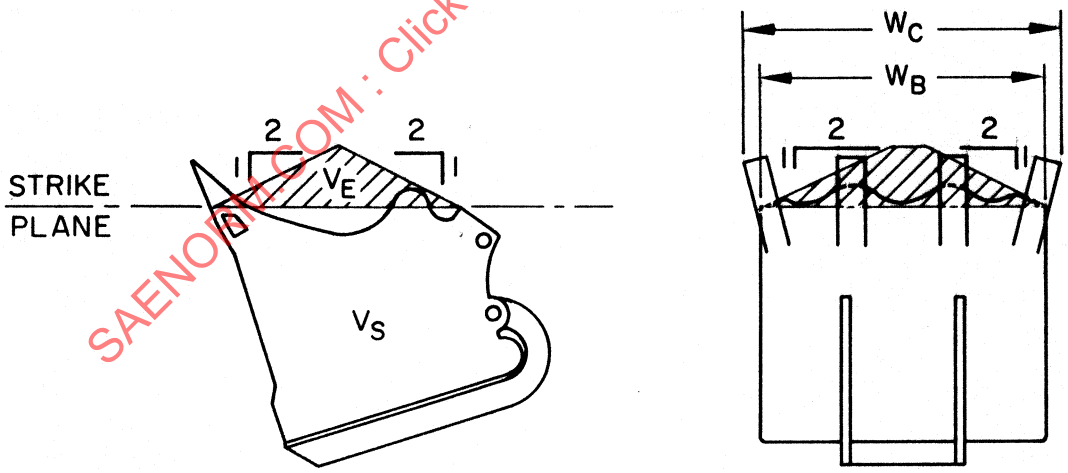


FIGURE 1—SHOVEL DIPPER



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**3.2 Shovel Dipper—**SAE rated capacity is the sum of the SAE struck capacity and the material heaped on the dipper at a 2:1 angle of repose (see Figure 1). This in no way implies that the shovel must carry the dipper oriented in this attitude, or that all material will naturally have a 2:1 angle of repose (see Equation 1).

$$V_R = V_S + V_E - V_M \quad \text{(Eq. 1)}$$

**3.3 Clam Bucket—**SAE struck capacity is the volume of the material in the bucket after it has been struck at the strike plane. The strike plane shall pass through the top edge of the back bands (see Figure 2).

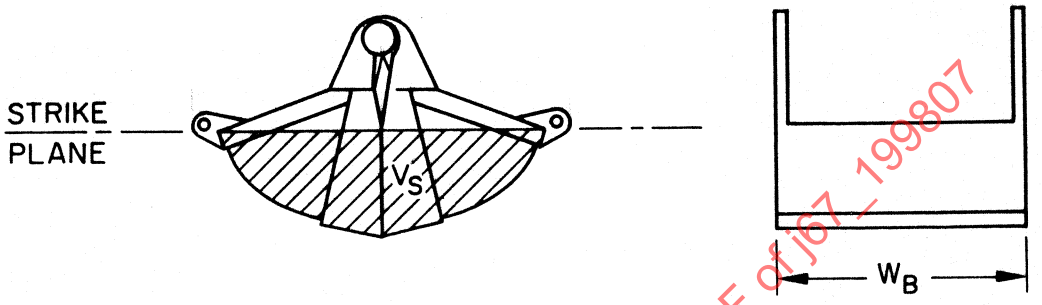


FIGURE 2—CLAM BUCKET STRUCK CAPACITY

**3.4 Clam Bucket—**SAE rated capacity is the volume of the material after it has been struck using the contour of the back band and side plate, providing the side plates do not have a slope exceeding 2:1 (see Figure 3).

