

Portable Tools Using Abrasive Wheels

WAC 296-807-180

Summary

YOUR RESPONSIBILITY:

Make sure abrasive wheel tools and wheels are safe to use

Important:

This section applies to portable tools using abrasive wheels.



Definition:

Abrasive wheel

A grinding tool consisting of bonded abrasive grains. This includes diamond and reinforced wheels.



Exemption:

This section doesn't apply to machines using:

- Natural sandstone wheels
- Pulpstone wheels
- Coated abrasive products
- Loose abrasives.

You must

DESIGN AND CONSTRUCTION

Make sure abrasive wheels and tools are properly designed and constructed

WAC 296-807-18005 180-4

- Continued -



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Summary

WAC 296-807-180 (Continued)

GUARDS

Make sure machines have safety guards WAC 296-807-18010	180-5
Keep safety guards in good functional condition WAC 296-807-18015	180-6

GUARDS - SPECIFIC WHEELS

Use specific safety guards for machines using Type 1 grinding wheels, cutting-off wheels, and tuck pointing wheels WAC 296-807-18020	180-7
Use specific safety guards for vertical and angle grinders using Type 6 or Type 11 wheels WAC 296-807-18025	180-7
Use specific safety guards for vertical and angle grinders using Type 27, 28 and 29 wheels WAC 296-807-18030	180-8

SIDE HANDLES

Use side handles on vertical and angle grinders WAC 296-807-18035	180-8
--	-------

ABRASIVE WHEELS

Make sure abrasive wheels are safe to use WAC 296-807-18040	180-9
--	-------

- Continued -



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Summary

WAC 296-807-180 (Continued)

MOUNTING

Mount wheels properly WAC 296-807-18045	180-10
--	--------

FLANGES

Use proper flanges WAC 296-807-18050	180-11
---	--------

Make sure flanges are in good condition WAC 296-807-18055	180-13
--	--------

FLANGES - SPECIFIC WHEELS

Use specific flanges for Type 1 cutting-off wheels WAC 296-807-18060	180-14
---	--------

Use specific flanges for Type 27A cutting-off wheels WAC 296-807-18065	180-14
---	--------

Use specific flanges for threaded hole wheels WAC 296-807-18070	180-15
--	--------

Use specific flanges for cup, cone or plug wheels with threaded inserts or projecting studs WAC 296-807-18075	180-15
---	--------

BLOTTERS

Use blotters when required WAC 296-807-18080	180-16
---	--------

BLOTTERS - TYPE 6 AND 11 WHEELS

Meet specific blotter requirements when using modified Types 6 and 11 wheels (terrazzo) WAC 296-807-18085	180-17
---	--------



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

DESIGN AND CONSTRUCTION

WAC 296-807-18005

Make sure abrasive wheels and tools are properly designed and constructed

You must

- Make sure abrasive wheels and tools meet the design and construction requirements of:
 - American National Standards Institute (ANSI) B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels

OR

- ANSI B186.1-1984, Safety Code for Portable Air Tools.



Note:

Tools may have a statement on the tool or in the instruction manual that the tool meets the appropriate ANSI standard. If in doubt, check with the manufacturer.



Helpful Tool:

Abrasive wheel illustrations

You can find illustrations of specific types of wheels, general types of flanges, and mounting requirements, in the Resources section of this chapter.

Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

GUARDS

WAC 296-807-18010

Make sure machines have safety guards

You must

- Use abrasive wheels only on machines that have safety guards.
- Make sure the safety guard:
 - Is mounted so it maintains proper alignment with the wheel
 - Is mounted with fasteners strong enough to keep the guard in position if a wheel breaks
 - Is positioned to deflect pieces of an accidentally broken wheel away from the operator
 - Covers the spindle end, nut, and flange projections.



Exemption:

Safety guards aren't required on machines that use:

- Wheels for internal grinding while advancing, retracting or within the work
- Mounted wheels 2 inches or less in diameter
- Types 16, 17, 18, 18R, and 19 cones and plugs and threaded hole pot balls where:
 - The work offers protection
 - or**
 - The size doesn't exceed 3 inches in diameter by 5 inches long.
- Notched, segmented, or continuous rim metal centered diamond lapidary wheels that are:
 - Used with a coolant deflector
 - and**
 - Operated at 3,500 SFPM or less.

