



SURFACE VEHICLE RECOMMENDED PRACTICE

J694™

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(R) Disc Wheel and Hub or Drum Interface Dimensions - Truck and Bus

RATIONALE

The primary change was adding 5.3 on two-piece sleeve flange nuts due to the increase in usage of this type of fastener in the North American market.

1. SCOPE

This SAE Recommended Practice contains dimensions and their tolerances concerning disc wheel to hub or drum interface areas for truck and bus applications. Disc wheels designed only for single wheel applications (not dual wheels) for light trucks and special or less common applications are not covered in this document.

1.1 Purpose

This document defines wheel mounting systems and documents the dimensions and tolerances necessary to maintain serviceability, and interchangeability in the interface areas. To be consistent with ISO, it is divided into two sections (I and II). Section I is in concert with ISO 4107, describing mounting systems currently used internationally and nominated for, or included in, the international standard for bolt circle interfaces. Section II records information on current mounting systems also used in North America. ***Components of different mounting systems with common bolt patterns could be mis-assembled together and cause service problems. Therefore, it is important to note that each mounting system should be treated individually, and their components not be intermixed.***

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J393 Nomenclature - Wheels, Hubs, and Rims for Commercial Vehicles

SAE J1671 Outboard Mounted Brake Drum/Disc Wheel Hub Interface Dimensions - Truck and Bus

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Full document details: SAE J694_202104

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Documents

Document Sharing Hub

2.1.2 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 4107 Commercial vehicles - Wheel hub attachment dimensions

ISO 7575 Commercial Road Vehicles - Flat Attachment Wheel Fixing Nuts

2.1.3 DIN Publications

Copies of these documents are available online at <https://www.beuth.de/en>.

DIN 74361-3 Disc wheels for motor vehicles and trailers -Part 3: Dimensions and fastening devices for hub-centering

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1842 Disc Wheel Hub/Spoke Wheel and Axle Interface Dimensions - Commercial Vehicles

SAE J2696 Inboard Mounted Disc Brake Rotor/Disc Wheel Hub Interface Dimensions - Commercial Vehicles

3. DEFINITIONS

A detailed listing of basic nomenclature is contained in SAE J393 which introduces, illustrates, and specifies additional nomenclature and definitions.

3.1 MOUNTING SYSTEM

The combination of wheel/hub or drum interface characteristics that identify uniqueness are: number of bolt holes, bolt circle diameter, and fastener type. Unique mounting systems are identified by the Roman numerals in applicable tables throughout the document. Within a given mounting system, the wheels are interchangeable only by use of the appropriate fasteners and/or hubs with appropriate dimensions for the wheel material shown.

3.2 SCALLOPED HUBS

In an attempt to reduce wheel end package weight, some hub manufacturers have adopted the practice of creating scallops in the wheel mounting flange on the hub. The term scallop refers to the removal of material from the wheel backup diameter that results in an interrupted support face. In some applications, the use of scalloped hubs has led to the development of cyclical fatigue cracks in disc wheels. It is recommended that scalloped hubs not be used when the disc wheel is mounted directly to the mounting face on the hub. Use of scalloped hubs with outboard mounted brake drums is generally deemed acceptable. Wheel manufacturers should be consulted for each particular application.

4. ABBREVIATIONS

Abbreviations used are as follows:

BSN = Ball seat nut

BSN-AL = Ball seat nut for aluminum wheels

BSN-HD = Ball seat nut, heavy duty

FN = Flange nut

SFN = Sleeved flange nut for aluminum wheels

N/A = Not applicable

5. SECTION I - DISC WHEEL/HUB OR DRUM INTERFACE COMPATIBLE WITH ISO 4107 AND ISO 7575 NUTS

5.1 Wheel Dimensions

5.1.1 Definitions of Wheel Dimensions

See Figures 1 and 2.

