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SAFETY CODE SERIES

**SAFETY CODE FOR THE
USE, CARE, AND PROTECTION
OF ABRASIVE WHEELS**

INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT
BOARDS AND COMMISSIONS AND GRINDING WHEEL
MANUFACTURERS ASSOCIATION, SPONSORS

—
TENTATIVE AMERICAN STANDARD
Approved February 11, 1922, by
American Engineering Standards Committee



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INTRODUCTION.

On April 3, 1920, the American Engineering Standards Committee invited the International Association of Industrial Accident Boards and Commissions and the Grinding Wheel Manufacturers Association of the United States and Canada to act as joint sponsors for a safety code for the use, care, and protection of abrasive wheels. These associations both accepted this sponsorship, and according to the rules of procedure of the American Engineering Standards Committee they jointly appointed a sectional committee to draft such a code.

This sectional committee consists of the following members:

| Name and address. | Association, society, or firm represented. | Sectional committee group. |
|--|--|---|
| Chairman, L. W. Chaney, U. S. Bureau of Labor Statistics, Washington, D. C. | U. S. Department of Labor | Governmental bodies. |
| H. L. Whittemore, U. S. Bureau of Standards, Washington, D. C. | U. S. Bureau of Standards | Do. |
| Prof. E. A. Winslow, consulting hygienist, 62 Park Street, New Haven, Conn. | U. S. Public Health Service | Do. |
| Fred G. Lange, Director of Safety Industrial Commission of Ohio, Columbus, Ohio. | I. A. I. A. B. C. and Industrial Commission of Ohio. | Do. |
| R. McA. Keown, Engineer, Industrial Commission of Wisconsin, Madison, Wis. | I. A. I. A. B. C. and Industrial Commission of Wisconsin. | Do. |
| John P. Meade, director, division of industrial safety, Department of Labor and Industry, Boston, Mass. | I. A. I. A. B. C. and Department of Labor and Industry of Massachusetts. | Do. |
| Rowland H. Leveridge, bureau of electrical and mechanical equipment, Department of Labor, Trenton, N. J. | I. A. I. A. B. C. and Department of Labor, New Jersey. | Do. |
| J. C. Cronin, Department of Labor and Industry, Harrisburg, Pa. | I. A. I. A. B. C. and Department of Labor and Industry, Pennsylvania. | Do. |
| Secretary, A. Rousseau, safety engineer, Norton Co., Worcester, Mass. | Grinding Wheel Manufacturers Association and Norton Co. | Manufacturers of apparatus concerned (grinding wheels and grinding machines). |
| F. R. Henry, Dayton Grinding Wheel Co., Dayton, Ohio. | Grinding Wheel Manufacturers Association and Dayton Grinding Wheel Co. | Do. |
| George W. Chormann, Carborundum Co., Niagara Falls, N. Y. | Grinding Wheel Manufacturers Association and Carborundum Co. | Do. |
| John R. Kempf, Detroit Star Grinding Wheel Co., Detroit, Mich. | Grinding Wheel Manufacturers Association and Detroit Star Grinding Wheel Co. | Do. |
| J. B. Baker, Safety Emery Wheel Co., Springfield, Ohio. | Grinding Wheel Manufacturers Association and Safety Emery Wheel Co. | Do. |
| J. H. Byers Abrasive Co., Philadelphia, Pa. | Grinding Wheel Manufacturers Association and Abrasive Co. | Do. |
| H. W. Dunbar, member, A. S. M. E., Norton Co., Worcester, Mass. | National Machine Tool Builders Association. | Do. |

| Name and address. | Association, society, or firm represented. | Sectional committee group. |
|---|---|--|
| C. H. Gale, superintendent foundries, Pressed Steel Car Co., McKees Rocks, Pa. | American Foundrymen's Association. | Employers as users of grinding wheels. |
| G. E. Sanford, member A. I. E. E., A. S. E. and A. S. M. E., General Electric Co., West Lynn, Mass. | National Founders' Association.. | Do. |
| Gregory Brown, Norton Co., Worcester, Mass. | National Metal Trades Association. | Do. |
| F. M. Ward, Otis Elevator Co., Yonkers, N. Y. | Otis Elevator Co..... | Do. |
| H. J. Weeks, chairman, General Standards Commission for State of Ohio, American Steel and Wire Co., Pittsburgh, Pa. | American Steel and Wire Co.... | Do. |
| B. C. Christy, International Harvester Co., Chicago, Ill. | International Harvester Co..... | Do. |
| S. E. Whiting, member, A. I. E. E., Liberty Mutual Insurance Co., Boston, Mass. | National Association Mutual Casualty Co. and Liberty Mutual Insurance Co. | Insurance interests. |
| L. L. Hall, Workmen's Compensation Service Bureau, 13 Park Row, New York, N. Y. | National Workmen's Compensation Service Bureau. | Do. |
| F. M. Rosseland, National Safety Council, Chicago, Ill. | National Safety Council..... | General interests. |
| W. B. Gardiner, mechanical superintendent, Lincoln Twist Drill Co., Taunton, Mass. | American Society Mechanical Engineers. | Engineering and technical bodies. |
| A. J. Gifford, Leland-Gifford Co., Worcester, Mass. | Society of Automotive Engineers. | Do. |
| G. E. Sanford, General Electric Co., West Lynn, Mass. | American Society of Safety Engineers. | Do. |
| Rowland H. Leveridge, Department of Labor, Trenton, N. J. | ...do..... | Do. |
| P. J. Conlon, 9th Street and Mt. Vernon Place NW., Washington, D. C. | International Association of Machinists. | Employees as users of equipment. |
| George J. Speidel, 90 Bayway, Elizabeth, N. J. | Metal Polishers, Buffers and Platers of North America. | Do. |

Meetings of this committee were held, and as a result a code was drafted which was submitted first to the grinding-wheel manufacturers for approval. A few changes were suggested which were resubmitted to the sectional committee and to the International Association of Industrial Accident Boards and Commissions.

This code in its present form is the net result of this work and was approved by the:

International Association of Industrial Accident Boards and Commissions executive committee, November 18, 1921.

Grinding Wheel Manufacturers Association, December 9, 1921.

Sectional committee, by letter ballot, January 30, 1922.

American Engineering Standards Committee, February 11, 1922.

The membership of the two associations sponsoring this code is as follows:

GRINDING WHEEL MANUFACTURERS OF UNITED STATES AND CANADA.

The Abrasive Co., Philadelphia, Pa.
 American Emery Wheel Works, Providence, R. I.
 Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
 Canadian-Hart Products Co., Hamilton, Ontario, Canada.
 Carborundum Co., Niagara Falls, N. Y.
 Chicago Wheel & Manufacturing Co., Chicago, Ill.
 Cortland Grinding Wheels Corporation, Chester, Mass., and Cortland, N. Y.
 Dayton Grinding Wheel Co., Dayton, Ohio.

Detroit-Star Grinding Wheel Co., Detroit, Mich.
 Dominion Abrasive Wheel Co. (Ltd.), New Toronto, Ontario, Canada.
 General Grinding Wheel Corporation, Philadelphia, Pa.
 Hampden Corundum Wheel Co., Springfield, Mass.
 Norton Co., Worcester, Mass.
 Norton Co. of Canada (Ltd.), Hamilton, Ontario, Canada.
 Pittsburg Grinding Wheel Co., Rochester, Pa.