- Continued -

<http://www.lni.wa.gov/>



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

WAC 296-807-18010 (Continued)



Exemption:

- Type 1 wheels that are:
 - 2 inches or less in diameter
 - 1/2 inch or less thick
 - Operating at peripheral speeds less than 1,800 SFPM
 - Mounted on mandrels and used in portable drills.
- Type 1 reinforced wheels that are:
 - 3 inches or less in diameter 1/4 inch or less thick
 - Operating at peripheral speeds of 9,500 SFPM or less
 - Used by operators wearing safety glasses and face shields.
- Valve seating grinding wheels.

WAC 296-807-18015

Keep safety guards in good functional condition

You must

- Make sure safety guards are in good functional condition.
 - Replace any safety guard that:
 - Is damaged, bent or severely worn
- OR**
- Has been hit by parts from a breaking wheel.

Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

GUARDS - SPECIFIC WHEELS

WAC 296-807-18020

Use specific safety guards for machines using Type 1 grinding wheels, cutting-off wheels, and tuck pointing wheels

You must

- Make sure the safety guard covers the top and sides of the wheel for at least 180°.



Note:

It isn't required to cover the spindle end, nut and outer flange.

WAC 296-807-18025

Use specific safety guards for vertical and angle grinders using Type 6 or Type 11 wheels

You must

- Make sure the safety guard:
 - Covers the wheel's plane of rotation toward the operator for at least 180°
 - Covers the side of the wheel toward the driving flange for at least 180°
 - Has a skirt which is adjustable to within 1/8 inch of the plane of the surface of the wheel.
- Make sure not to use a "revolving cup guard."



Note:

"Cup back bushings" don't substitute for safety guards.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

WAC 296-807-18030

Use specific safety guards for vertical and angle grinders using Type 27, 28 and 29 wheels

You must

- Make sure safety guards:
 - Cover the wheel's plane of rotation toward the operator for at least 180°
 - Cover the side of the wheel toward the driving flange for at least 180°
 - Have a lip on the outer edge that:
 - Extends beyond the surface of the wheel throughout the 180° coverage
- AND**
- Curls inward to deflect wheel fragments.

SIDE RAILS

WAC 296-807-18035

Use side handles on vertical and angle grinders

You must

- Use a side handle on all 4-inch and larger vertical and angle grinders.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

ABRASIVE WHEELS

WAC 296-807-18040

Make sure abrasive wheels are safe to use

You must

- Do the following before mounting a wheel:
 - Visually inspect the wheel for cracks or damage
 - Perform a ring test for cracks (size and shape of the wheel permitting)
 - Make sure the spindle speed of the machine isn't greater than the operating speed of the wheel.

You must

- Make sure a damaged or cracked wheel isn't mounted or used.



Helpful Tool:

Ring Test

You can find illustrations on how to do a ring test in the Resources section of this chapter.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule MOUNTING

WAC 296-807-18045

Mount wheels properly

You must

- (1) Make sure wheels fit freely on the spindle, wheel sleeves, or adaptors, and remain free under all grinding conditions.
- (2) Make sure wheel, blotter and flange surfaces that contact each other are flat and free of foreign particles.
- (3) Make sure any reducing bushing used in the wheel hole:
 - Fits freely on the spindle and maintains proper clearance
 - Doesn't exceed the width of the wheel or contact the flanges.
- (4) Make sure that multiple wheels mounted between a single set of flanges are either:
 - Cemented together
 - OR**
 - Separated by spacers that have a diameter and bearing surface that is the same as the mounting flanges.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

FLANGES

WAC 296-807-18050

Use proper flanges

You must

- Mount all abrasive wheels between flanges that have a diameter at least 1/3 the diameter of the wheel.



