State of Illinois
Department of Transportation
Division of Highways
Springfield

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SPECIFICATIONS
FOR
CUTTING EDGES FOR GRADER BLADES

Serial Number: M37-07

1. *Material:* The cutting edges shall be alloy steels meeting the approval of the Department. The steels shall be melted by the electric-furnace, basic-oxygen or other similar commercially accepted steel making process, and may be either ingot cast or strand cast. The manufacturer shall have the option to fabricate and machine the blades in the as-rolled or annealed condition, and then subsequently quench and temper the steel to meet the requirements of this specification.

2. *Chemical Composition:* The cutting edges shall be made of one or more of the following approved alloy steels, listed in numerical order. Their respective chemical compositions shall conform to the following requirements*:

Alloy Name	%C	%Mn	%P	%S	%Si	%Cr	%Ni	%Mo
SAE 1330[D]	0.28-0.33	1.60-1.90	0.035 max	0.040 max	0.15-0.35	[A]	[B]	[C]
SAE 15B30 modified[E]	0.28-0.34	1.00-1.30	0.025 Max	0.050 Max	0.15-0.30	0.35-0.55	0.40 max	0.15 max
SAE 4130	0.28-0.33	0.40-0.60	0.035 max	0.040 max	0.15-0.35	0.80-1.10	[B]	0.15-0.25
SAE 8620	0.18-0.23	0.70-0.90	0.035 max	0.040 max	0.15-0.35	0.40-0.60	0.40-0.70	0.15-0.25
T-1 Type A (ASTM A514 Grade B)	0.12-0.21	0.70-1.00	0.035 max	0.035 max	0.20-0.35	0.40-0.65	[B]	0.15-0.25

*All alloys in the above table must be quenched and tempered in their final finished condition, and have a min CVN impact toughness of 25 ft-lbs at 32°F in the plate's rolling (longitudinal) direction. For the alloys listed in the above table, except for SAE 15B30, up to 0.35% copper is permitted in the heat analysis as scrap residual.

[A] Up to 0.20% chromium is permitted in the heat analysis as scrap residual.

[B] Up to 0.25% nickel is permitted in the heat analysis as scrap residual.

[C] Up to 0.06% molybdenum is permitted in the heat analysis as scrap residual.

[D] 0.04-0.08% vanadium is permitted.

[E] Boron, 0.00050-0.0020%; copper, 0.50% max; titanium, 0.007-0.030%; aluminum, 0.010-0.060%, nitrogen, 0.015% max; vanadium, 0.01% max.

If a special alloy steel is proposed, its composition shall be approved in writing by the Department prior to its use.

3. *Chemical Analysis:* A certified analysis of each heat of steel shall be furnished to the Department to verify the weight percentages of the elements specified in Paragraph 2. A product analysis of the cutting edge from an independent laboratory, in lieu of a heat analysis, can be furnished to the Department. The chemical composition shall be within the ranges for the elements specified in Paragraph 2, but can deviate within the permitted variations for the same elements as listed in Table B of ASTM Standard A 6, *General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling.*

4. *Hardness:* The finished cutting edges shall have a Rockwell C Scale (R_c) hardness of not less than 25, nor more than 35. The corresponding Brinell hardness (BHN) range for a 3000 kg-f load and a 10 mm ball is 266 to 327 BHN. The Rockwell C or Brinell hardness shall be determined on a finished cutting edge in accordance with ASTM A 370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products.*

5. *Impact Toughness:* All cutting edges shall have a minimum average Charpy V-notch impact toughness of 25 ft-lbs at 32°F, based on a minimum of three test specimens. No single test value out of three or more specimens shall be less than 17 ft-lbs. Testing shall be in conformance with ASTM A 370. The Charpy V-notch test will not be required for blades that have a lifetime guarantee providing replacement for blades that are broken by impact.

6. *Dimensions:* The length, width, thickness, curvature and bevel of the finished cutting edges shall be as shown on the plans or specified on the order. All grader blades to be double-bevel curved unless otherwise specified.

7. *Spacing and Size of Holes:* The spacing and size of the holes for the finished cutting edges shall comply with the sketches. For sketches, contact the Bureau of Materials and Physical Research, Engineer of Tests, at (217) 782-7200.

8. *Finish:* The finished cutting edges shall be straight, free from observable flaws, voids, seams, large non-metallic inclusions, or other injurious defects. All finished or machined surfaces shall have a surface roughness of 125 microinches or less. All surfaces shall be painted with a metal primer and an acrylic top coat meeting the approval of the Department.

9. *Inspection:* All cutting edges shall be inspected by the Department for specification compliance. Inspection may be performed upon delivery, or if the Department elects, at the place of manufacture, whereby the inspector representing the Department shall have free entry to all parts of the plant related to that specific order of cutting edges.

10. *Holes:* Holes cuts to accept countersunk head, square neck plow bolts shall be plasma or laser cut or punched. If the square holes exhibit any cutting protrusions or deformation lips, these raised hole edges shall be ground smooth to conform with the adjacent undeformed surfaces of the cutting edge. Holes may be punched in as-rolled or annealed alloy steels, and then subsequently heat treated to their final condition in order to meet this specification.

This specification supersedes Serial Number M37-02, effective February 1, 2002.

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