GRINDING WHEEL MANUFACTURERS OF UNITED STATES AND CANADA—Concluded.

Precision Grinding Wheel Co., Philadelphia, Pa.
 Safety Emery Wheel Co., Springfield, Ohio.
 Sterling Grinding Wheel Co., Tiffin, Ohio.
 Superior Corundum Wheel Co., Waltham, Mass.

Vitrified Wheel Co., Westfield, Mass.
 Waltham Grinding Wheel Co., Waltham, Mass.
 Waltham Grinding Wheel Co. of Canada (Ltd.), Brantford, Ontario, Canada.
 White Heat Products Co., Frazer, Pa.

INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS.

ACTIVE MEMBERS.

U. S. Employees' Compensation Commission.
 U. S. Bureau of Labor Statistics.
 California Industrial Accident Commission.
 Connecticut Workmen's Compensation Commission.
 Delaware Industrial Accident Board.
 Georgia Industrial Commission.
 Hawaii Industrial Accident Boards (counties of Kauai, Maui, Hawaii, and Honolulu).
 Illinois Industrial Commission.
 Iowa Workmen's Compensation Service.
 Kansas Court of Industrial Relations.
 Maine Industrial Accident Commission.
 Maryland State Industrial Accident Commission.
 Massachusetts Industrial Accident Board.
 Michigan Department of Labor and Industry.
 Minnesota Industrial Commission.
 Montana Industrial Accident Board.
 Nevada Industrial Commission.
 New Jersey Department of Labor.
 New York State Industrial Commission.
 Ohio Industrial Commission.
 Oklahoma Industrial Commission.
 Oregon State Industrial Accident Commission.
 Pennsylvania Department of Labor and Industry.

Utah Industrial Commission.
 Virginia Industrial Commission.
 Washington Department of Labor and Industries.
 West Virginia State compensation commissioner.
 Wisconsin Industrial Commission.
 Wyoming Workmen's Compensation Department.
 Department of Labor of Canada.
 Alberta Workmen's Compensation Board.
 Manitoba Workmen's Compensation Board.
 New Brunswick Workmen's Compensation Board.
 Nova Scotia Workmen's Compensation Board.
 Ontario Workmen's Compensation Board.

ASSOCIATE MEMBERS.

Idaho Industrial Accident Board.
 North Dakota Workmen's Compensation Board.
 Ontario Safety League.
 Porto Rico Workmen's Relief Commission.
 Republic Iron & Steel Company, Youngstown, Ohio.
 Industrial Accident Prevention Association of Toronto.
 Nebraska Industrial Commission.

SECTION I. SCOPE AND DEFINITIONS.

10. **Scope.**—This code is intended to give rules and specifications which are necessary to insure safety in the use of abrasive wheels operating at speeds in excess of 2,000 surface feet per minute.

11. **Definitions.**

Shall and should.—The word "shall" where used is to be understood as mandatory and "should" as advisory.

Abrasive wheel.—The term "abrasive wheel" where used shall be understood to mean power-driven wheels which consist of abrasive particles held together by artificial or natural mineral or organic bonds. Metal, wooden, cloth, or paper wheels or discs having a layer or layers of abrasive on the surface are not included.

Protection hood.—A “protection hood” is an inclosure consisting of a peripheral and two side members, constructed according to specifications which appear later in this code.

Cast hood.—A cast hood shall be defined as a hood which has the peripheral protecting member cast integral with at least one side member, and may be made of gray iron castings, malleable iron castings, or steel castings.

Fabricated hood.—A fabricated hood shall be defined as a hood which is built up or constructed by bolting, pinning, riveting, or welding the peripheral protecting member to the side members, and may be made of structural steel plate, wrought-iron plate, or an assembly of either of these in combination with gray iron castings, malleable iron castings, or steel castings or a material possessing an equivalent tensile strength.

Protection flanges.—“Protection flanges” are flanges designed to be used with abrasive wheels of special shape, in such a manner as to effectively retain the parts of a wheel—should such wheel break in operation—in addition to the usual function of clamping the wheel to the spindle.

Protection flanges are of several types, of which the following are the most commonly used:

“Tapered flanges,” sometimes called safety, beveled, or concave flanges, which are used with wheels having convex side or sides.

“Hub flanges,” which are used with wheels having a raised hub or hubs.

“Ring flanges,” having concentric ring or rings projecting from the bearing sides of the flanges, which fit into corresponding grooves in the sides of the wheels.

Protection band.—A “protection band” is a continuous band placed around a cup, cylinder, or sectional ring wheel to effectually retain the pieces of such a wheel which might break in operation.

Protection chuck.—A “protection chuck” is a chuck used for mounting cup, cylinder, or sectional ring wheels, so designed that the jaws inclose the wheel up to the point specified in rule 70.

SECTION II. TYPES OF PROTECTION DEVICES.

20. **General requirements.**—All abrasive wheels shall be provided with one of the following forms of protection, which are listed in the order of preference:

- (a) Protection hoods.
- (b) Protection flanges.
- (c) Protection bands.
- (d) Protection chucks.

Exception: This requirement shall not apply to wheels used for internal grinding, nor to wheels 3 inches or less in diameter running at a speed not exceeding 3,000 feet per minute.

Forms *c* and *d* shall apply to cups, cylinders, and sectional ring wheels; forms *a* and *b* to all other shapes of wheels.

SECTION III. HANDLING AND STORAGE.

30. **Storage.**—Extreme care should be exercised in the storage of wheels. They should be stored in dry places and should be supported on edge in racks. Straight-sided shellac and rubber-bonded wheels of one-fourth inch or less in thickness shall be laid flat on a straight surface to prevent warpage.

31. **Inspection.**—Immediately upon receipt, all wheels should be closely inspected to make sure that they have not been injured in transit or otherwise. For added precaution wheels should be tapped gently with a light implement, such as the handle of a screw driver. If they sound cracked, they should not be used. Wheels must be dry, and free from sawdust, when applying the test.

SECTION IV. GENERAL MACHINE REQUIREMENTS.

40. **Rigidity, supports.**—Grinding machines should be sufficiently heavy and rigid so as to minimize vibration. They should be securely mounted on substantial floors, benches, foundations, or other structures.

