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SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1304 ISSUED FEB85

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An American National Standard

CUTTING EDGE—CROSS SECTIONS LOADER STRAIGHT WITH BOLT HOLES

Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. Scope—For cutting edges used on buckets for loaders defined in SAE J1057a. The dimensions are applicable to rolled and machined sections only. Cutting edge cross section thickness is limited to a maximum of 35 mm. Bolt-on tooth adapters are rarely used on loader buckets with cutting edge thicknesses in excess of 35 mm. This recommended practice applies only to straight cutting edges defined as those whose leading edge and rear edge are parallel and thus are of constant cross section. Overall cross sections to which bolt holes were added as indicated by this recommended practice were selected from those indicated per "Cutting Edge—Cross Sections Loader Straight," SAE J1303 FEB85. Selection was based on minimum section width requirements to accommodate bolt-on tooth adapters.

NOTE—For some heavy-duty applications, cross sections with larger blunts, greater bevel angles, and larger bolt holes may be required.

1.1 Purpose—To specify dimensions for straight cutting edge cross sections with bolt holes for mounting bolt-on tooth adapters on loader buckets described by SAE J731d. It is the intent of this recommended practice to describe the cross sections viable for bolt-on tooth mounting and identify the bolt hole size and location relative to the cutting edge cross section. Thus, a foundation for future standardization of bolt-on tooth adapters is established by the recommended practice.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the lastest revision of SAE publications shall apply

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J731d—Component Nomenclatuare—Loader
SAE J1057a—Identification Terminology of Earthmoving Machines
SAE J1303 FEB85—Cutting Edge—Cross Sections Loader Straight

3. Dimensions and Tolerances—See Figure 1 and Table 1 for recommended specifications.

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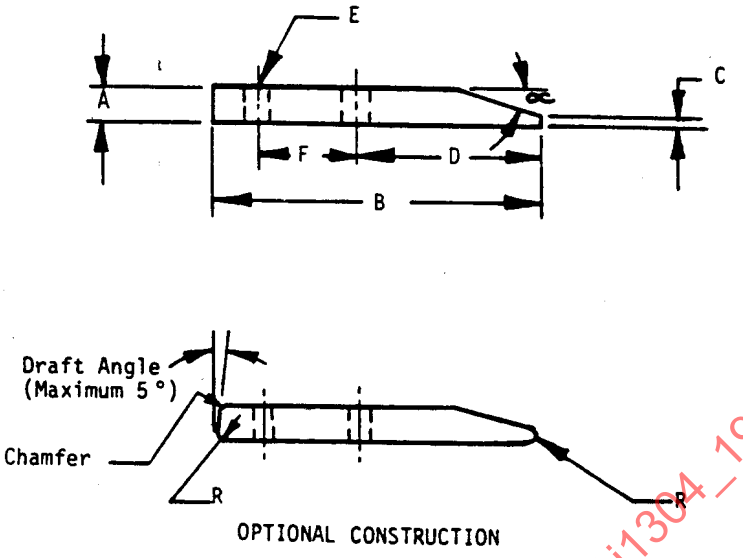

FIGURE 1—DIMENSIONS ASSOCIATED WITH LOADER STRAIGHT CUTTING EDGE SECTIONS WITH BOLT HOLES

TABLE 1—DIMENSIONS FOR CUTTING EDGE—CROSS SECTIONS LOADER STRAIGHT WITH BOLT HOLES

A Thickness(1)		B Section Width(2)		α Bevel Angle(3)	C Blunt1		D Maximum Front Hole Location(4)		E Hole Size(5)		Bolt Size	F Hole Spacing(6)	
mm	in	mm	in	deg	mm	in	mm	in	mm	in	in	mm	in
12	0.47	150	5.91	23	2	0.08	41.00	1.614	17.48	0.688	5/8	83	3.268
16	0.63	150	5.91	23	3	0.12	48.00	1.890	17.48	0.688	5/8	76	2.992
20	0.79	150	5.91	23	4	0.16	59.00	2.323	21.43	0.844	3/4	60	2.362
20	0.79	200	7.87	23	4	0.16	59.00	2.323	21.43	0.844	3/4	60	2.362
22	0.87	150	5.90	23	4	0.16	63.00	2.480	21.43	0.844	3/4	56	2.205
22	0.87	200	7.87	23	4	0.16	63.00	2.480	21.43	0.844	3/4	56	2.205
25	0.98	200	7.87	23	5	0.20	68.00	2.677	21.43	0.844	3/4	101	3.976
25	0.98	230	9.06	23	5	0.20	68.00	2.677	21.43	0.844	3/4	101	3.976
25	0.98	250	9.84	23	5	0.20	68.00	2.677	21.43	0.844	3/4	101	3.976
30	1.18	200	7.87	23	6	0.24	81.00	3.189	25.40	1.000	7/8	83	3.268
30	1.18	250	9.84	23	6	0.24	81.00	3.189	25.40	1.000	7/8	123	4.843
35	1.38	250	9.84	23	7	0.28	91.00	3.583	25.40	1.000	7/8	123	4.843