Exemption:

This requirement doesn't apply to the following types of wheels:

- Mounted wheels
- Cup, cone or plug wheels with threaded inserts or projecting studs
- Abrasive disc wheels (inserted nut, inserted washer and projecting stud type)
- Plate mounted wheels
- Cylinder, cup, or segmental wheels mounted in chucks
- Types 27, 28 and 29 wheels
- Internal wheels less than 2 inches in diameter
- Modified Type 6 and 11 wheels (terrazzo)
- Types 1 and 27A cutting-off wheels.

You must

- Make sure flanges are:
 - Dimensionally accurate
 - Properly balanced
 - Flat
 - Free of rough surfaces or sharp edges.

- Continued -



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

WAC 296-807-18050 (Continued)

You must

- Make sure, if a wheel is mounted between 2 flanges, that both flanges:
 - Are the same diameter
 - Have equal bearing surfaces.



Exemption:

The following wheels don't require same diameter, equal bearing surface flanges:

- Types 27, 28, and 29 wheels with adaptors
- Modified Types 6 and 11 wheels with tapered K dimension
- Internal wheels less than 2 inches in diameter.

You must

- Make sure the driving flange is:
 - Part of the spindle

OR

 - Securely fastened to the spindle.

Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

WAC 296-807-18055

Make sure flanges are in good condition

You must

- Make sure flange bearing surfaces are in good condition.
- Replace or remachine any flange with a mounting surface that has any of the following problems:
 - Warped
 - Burred on the bearing surface
 - Excessively worn (thickness or diameter)
 - Out of true.



Note:

Flanges that are refaced or trued need to satisfy minimum dimension requirements specified in ANSI B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

FLANGES - SPECIFIC WHEELS

WAC 296-807-18060

Use specific flanges for Type 1 cutting-off wheels

You must

- Mount Type 1 cutting-off wheels between flanges that are:
 - Properly relieved with matching bearing surfaces
 - At least 1/4 the wheel diameter.



Note:

American National Standards Institute (ANSI) B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels, has specific exemptions for some reinforced, bonded abrasive cutting-off wheels and steel centered, diamond cutting-off wheels. These wheels are primarily used for masonry cutting and concrete sawing.

WAC 296-807-18065

Use specific flanges for Type 27A cutting-off wheels

You must

- Mount Type 27A cutting-off wheels between flanges that are:
 - Flat (unrelieved) with matching bearing surfaces
 - At least 1/4 the wheel diameter.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

WAC 296-807-18070

Use specific flanges for threaded hole wheels

You must

- Use a back flange to mount threaded hole wheels that is:
 - Flat (unrelieved)
 - Securely fastened and square to the spindle axis
 - Able to properly support the wheel.

WAC 296-807-18075

Use specific flanges for cup, cone or plug wheels with threaded inserts or projecting studs

You must

- Mount cup, cone or plug wheels with threaded inserts or projecting studs against a straight, unrelieved flange.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

BLOTTERS

WAC 296-807-18080

Use blotters when required

You must

- Use a blotter between each flange and the abrasive wheel surface to uniformly distribute flange pressure.
- Make sure the blotter covers the entire flange contact area.
- Use a new blotter each time a wheel is mounted unless the wheel has a blotter already attached to it by the manufacturer.
- Make sure scuffed or damaged blotters aren't used.



Exemption:

You don't need to use a blotter with:

- Mounted wheels
- Abrasive disc and Type 2 wheels which are mounted by inserted nuts, inserted washers, or projecting studs
- Plate mounted wheels
- Wheels mounted in chucks (such as cylinders and segmental wheels)
- Types 27, 28 and 29 wheels
- Type 1 and Type 27A cutting-off wheels
- Internal wheels less than 2 inches in diameter
- Diamond and cubic boron nitride wheels with metal or carbon fiber cores.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

BLOTTERS - TYPE 6 AND 11 WHEELS

WAC 296-807-18085

Meet specific blotter requirements when using modified Types 6 and 11 wheels (terrazzo)

You must

- Mount modified Types 6 and 11 wheels (terrazzo) with a blotter applied to the flat side of the wheel only.



Notes