41. **Size of spindle.**—No user of wheels shall operate on any machine of given spindle diameter a wheel of larger diameter or greater thickness than specified in the following table:

| Diameter in inches. | Thickness of wheel in inches. | | | | | | | | | | | | | | | | | | |
|---------------------|-------------------------------|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | ¼ | ⅜ | ½ | ⅝ | ¾ | 1 | 1¼ | 1½ | 1¾ | 2 | 2¼ | 2½ | 2¾ | 3 | 3¼ | 3½ | 4 | 4½ | 5 |
| 6..... | ½ | ½ | ½ | ½ | ½ | ½ | ⅝ | ⅝ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | 1 | 1 | 1 |
| 7..... | ½ | ½ | ½ | ½ | ⅝ | ⅝ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | 1 | 1 | 1 | 1 | 1 | 1 |
| 8..... | ⅝ | ⅝ | ⅝ | ⅝ | ⅝ | ⅝ | ¾ | ¾ | ¾ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1¼ | 1¼ | 1¼ |
| 9..... | ⅝ | ⅝ | ⅝ | ⅝ | ¾ | ¾ | ¾ | ¾ | 1 | 1 | 1 | 1 | 1 | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ |
| 10..... | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | ¾ | 1 | 1 | 1 | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ |
| 12..... | ¾ | ¾ | ¾ | ¾ | ¾ | 1 | 1 | 1 | 1 | 1 | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1½ | 1½ | 1½ |
| 14..... | 7⁄8 | 7⁄8 | 7⁄8 | 7⁄8 | 1 | 1 | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ |
| 16..... | | | | | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1¼ | 1½ | 1½ | 1½ | 1½ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ |
| 18..... | | | | | 1¼ | 1¼ | 1¼ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ |
| 20..... | | | | | | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1½ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ |
| 24..... | | | | | | 1½ | 1½ | 1½ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ | 1¾ | 2 | 2 | 2 | 2 | 2 |
| 26..... | | | | | | 1½ | 1½ | 1¾ | 1¾ | 1¾ | 1¾ | 2 | 2 | 2 | 2 | 2 | 2¼ | 2¼ | 2¼ |
| 30..... | | | | | | | 1¾ | 1¾ | 2 | 2 | 2 | 2 | 2 | 2 | 2¼ | 2¼ | 2½ | 2½ | 2½ |
| 36..... | | | | | | | | 2 | 2¼ | 2¼ | 2¼ | 2½ | 2½ | 2½ | 2½ | 2¾ | 2¾ | 3 | 3 |

42. **Limit stop.**—Grinding machines should be provided with a stop or other means of fixing the maximum size of wheel which can be used.

44. **Direction of spindle thread.**—Ends of spindles shall be so threaded that the nuts on both ends will tend to tighten as the spindles revolve. Care should be taken in setting up machines that the spindles are arranged to revolve in the proper direction, else the nuts on the ends will loosen.

NOTE.—To remove the nuts they should both be turned in the direction that the spindle revolves when the wheel is in operation.

45. **Length of spindle thread.**—The length of the spindle and the distance from the end which the thread extends shall be such as to allow the entire length of the nut to bear on the thread so as to exert its full pressure on all thicknesses of wheels which may be used.

46. **Size of wheel holes.**—Wheel holes should be made approximately 0.005 inch large.

SECTION V. PROTECTION HOODS.

50. **General requirements.**—Hoods should be used on every operation where the nature of the work will permit, and shall always be used with wheels which are not provided with protection flanges, chucks, or bands.

51. **Mounting and fastenings.**—Hoods shall be so mounted as to maintain proper alignment with wheels, and the fastenings shall have ample strength to minimize displacement in case of wheel breakage.

52. **Exposure: Bench and floor stands.**—The maximum angular exposure of the grinding wheel periphery and sides for hoods used on machines known as bench and floor stands should not exceed 90° , or one-fourth of the periphery. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See fig. 1.)

Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125° . This exposure shall begin at a point not more than 65° above and extend to a point not more than 60° below the horizontal plane of the wheel spindle. (See fig. 2.)

53. **Exposure: Cylindrical grinders.**—The maximum angular exposure of the grinding wheel periphery and sides for hoods used on cylindrical grinding machines shall not exceed 180° . This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See fig. 3.)

54. **Exposure: Surface grinders.**—The maximum angular exposure of the grinding wheel periphery and sides for hoods used on surface grinding machines which employ the wheel periphery shall not exceed 150° . (See fig. 4.)

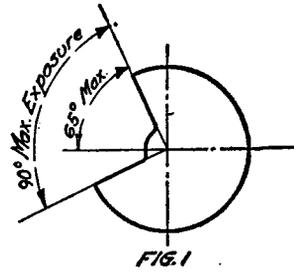


FIG. 1

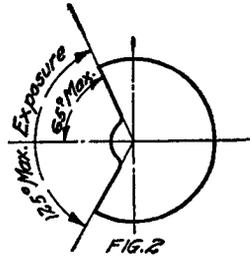


FIG. 2

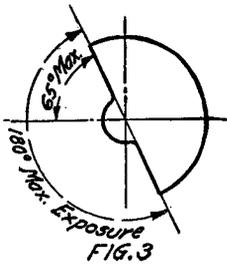


FIG. 3

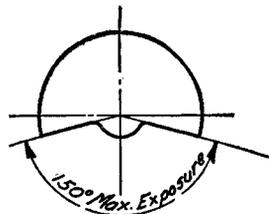


FIG. 4

55. Exposure: Swing frame and portable grinders.—The maximum angular exposure of the grinding wheel periphery and sides for hoods used on machines known as swing frame and portable grinding machines shall not exceed 180°, and the top half of the wheel shall be protected at all times. (See fig. 5.)

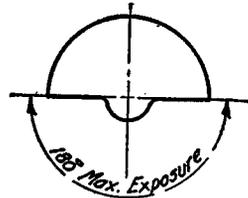


FIG. 5

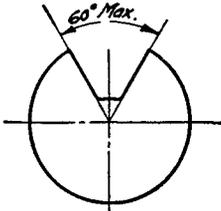


FIG. 6

56. Exposure: Top grinding.—In operations where the work is ground on the top of the wheel, the exposure of the grinding wheel periphery shall be as small as practicable, with a maximum exposure of 60°. (See fig. 6.)

57. Exposure adjustment.—Hoods shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel by means of an adjustable tongue, or its equivalent, so that the angular protection specified in rules 52 to 56 will be maintained throughout the life of the wheel, and the maximum distance between the wheel periphery and tongue or end of peripheral band at top of opening will not exceed 1/4 inch. (See figs. 7, 8, and 9.)

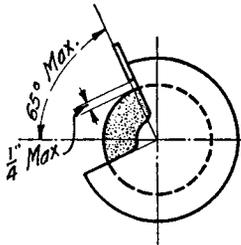


FIG. 7—CORRECT

Showing adjustable tongue giving required angular protection for all sizes of wheels used.

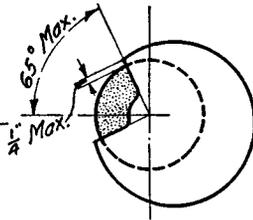


FIG. 8—CORRECT.

Showing movable hood with opening small enough to give required protection for smallest size wheel used

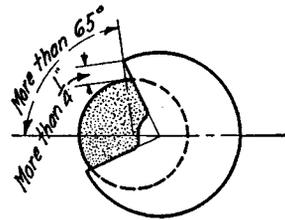


FIG. 9—INCORRECT.

Showing movable hood with size of opening correct for full size wheel, but too large for smaller wheels.

58. Fixed members.—Hoods shall be constructed so that it is not necessary when changing wheels to detach the peripheral protecting member from the side member which is connected to the machine.

59. Enclosure requirements.—The hood shall inclose the spindle end, nut, and flange projections, if any.

NOTE.—Protection hoods on cylindrical grinding machines, in all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and flanges are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted.