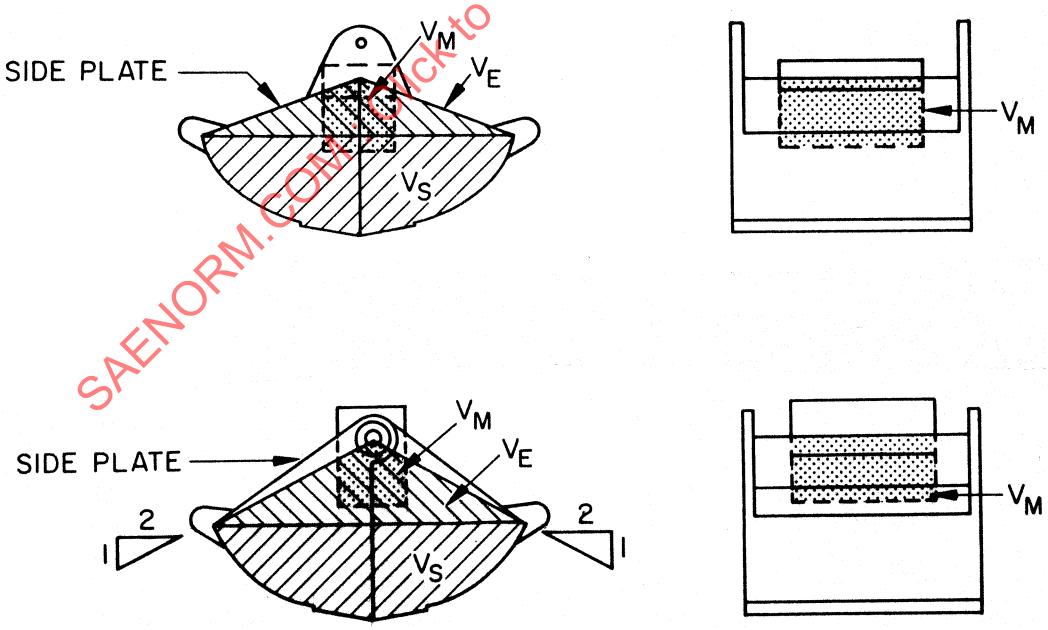


FIGURE 3—CLAM BUCKET RATED CAPACITY

If the operating mechanism is included in this volume, the total volume must be decreased by the volume of the mechanism (see Equation 2).

$$V_R = V_S + V_E - V_M \quad \text{(Eq. 2)}$$

**3.5 Dragline Bucket**—SAE rated capacity is the volume of the bucket after being struck across the top and vertically from the front edge of the bottom bit and then reduced by 10% to compensate for the angle of repose of the material (see Figure 4 and Equation 3).