1. Thickness and blunt tolerance are each to be: ±0.8 mm for 12 mm and all thicknesses up to and inclusive of 16 mm ; ±1.0 mm for 20 through 25 mm thick; ±1.2 mm for 30 through 35 mm.
2. Width tolerance to be: +3.2–2.4 mm for 150 through 200 mm; ±3.2 mm for all widths over 200 mm.
3. Angle tolerance to be ±1/2 deg for all thicknesses.
4. "D" maximum should be used as a basis for locating the holes. "D" minimum is a direct result of the amount of camber, bevel angle tolerance, and thickness tolerance. The allowable minimum specification is left up to the individual manufacturers and should be based upon adequate tooth adapter-lip fit-up plus ensure that holes do not lie on the bevel.
5. Tolerances for hole diameters to be: +0.48–0.28 mm for diameters up through 30 mm; +0.64–0.28 mm for diameter s over 30 mm.
6. Tolerance on hole spacing to be ±0.40 mm.

PREPARED BY THE SAE OFF-ROAD MACHINERY TECHNICAL COMMITTEE

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Rationale—This recommended practice was developed as a guideline to use for loader cutting edge sections to which bolt-on bucket teeth are to be mounted. The overall cutting edge cross section is identified; plus, specifications are given concerning the size and location of the pre-drilled bolt holes provided.

The overall cutting edge cross sections used for this recommendation were selected from those listed per SAE Recommended Practice, J1303, CUTTING EDGE—CROSS SECTIONS LOADER STRAIGHT on the basis that bolt-on teeth could be mounted. Not all sections were chosen from SAE J1303 primarily due to limitations on section width and section thicknesses. Furthermore, the scope is restricted to only those sections that are rolled or machined due to excessive bevel angle tolerances associated with other processes.

A survey of bolt-on loader bucket teeth was made industry-wide that helped produce feasible guidelines. The overwhelming majority of bolt-on teeth used two bolts for retention. Bolt-on teeth were rarely used on cutting edges thicker than 33 mm (weld-on teeth were used in those incidences). Thus, the scope of this recommendation was limited to cutting edge sections no thicker than 35 mm and a two-hole bolt pattern was adapted for tooth retention.

This survey also indicated that numerous combinations of bolt sizes and bolt hole patterns were used on comparable size cutting edges for similar loader applications. This most severe loading on the mounting bolts is encountered when a side load is imparted to the tooth. Spreading the bolts apart from forward to aft will minimize the loads incurred and using larger diameter bolts will minimize bolt stresses.

The criteria used for this recommendation was based on first selecting a substantial bolt diameter to use for each section thickness. Then, the maximum distance between bolt holes was determined for all section widths as listed per CUTTING EDGE—CROSS SECTIONS LOADER STRAIGHT, SAE J1303, based on the front bolt hole being one bolt diameter behind the bevel and the back bolt hole being two bolt diameters in front of the rear end of the cutting edge. The scope was then limited to those section widths of a given thickness, whereby, the bolt hole spacing was greater than the minimum dimensions required for open end wrench clearance when tightening the bolts. Manufacturing tolerances were included in the calculations to determine the maximum bolt hole spacing for each section width. In general, only one bolt spacing was recommended for each section thickness. An exception was made for the 30 mm thick sections due to the high usage and extreme difference of both section widths available.

Ideally, the tooth adapter should make contact with the cutting edge bevel and/or blunt. Analysis of current tooth adapter and cutting edge combinations used by the industry shows that there is no assurance of contact. The "D" dimension in this recommendation for locating the front hole relative to the front of the cutting edge is the maximum allowed for pre-drilled edges without having interference with the tooth adapter. If there is any camber in the cutting edge, the actual "D" dimension will decrease along the length of the edge proportional to the amount of camber. Thus, the tooth adapter will contact the bevel and/or blunt when "D" maximum is realized but may not contact either if "D" is less than "D" maximum. Thus, the bolts must be capable of taking the complete load in some cases.

Metric fasteners were not used as a basis for selecting hole sizes since no directive has yet been established by ISO.

This recommended practice should provide an excellent benchmark from which standardization of pre-drilled loader cutting edges and bolt-on bucket teeth can be developed. Since many of these recommendations are arbitrary in nature, it is expected that modifications, deletions and additions will come about with future feedback and experience.

SC8 is responsible for the contents of this document. The subcommittee members are representative of loader, cutting edge and bucket teeth manufacturers.