500. Minimum dimensions for the peripheral and side members.

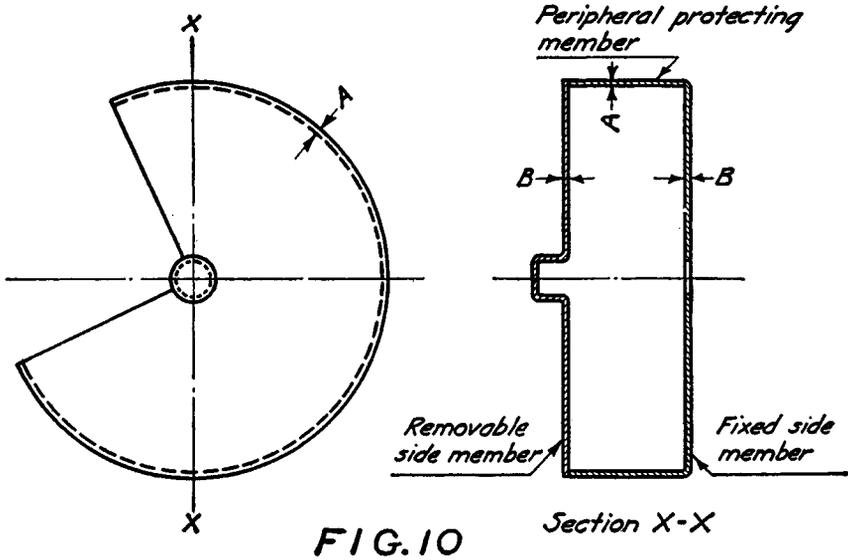


FIG. 10

| Material used in construction guard. | Maximum thickness of grinding wheel, inches. | Grinding-wheel groups by diameters. | | | | | | | | | | | | | |
|---|--|-------------------------------------|------|-----------------|------|------------------|-------|------------------|-------|------------------|-------|------------------|-------|------------------|-------|
| | | 3 to 6 inches. | | 7 to 12 inches. | | 13 to 16 inches. | | 17 to 20 inches. | | 21 to 24 inches. | | 25 to 30 inches. | | 31 to 48 inches. | |
| | | A | B | A | B | A | B | A | B | A | B | A | B | A | B |
| <i>Cast members.</i> Cast iron..... | 2 | 1/4 | 1/4 | 3/8 | 5/16 | 1/2 | 3/8 | 5/8 | 1/2 | 7/8 | 5/8 | 1 | 3/4 | 1 1/4 | 1 |
| | 4 | 5/16 | 5/16 | 3/8 | 1/2 | 3/8 | 5/8 | 1 | 1 1/8 | 5/8 | 1 1/8 | 3/4 | 1 3/8 | 1 | 1 1/8 |
| | 6 | 3/8 | 5/16 | 1/2 | 1/2 | 5/8 | 1 1/2 | 1 | 1 1/8 | 3/4 | 1 1/4 | 7/8 | 1 1/2 | 1 1/2 | 1 1/8 |
| Malleable iron..... | 2 | 1/4 | 1/4 | 3/8 | 5/16 | 1/2 | 3/8 | 5/8 | 1/2 | 7/8 | 5/8 | 1 | 3/4 | 1 | 7/8 |
| | 4 | 5/16 | 5/16 | 3/8 | 1/2 | 3/8 | 5/8 | 1 1/2 | 3/4 | 5/8 | 1 1/8 | 3/4 | 1 1/8 | 1 1/8 | 7/8 |
| | 6 | 3/8 | 5/16 | 1/2 | 1/2 | 5/8 | 1 1/2 | 3/4 | 7/8 | 5/8 | 1 | 3/4 | 1 1/4 | 1 1/4 | 7/8 |
| Steel castings..... | 2 | 1/4 | 1/4 | 1/4 | 1/4 | 3/8 | 3/8 | 1/2 | 7/8 | 5/8 | 1/2 | 3/4 | 5/8 | 7/8 | 3/4 |
| | 4 | 1/4 | 1/4 | 1/4 | 1/4 | 3/8 | 3/8 | 1 1/2 | 7/8 | 5/8 | 1 1/2 | 3/4 | 5/8 | 1 | 3/4 |
| | 6 | 3/8 | 1/4 | 3/8 | 1/4 | 1/2 | 3/8 | 5/8 | 1 1/2 | 3/4 | 5/8 | 3/4 | 1 1/8 | 1 1/8 | 3/4 |
| <i>Fabricated members.</i> Structural steel..... | 2 | 1/8 | 1/16 | 3/16 | 1/8 | 3/16 | 3/16 | 1/4 | 1/4 | 5/16 | 1/4 | 3/8 | 5/16 | 1/2 | 3/8 |
| | 4 | 1/8 | 1/16 | 3/16 | 1/8 | 3/16 | 3/16 | 1/4 | 1/4 | 5/16 | 1/4 | 3/8 | 5/16 | 1/2 | 3/8 |
| | 6 | 3/16 | 1/16 | 1/4 | 1/8 | 1/4 | 3/16 | 3/8 | 1/4 | 3/8 | 1/4 | 1/2 | 5/16 | 5/8 | 3/8 |
| Wrought iron..... | 2 | 1/8 | 1/16 | 3/16 | 1/8 | 1/4 | 3/16 | 5/16 | 1/4 | 3/8 | 1/4 | 7/16 | 5/16 | 1/2 | 3/8 |
| | 4 | 1/8 | 1/16 | 1/4 | 1/8 | 1/4 | 3/16 | 1/4 | 3/8 | 1/4 | 1/2 | 5/16 | 5/8 | 3/8 | 3/8 |
| | 6 | 3/16 | 1/16 | 1/4 | 1/8 | 1/4 | 3/16 | 3/8 | 1/4 | 7/16 | 1/4 | 1/2 | 5/8 | 1 1/8 | 7/16 |

501. **Material specifications.**—Materials used in the construction of hoods shall conform to and be in accordance with the following designated specifications of the American Society for Testing Materials:

- (a) Gray-iron castings—A 48.
- (b) Malleable-iron castings—A 47.
- (c) Steel castings—A 27 (class A).
- (d) Structural steel plate—A 9 (excluding specifications for rivet steel).
- (e) Wrought-iron plate—A 42 (class A).

NOTE.—Copies of these specifications may be procured at a nominal price from the American Society for Testing Materials, Philadelphia, Pa.

502. **Construction guide.**—As a guide for the construction of fabricated hoods of steel plate or wrought iron the following drawings have been prepared. Other types offering equal protection will also be accepted.

The requirements given in columns C, D, and E of this table shall apply also to cast hoods; and in such cases where the tongue is held by bolts, column F shall also apply.

| | C | D | E | F | G | H | J |
|------------------------------|--|-------------------------------|-----------------------------|---|---|--|---|
| Diameter of wheel in inches. | Maximum-space between new wheel and hood at periphery in inches. | Maximum inside width of hood. | Length of tongue in inches. | Diameter of bolts for tongue in inches. | Size of angle supports for tongue and rest in inches. | Diameter of rivets for supports in inches. | Diameter of end connecting bolts in inches. |
| Under 12.. | 1½ | 1½ inches wider than wheel. | 3½ | ½ | 1½ by 1½ by ¼.. | ⅞ | ⅞ |
| 12 to 16... | 1½ | 2 inches wider than wheel. | 5 | ⅞ | 2 by 2 by ⅞.. | ½ | ½ |
| 17 to 24... | 1½ |do..... | 6 | ⅞ | 2 by 2 by ½.. | ½ | ⅞ |
| Over 24.... | 1½ |do..... | 7 | ⅞ | 2½ by 2½ by ½.. | ⅞ | ⅞ |

