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Hydraulic Excavator Digging Forces—SAE J1179

SAE Recommended Practice
Approved March 1977

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HYDRAULIC EXCAVATOR DIGGING FORCES—SAE J1179

SAE Recommended Practice

Report of Construction and Industrial Machinery Technical Committee approved
March 1977. Rationale statement available.

1. Purpose—The purpose of this Recommended Practice is to provide a uniform method of rating digging forces for mobile hydraulic excavators.

2. Scope—This Recommended Practice applies to mobile hydraulic excavators which are either crawler or wheel mounted, with or without outrigger members. (A mobile hydraulic excavator is defined as “a self-propelled machine with an upper structure capable of continuous rotation and which digs, elevates, swings, and dumps material by action of the boom and arm or telescoping boom with bucket.”)

3. Rated Digging Forces—Rated digging forces are the digging forces that can be exerted at the outermost cutting point. These forces are calculated by applying working relief hydraulic pressure to the cylinder(s) providing the digging force. Weight of components and friction are to be excluded from these force calculations.

3.1 Rated Bucket Tangential Force—The rated bucket tangential force, “V”, Fig. 1, is the rated digging force generated by the bucket cylinder(s) and tangent to the arc of radius “C”, Fig. 1. The bucket shall be positioned to obtain the maximum output moment from the bucket cylinder(s) and connecting linkage.

3.2 Rated Arm Force—The rated arm force, “W”, Fig. 2 is the rated digging force generated by the arm cylinder(s) and tangent to the arc of radius “B”, Fig. 2. The arm shall be positioned to obtain the maximum output moment from the arm cylinder and the bucket positioned as in Section 3.1.

3.3 Rated Telescoping Boom Crowd Force—The rated telescoping boom crowd force “U”, Fig. 3, is the rated digging force generated by the telescoping boom cylinder acting on a line parallel to the boom. Force “U” is independent of bucket position.

4. Conditions

4.1 Specified bucket linkage configuration must be used unless otherwise noted.

4.2 Rated digging forces will be with the specified bucket.

4.3 Adjustable arm must be in the specified configuration unless otherwise noted.

4.4 Rated digging forces are to be in N (lb).

4.5 Additional digging forces may be specified separately for available buckets or equipment.

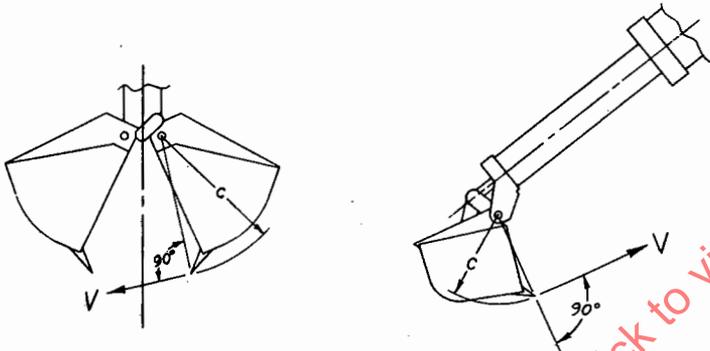


FIG. 1—RATED BUCKET TANGENTIAL FORCE

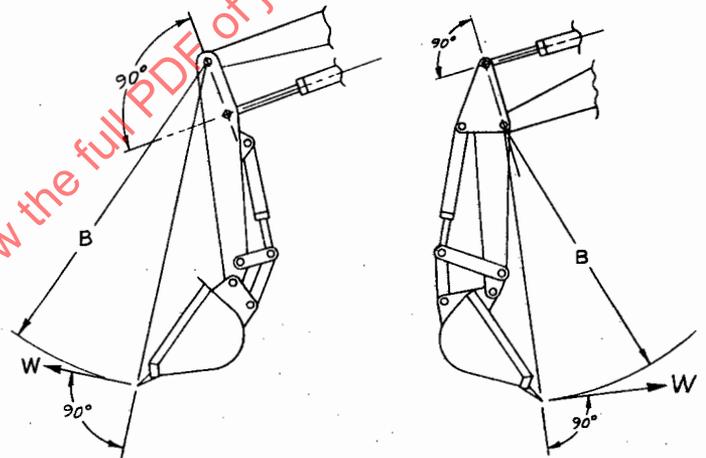


FIG. 2—RATED ARM FORCE

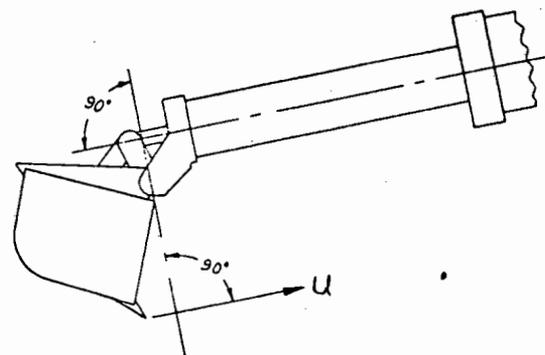
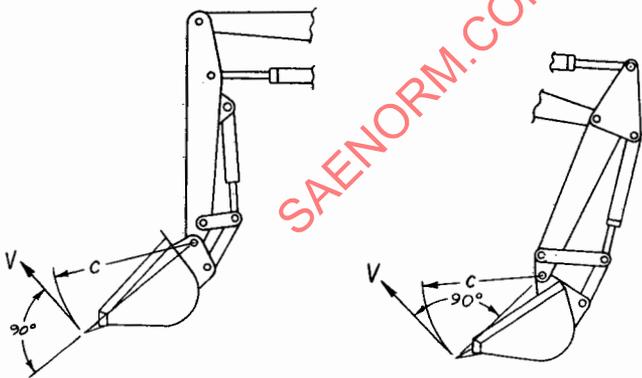


FIG. 3—RATED TELESCOPING BOOM CROWD FORCE