$$V_R = 0.9(V_S - V_M) \quad \text{(Eq. 3)}$$

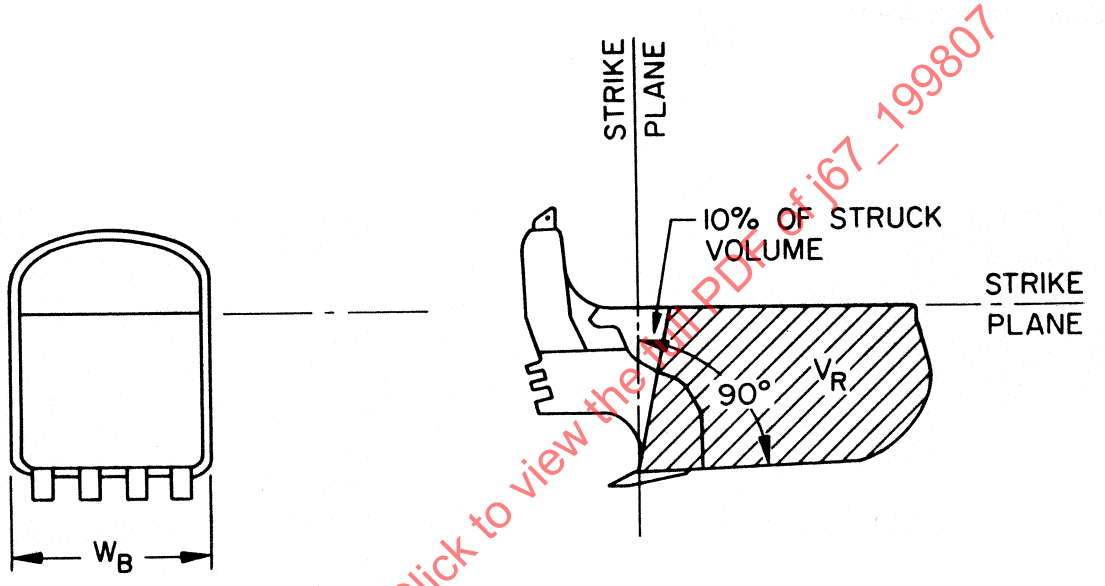


FIGURE 4—DRAGLINE BUCKET

**3.6** SAE ratings shall be according to Table 1:

**TABLE 1—SAE RATED SIZES AND INCREMENTS**

| Range of Rated Sizes $m^3$ | Range of Rated Sizes English Units | Increments $m^3$ | Increments English Units |
|---|---|---|---|
| Under 0.2 | Under 7 $ft^3$ | 0.01 | 1/2 $ft^3$ |
| 0.2–0.3 | 7–13 $ft^3$ | 0.02 | 1 $ft^3$ |
| 0.4–0.6 | 1/2–3/4 $yd^3$ | 0.05 | 1/16 $yd^3$ |
| 0.6–2.3 | 3/4–3 $yd^3$ | 0.1 | 1/8 $yd^3$ |
| 2.3 and over | 3 $yd^3$ and over | 0.2 | 1/4 $yd^3$ |

The SAE rated capacities shall be in the same range of rated sizes and increments as the SAE struck capacity.

If the calculated capacity falls below a rated size by more than 2%, use the next lower rated size.

**3.7 Clam Bucket—**SAE deck area. The deck area shall be the area of the shaded portion shown in Figure 5. This area shall be the product of the outside width of the lips times the open length of the lips.

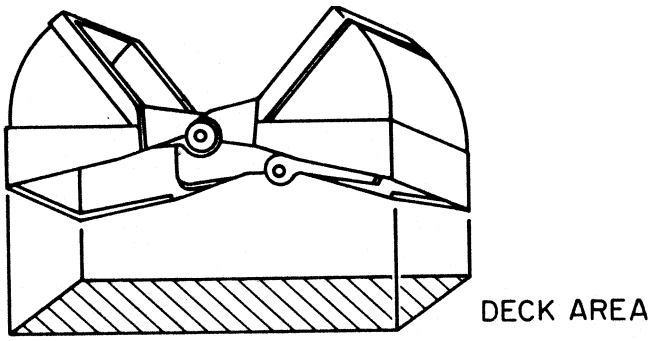


FIGURE 5—CLAM BUCKET DECK AREA

**3.8 General Notes—**A contoured cutting edge will use the lowest opening. Spill guards, teeth, or other accessories shall not be in the dipper or bucket capacity calculations. Volume calculations for $V_S$ shall be based on inside physical dimensions only and shall be reduced for side relief, odd shapes, and structures or mechanisms, protruding into this volume.

**3.9 Definitions of Symbols Used**

$V_R$ = SAE rated capacity
$V_S$ = SAE struck capacity
$V_E$ = Material heaped at a 2:1 angle of repose
$V_M$ = Material displaced by operating mechanism or structure
$W_B$ = Dipper or bucket width
$W_C$ = Cutting width

***4. Width***

**4.1** The dipper or bucket width is measured over the sides of the dipper or bucket at the lower lip without teeth or side cutters attached (see $W_B$, Figures 1, 2, and 4).

**4.2** The cutting width is measured over the teeth or side cutters (see $W_C$, Figure 1). For buckets or dippers having teeth installed inside the width ($W_B$), the cutting width ($W_C$) is also the bucket or dipper width.



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