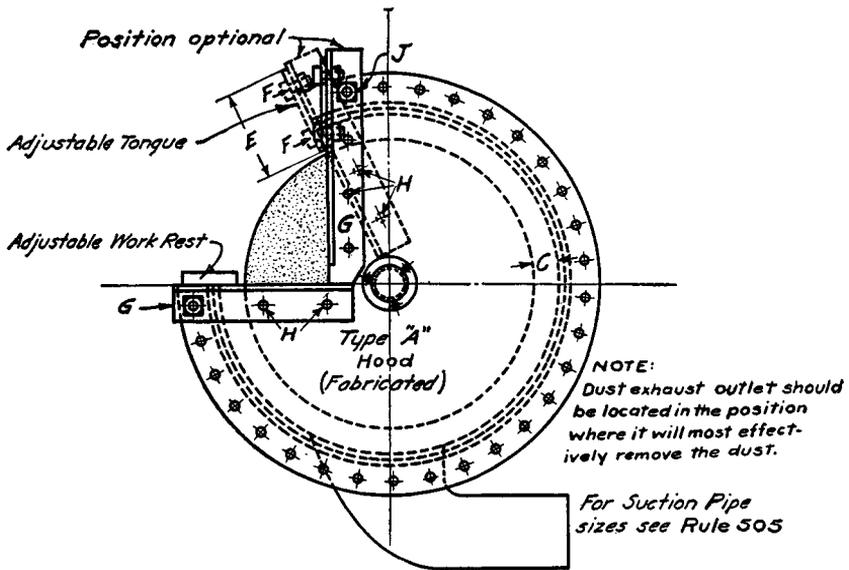


FIG. 11

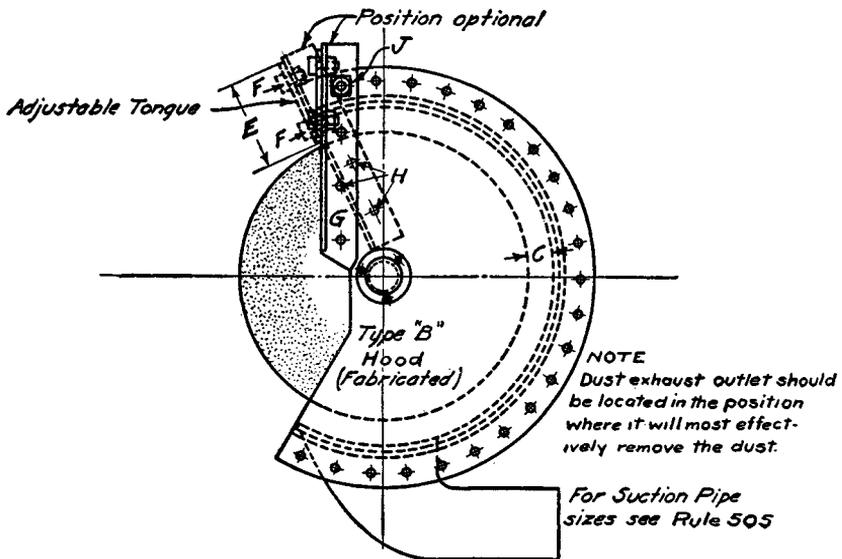


FIG. 12

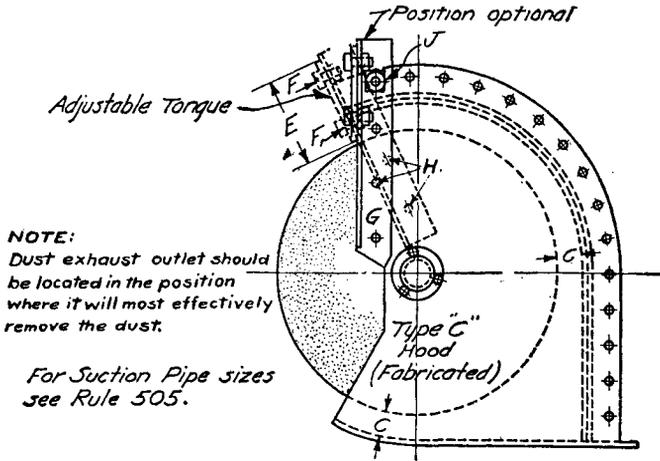
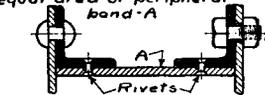


FIG. 13.

FRONT VIEW, ALSO CROSS SECTIONS SHOWING FOUR SATISFACTORY METHODS OF SECURING COVER-B2

NOTE: These views all apply to types A, B & C Hoods

NOTE: Combined sectional area of angles to at least equal area of peripheral band-A



SECTION SHOWING BOLT WELDED INTO ANGLE - COVER HELD BY NUTS ON ENDS OF BOLTS -

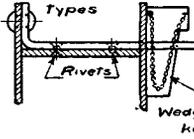


SECTION SHOWING BOLT THREADED INTO ANGLE ONLY - COVER HELD BY NUTS ON ENDS OF BOLTS -



SECTION SHOWING STUD THREADED INTO ANGLE ONLY - COVER HELD BY PINS THROUGH ENDS OF STUDS -

NOTE: Combined sectional area of straps to at least equal twice the total area of bolts in other Types



SECTION AND SIDE VIEW SHOWING COVER HELD BY WEDGE KEYS THROUGH FLAT IRON STRAPS -

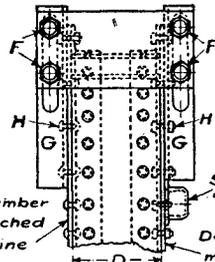
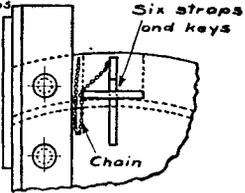


FIG. 14

FRONT VIEW

503. Connection requirements.—Hoods shall be constructed so that the connections between the peripheral and side members, or between parts of a sectional hood, will have a strength in a radial direction at least equal to the strength of the material of which the hoods are constructed.

504. Connecting members (specifications).

MINIMUM SIZES AND SPACING OF RIVETS, BOLTS, AND STUDS FOR CONNECTING PERIPHERAL AND SIDE MEMBERS IN FABRICATED HOODS OF WROUGHT-IRON AND STEEL PLATE.

| Thickness of plates being connected in inches. | For side plate (B-1) attached to machine. | | For detachable side plate (B-2). | |
|--|---|---|---------------------------------------|---|
| | Diameter of rivets in inches. | Maximum distance between centers in inches. | Diameter of bolts or studs in inches. | Maximum distance between centers in inches. |
| $\frac{1}{8}$ and $\frac{1}{8}$ | $\frac{3}{16}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{1}{8}$ and $\frac{1}{8}$ | $\frac{3}{16}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{3}{16}$ and $\frac{1}{8}$ | $\frac{3}{16}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{3}{16}$ and $\frac{3}{16}$ | $\frac{3}{16}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{1}{4}$ and $\frac{1}{8}$ | $\frac{1}{4}$ | 2 | $\frac{3}{8}$ | 4 |
| $\frac{1}{4}$ and $\frac{3}{8}$ | $\frac{1}{4}$ | $1\frac{3}{4}$ | $\frac{3}{8}$ | $3\frac{1}{2}$ |
| $\frac{1}{4}$ and $\frac{1}{4}$ | $\frac{1}{4}$ | $1\frac{1}{2}$ | $\frac{3}{8}$ | 3 |
| $\frac{5}{16}$ and $\frac{3}{16}$ | $\frac{3}{8}$ | 2 | $\frac{5}{16}$ | 4 |
| $\frac{5}{16}$ and $\frac{1}{4}$ | $\frac{3}{8}$ | 2 | $\frac{5}{16}$ | 4 |
| $\frac{3}{8}$ and $\frac{1}{4}$ | $\frac{3}{8}$ | 2 | $\frac{5}{16}$ | 4 |
| $\frac{3}{8}$ and $\frac{1}{8}$ | $\frac{3}{8}$ | $1\frac{3}{4}$ | $\frac{5}{16}$ | $3\frac{1}{2}$ |
| $\frac{7}{16}$ and $\frac{1}{4}$ | $\frac{3}{8}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{1}{2}$ and $\frac{1}{8}$ | $\frac{3}{8}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{1}{2}$ and $\frac{3}{8}$ | $\frac{3}{8}$ | $1\frac{1}{2}$ | $\frac{5}{16}$ | 3 |
| $\frac{5}{8}$ and $\frac{3}{8}$ | $\frac{3}{8}$ | $1\frac{1}{2}$ | $\frac{5}{8}$ | 3 |
| $\frac{1}{2}$ and $\frac{1}{8}$ | $\frac{3}{8}$ | $1\frac{1}{2}$ | $\frac{5}{8}$ | 3 |

505. **Dust-exhaust provision.**—Hoods on machines used for dry grinding and other operations where dust is produced shall have provision made for connection to an exhaust system.

The size of such connections shall be in conformity with the following specified dimensions:

| Diameter of wheel. | Medium diameter of branch pipe. |
|-----------------------------------|---------------------------------|
| 6 inches or less in diameter..... | 3 inches. |
| 7 to 16 inches in diameter..... | 4 inches. |
| 17 to 24 inches in diameter..... | 5 inches. |
| 25 to 30 inches in diameter..... | 6 inches. |

A modification of the above requirements will be allowed in the case of narrow wheels used for light work where very little dust is generated and where a smaller pipe will satisfactorily remove it.

The requirements in this paragraph shall not apply to swing-frame and portable grinding machines.

SECTION VI. WORK RESTS.

60. **Construction.**—Work rests shall be rigid in construction.

61. **Adjustment.**—The work rest should be kept adjusted close to the wheel, with a maximum distance of $\frac{1}{8}$ inch, to prevent the work from being caught between the wheel and rest, and should be securely clamped after each adjustment.

SECTION VII. PROTECTION FOR CUP, CYLINDER, AND SECTIONAL RING WHEELS.

70. **General requirements.**—Cups, cylinders, and sectional ring wheels shall be either protected with hoods, inclosed in protection chucks, or surrounded with protection bands. Not more than one-quarter of the height of such grinding wheels shall protrude beyond the provided protection. Where the thickness of the rim of such wheels is less than 2 inches, the maximum distance which the wheel may protrude beyond the provided protection shall not exceed 1 inch. If the thickness of the rim is 2 inches or more, the wheel may protrude 2 inches beyond the protection, but shall not exceed this amount.

71. **Hoods.**—Where hoods are used they shall conform to the specifications given in rules 50 to 505, inclusive, in this code.

72. **Chucks.**—Where the chuck which holds the wheel is the only protection provided, it shall be so designed that the jaws will at all times protect the wheel up to the point specified in rule 70.

73. **Bands.**—Where protection bands are used, they shall conform to the following specifications:

(a) They shall be made of wrought-iron or steel plate or other material of equal strength, shall be continuous and bent to conform as closely to the periphery of the wheel as practical. The ends shall either be riveted, bolted, or welded together in such a manner as to leave the inside of the band free from projections.

(b) The bands shall be of sufficient width to provide the protection specified in rule 70.

(c) The thickness of the band shall be made according to the following table, which also shows the size and spacing for riveted joints. If bolting or welding is used, the strength of the connections shall be at least equal to the riveted joints specified in this table.

MINIMUM THICKNESS, SIZE, AND SPACING OF RIVETS FOR PROTECTION BANDS FOR CUPS, CYLINDERS, AND SECTIONAL RING WHEELS.

| Size of wheels in inches. | Thickness of band in inches. | Minimum diameter of rivets in inches. | Maximum distance between centers in inches. |
|---------------------------|------------------------------|---------------------------------------|---|
| Under 8..... | $\frac{1}{8}$ | $\frac{3}{8}$ | $\frac{3}{4}$ |
| 8 to 24..... | $\frac{1}{8}$ | $\frac{1}{4}$ | 1 |
| 25 to 30..... | $\frac{1}{4}$ | $\frac{3}{8}$ | $1\frac{1}{4}$ |

SECTION VIII. FLANGES.

80. **General requirements.**—All wheels excepting those which are mounted in chucks shall always be run with flanges.

81. **Material.**—All tapered flanges over 10 inches in diameter shall be of steel, or other material of equal strength. All other flanges may be made of cast iron, or other material of equal strength.

82. **Finish and balance.**—Flanges shall be finished all over correct to dimensions and in balance. The requirement for balance does not apply to so-called balancing flanges, which are purposely made out of balance.

83. **Uniformity of diameter.**—Both flanges, whether straight or tapered, in contact with wheel, shall be of the same diameter.

84. **Recess.**—Each flange, whether straight or tapered, shall be recessed at the center at least one-sixteenth of an inch on the side next to the wheel for a distance as specified in the respective tables of dimensions for straight and tapered flanges.

85. **Fit.**—The inner flange shall be keyed, screwed, shrunk, or pressed onto the spindle, and the bearing surface shall run true and at right angles with the spindle. The bore in the outer flange should be not more than 0.002 inch larger than the spindle.

86. **Straight flange dimensions.**—Where protection hoods are used, sizes of straight flanges for straight wheels shall not be less than shown in the following table:

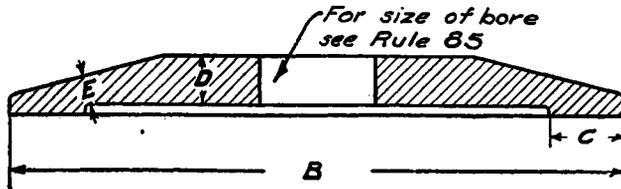


FIG. 15

[All dimensions in inches.]

| A Diameter of wheel in inches. | B Minimum outside diameter of flanges. | C Radial width of bearing surface. | | D Minimum thickness of flange at bore. | E Minimum thickness of flange at edge of recess. |
|---|--|--|----------------|--|--|
| | | Minimum. | Maximum. | | |
| 1 | $\frac{3}{8}$ | $\frac{1}{16}$ | $\frac{1}{8}$ | $\frac{1}{16}$ | $\frac{1}{16}$ |
| 2 | $\frac{3}{4}$ | $\frac{1}{8}$ | $\frac{3}{16}$ | $\frac{1}{8}$ | $\frac{3}{16}$ |
| 3 | 1 | $\frac{1}{8}$ | $\frac{1}{4}$ | $\frac{3}{16}$ | $\frac{3}{16}$ |
| 4 | $1\frac{1}{4}$ | $\frac{3}{16}$ | $\frac{3}{8}$ | $\frac{3}{16}$ | $\frac{1}{8}$ |
| 5 | $1\frac{1}{2}$ | $\frac{3}{16}$ | $\frac{3}{8}$ | $\frac{1}{4}$ | $\frac{1}{8}$ |
| 6 | 2 | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{3}{16}$ |
| 8 | 3 | $\frac{1}{4}$ | $1\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{3}{16}$ |
| 10 | $3\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{3}{8}$ | $\frac{1}{4}$ |
| 12 | 4 | $\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{1}{2}$ | $\frac{1}{8}$ |
| 14 | $4\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{5}{16}$ |
| 16 | $5\frac{1}{2}$ | $\frac{1}{2}$ | 1 | $\frac{1}{2}$ | $\frac{5}{16}$ |
| 18 | 6 | $\frac{1}{2}$ | 1 | $\frac{5}{8}$ | $\frac{3}{8}$ |
| 20 | 7 | $\frac{5}{8}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{3}{8}$ |
| 22 | $7\frac{1}{2}$ | $\frac{5}{8}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{7}{16}$ |
| 24 | 8 | $\frac{3}{4}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{7}{16}$ |
| 26 | $8\frac{1}{2}$ | $\frac{3}{4}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{1}{2}$ |
| 28 | 10 | $\frac{7}{8}$ | $1\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{1}{2}$ |
| 30 | 10 | $\frac{7}{8}$ | $1\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{5}{8}$ |
| 36 | 12 | 1 | 2 | $\frac{7}{8}$ | $\frac{3}{4}$ |

87. **Protection flange requirements.**—Protection flanges (see definition) shall always be used with wheels 6 inches and larger which are not provided with protection hoods, chucks, or bands. (See rule 50.) Specifications follow for the tapered type only, which type should be used wherever possible.

88. **Degree of taper.**—Tapered protection flanges (see definition) shall always be used with tapered wheels having the same degree of taper, which should be at least $\frac{3}{4}$ inch per foot for each flange.

89. **Tapered flange dimensions.**—Where no hoods are used, the dimensions of taper flanges shall not be less than shown in the following table:

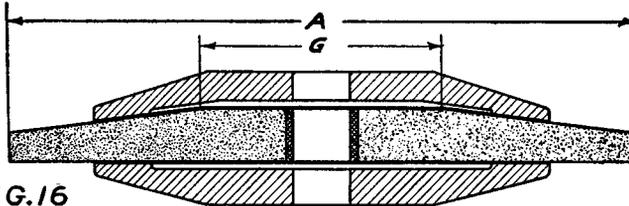


FIG. 16

Single Taper Wheel with one straight and one Tapered Flange

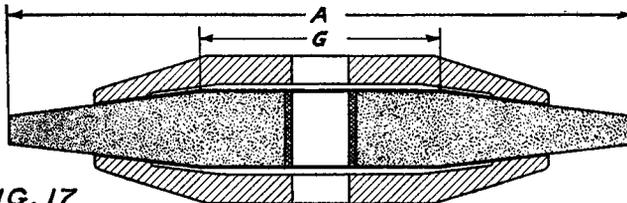


FIG. 17

Double Taper Wheel with two Tapered Flanges

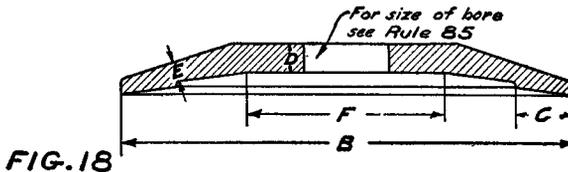


FIG. 18

[All dimensions in inches.]

| A Diam- eter of wheel in inches. | B Mini- mum outside diam- eter of flanges. | C Radial width of bearing surface. | | D Minimum thick- ness of flange. at bore. | | E Minimum thick- ness at edge of recess. | | F Maxi- mum flat spot at center of flange. | G Approx- imate diam- eter of flat spot or hub of wheel. |
|---|--|--|----------------|--|-----------------------------------|---|-----------------------------------|---|--|
| | | Mini- mum. | Maxi- mum. | For double taper wheels. | For single taper wheels. | For double taper wheels. | For single taper wheels. | | |
| 6 | 3 | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{3}{8}$ | $\frac{3}{16}$ | $\frac{3}{16}$ | 0 | 1 |
| 8 | 4 | $\frac{1}{8}$ | $\frac{5}{8}$ | $\frac{3}{8}$ | $\frac{3}{8}$ | $\frac{1}{4}$ | $\frac{1}{4}$ | 0 | 1 |
| 10 | 5 | $\frac{1}{2}$ | 1 | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{4}$ | 0 | 2 |
| 12 | 6 | $\frac{1}{2}$ | 1 | $\frac{5}{8}$ | $\frac{5}{8}$ | $\frac{5}{16}$ | $\frac{5}{16}$ | 4 | $4\frac{1}{2}$ |
| 14 | 8 | $\frac{5}{8}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{3}{4}$ | $\frac{3}{8}$ | $\frac{3}{8}$ | 4 | $4\frac{1}{2}$ |
| 16 | 10 | $\frac{3}{4}$ | $1\frac{1}{2}$ | $\frac{5}{8}$ | $\frac{7}{8}$ | $\frac{3}{8}$ | $\frac{7}{16}$ | 4 | 6 |
| 18 | 12 | 1 | 2 | $\frac{3}{4}$ | 1 | $\frac{1}{2}$ | $\frac{9}{16}$ | 4 | 6 |
| 20 | 14 | $1\frac{1}{4}$ | $2\frac{1}{2}$ | $\frac{3}{4}$ | 1 | $\frac{1}{2}$ | $\frac{9}{16}$ | 4 | 6 |
| 22 | 16 | $1\frac{3}{8}$ | $2\frac{3}{4}$ | $\frac{3}{4}$ | $1\frac{1}{8}$ | $\frac{1}{2}$ | $\frac{9}{16}$ | 4 | 6 |
| 24 | 18 | $1\frac{1}{2}$ | 3 | $\frac{3}{4}$ | $1\frac{1}{8}$ | $\frac{9}{16}$ | $\frac{5}{8}$ | 4 | 6 |
| 26 | 20 | $1\frac{1}{2}$ | $3\frac{1}{4}$ | $\frac{3}{4}$ | $1\frac{1}{8}$ | $\frac{5}{8}$ | $\frac{11}{16}$ | 4 | 6 |
| 28 | 22 | $1\frac{3}{4}$ | $3\frac{3}{4}$ | $\frac{7}{8}$ | $1\frac{1}{4}$ | $\frac{5}{8}$ | $\frac{3}{4}$ | 4 | 6 |
| 30 | 24 | 2 | 4 | $\frac{7}{8}$ | $1\frac{1}{4}$ | $\frac{3}{4}$ | $\frac{7}{8}$ | 4 | 6 |
| 36 | 28 | 2 | 4 | 1 | $1\frac{3}{8}$ | $\frac{7}{8}$ | 1 | 4 | 6 |

NOTE.—Where hoods are used in conjunction with tapered wheels and tapered flanges, the specifications given in rule 86 may be followed.

SECTION IX. MOUNTING.

90. **Inspection.**—Before mounting, all wheels should again be closely inspected to make sure that they have not been injured in transit, storage, or otherwise. (See rule 31.)

91. **Fit.**—Grinding wheels shall fit freely on the spindles; they should not be forced on, nor should they be too loose. (See rule 46.)

92. **Surface condition.**—All surfaces of wheels, washers, and flanges in contact with each other should be free from foreign material.

93. **Bushing.**—The soft metal bushing shall not extend beyond the sides of the wheel.

94. **Washers.**—Washers or flange facings of compressible material shall be fitted between the wheel and its flanges. If blotting paper is used, it should not be thicker than 0.025 inch. If rubber or leather is used, it should not be thicker than $\frac{1}{8}$ inch. If flanges with babbitt or lead facings are used, the thickness of the babbitt or lead should not exceed $\frac{1}{8}$ inch. The diameter of the washers shall not be smaller than the diameter of the flanges.

95. **Tightening of nut.**—When tightening spindle end nuts, care should be taken to tighten same only enough to hold the wheel firmly; otherwise the clamping strain is liable to damage the wheel or associated parts.

SECTION X. SPEED.

100. Recommended and maximum speeds.—The speeds shown in column A of the following table should not be exceeded, except on recommendation of the wheel manufacturer, and in no case should speeds shown in column B be exceeded.

NOTE.—Some manufacturers are willing to recommend higher speeds for precision grinding and on rubber bonded wheels.

| Wheel classification. | A Standard peripheral speed (feet per minute). | B Maximum peripheral speed (feet per minute). |
|---|---|--|
| <i>Vitrified and silicate wheels.</i> | | |
| Cup and cylinder wheels when used for rough grinding, on bench, floor, portable machines, etc. | 4,500 | 5,500 |
| All other vitrified and silicate bonded wheels..... | 5,000 | 6,500 |
| <i>Rubber and shellac bonded wheels.</i> | | |
| Rubber bonded wheels..... | 8,000 | 10,000 |
| Shellac bonded wheels used for cutting off..... | 8,000 | 10,000 |
| All other shellac bonded wheels..... | 5,000 | 6,500 |

101. Table of speeds.

REVOLUTIONS PER MINUTE FOR VARIOUS SIZES OF GRINDING WHEELS TO GIVE PERIPHERAL SPEED IN FEET PER MINUTE AS INDICATED.

| Diameter of wheel in inches. | 4,000 s. f. m. | 4,500 s. f. m. | 5,000 s. f. m. | 5,500 s. f. m. | 6,000 s. f. m. | 6,500 s. f. m. |
|------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1..... | 15,279 | 17,200 | 19,099 | 21,000 | 22,918 | 24,850 |
| 3..... | 7,639 | 8,590 | 9,549 | 10,500 | 11,459 | 12,420 |
| | 5,093 | 5,725 | 6,366 | 7,000 | 7,639 | 8,279 |
| 4..... | 3,820 | 4,295 | 4,775 | 5,250 | 5,730 | 6,205 |
| 5..... | 3,056 | 3,440 | 3,820 | 4,200 | 4,584 | 4,970 |
| 6..... | 2,546 | 2,865 | 3,183 | 3,500 | 3,820 | 4,140 |
| 7..... | 2,183 | 2,455 | 2,728 | 3,000 | 3,274 | 3,550 |
| 8..... | 1,910 | 2,150 | 2,387 | 2,635 | 2,865 | 3,100 |
| 10..... | 1,528 | 1,720 | 1,910 | 2,100 | 2,292 | 2,485 |
| 12..... | 1,273 | 1,453 | 1,592 | 1,750 | 1,910 | 2,070 |
| 14..... | 1,091 | 1,228 | 1,364 | 1,500 | 1,637 | 1,773 |
| 16..... | 955 | 1,075 | 1,194 | 1,314 | 1,432 | 1,552 |
| 18..... | 849 | 957 | 1,061 | 1,167 | 1,273 | 1,380 |
| 20..... | 764 | 860 | 955 | 1,050 | 1,146 | 1,241 |
| 22..... | 694 | 782 | 868 | 952 | 1,042 | 1,128 |
| 24..... | 637 | 716 | 796 | 876 | 955 | 1,035 |
| 26..... | 586 | 661 | 733 | 809 | 879 | 955 |
| 28..... | 546 | 614 | 683 | 749 | 819 | 887 |
| 30..... | 509 | 573 | 637 | 700 | 764 | 827 |
| 32..... | 477 | 537 | 596 | 657 | 716 | 776 |
| 34..... | 449 | 506 | 561 | 618 | 674 | 730 |
| 36..... | 424 | 477 | 531 | 584 | 637 | 689 |

NOTE.—“Centrifugal force,” which is the force that tends to rupture a given wheel when overspeeding, increases as the square of the velocity of that wheel. For example, the centrifugal force in a wheel running at 5,500 surface feet per minute is 49 per cent greater than in the same wheel running at 4,500 surface feet per minute, although the speed is actually only 22 per cent greater.

102. **Speed test.**—Machine spindle speeds shall be tested and determined correct for size of wheel to be operated, before the wheel is mounted, and shall never be changed as wheel is reduced in diameter, except by men assigned for such duties.

103. **Speed adjustment control.**—Where speed of wheel spindle is adjustable, speed adjustment shall be in control of authorized persons only.

SECTION XI. OPERATING RULES AND GENERAL DATA.

110. **Responsibility.**—Competent men should be assigned to the mounting, care, and inspection of grinding wheels and machines.

111. **Inspection after breakage.**—Whenever a wheel breaks, a careful inspection shall be made to make sure that the hood has not been damaged, nor the flanges bent or sprung out of true or out of balance. The spindle and nuts shall also be carefully inspected.

112. **Replacing hood.**—After mounting a new wheel, care should be taken to see that the hood is properly replaced.

113. **Starting new wheels.**—All new wheels shall be run at full operating speed for at least one minute before applying work, during which time the operator shall stand at one side.

114. **Applying work.**—Work should not be forced against a cold wheel, but applied gradually, giving the wheel an opportunity to warm and thereby minimize the chance of breakage. This applies to starting work in the morning in cold rooms, and to new wheels which have been stored in a cold place.

115. **Test for balance.**—Wheels should be occasionally tested for balance, and rebalanced if necessary.

116. **Truing.**—Wheels worn out of round shall be trued by a competent man. Wheels out of balance through wear, which can not be balanced by truing or dressing, shall be removed from the machine.

117. **Wet grinding wheels.**—Wheels used in wet grinding should not be allowed to stand partly immersed in the water. The water-soaked portion may throw the wheel dangerously out of balance.

All wet tool grinders which are not so designed as to provide a constant supply of fresh water shall be thoroughly drained at the end of each day's work and a fresh supply provided just before starting.

118. **Side grinding.**—Grinding on the flat sides of straight wheels is often hazardous and should not be allowed on such operations when the sides of the wheel are appreciably worn thereby or when any considerable or sudden pressure is brought to bear against the sides.

119. **Dresser guards.**—Wheel dressers, excepting the diamond type, shall be equipped with guards over the tops of the cutters to protect the operator from flying pieces of broken cutters or wheel particles.

1100. **Grinding room.**—The space about the machine should be kept light, dry, and as free as possible from obstructions.

1102. **Lubrication.**—Care should be exercised so that the spindle will not become sufficiently heated to damage the wheel.

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