- A = Number of bolt holes
B = Bolt circle diameter
C = Center hole diameter
D = Bolt hole diameter
E = Disc flat clearance diameter
F = Disc thickness

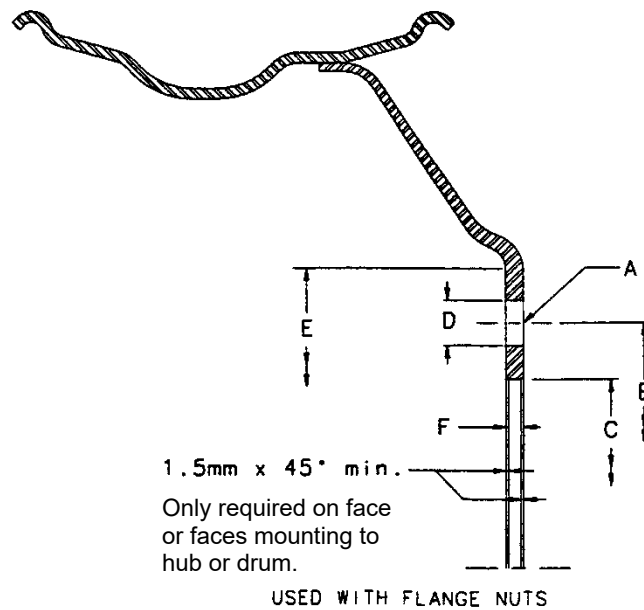


Figure 1 - Ferrous disc wheel

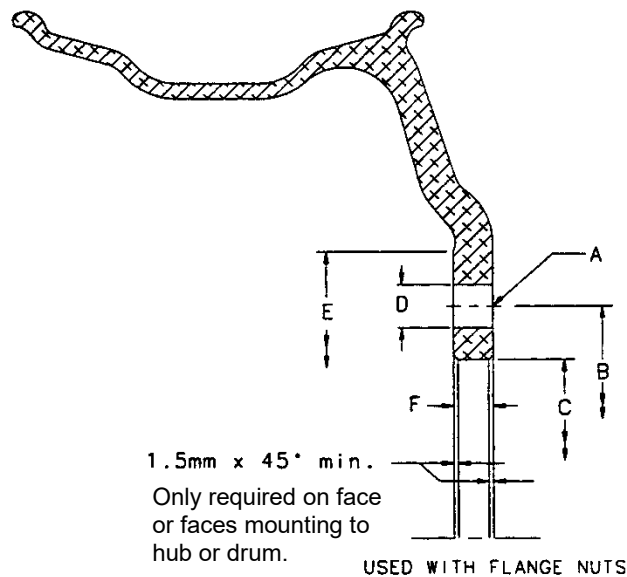


Figure 2 - Aluminum disc wheel

5.1.2 Dimensions and Tolerances of Wheels

5.1.2.1 Metric System Mountings - Wheel Dimensions

All dimensions are in millimeters. See Table 1.

Table 1 - Metric system mountings - wheel dimensions

Mounting System	Mounting Systems No. of Bolt Holes A	Mounting Systems Bolt Circle Diameter B $\pm 0.40 \varnothing$	Mounting Systems Fastener Type ⁽¹⁾	Mounting Systems Wheel Material ⁽¹⁾	Dimensions Center Hole Diameter C +0.2, -0	Dimensions Bolt Hole Diameter for Flange Nut D +1, -0	Dimensions Disc Flat Clearance Diameter E Minimum	Dimensions Disc Thickness ⁽¹⁾⁽²⁾ F Maximum		
								≤ 8.25 Rim Width	8.50 & 9.00 Rim Width	>9.00 Rim Width
II	8	275	FN	Ferrous	221.0	24	325	13	N/A	N/A
			FN	Aluminum	221.1 ⁽³⁾	24	325	25.4	N/A	N/A
			SFN	Aluminum	221.1 ⁽³⁾	30	325	25.4	N/A	N/A
III	10	285.75	FN	Ferrous	220.0	26	345	14	16	16
			FN	Aluminum	220.1	26	345	25.4	25.4	30
			SFN	Aluminum	220.1	32	345	25.4	25.4	30
IV	10	335	FN	Ferrous	281.0	26	390	14	16	16
			FN	Aluminum	281.1	26	390	25.4	25.4	30
			SFN	Aluminum	281.1	32	390	25.4	25.4	30
XIII	6	205	FN	Ferrous	161.0	21	255	13	N/A	N/A
			FN	Aluminum	161.1	21	255	20	N/A	N/A
			SFN	Aluminum	161.1	26	255	20	N/A	N/A
XV	6	245	FN	Ferrous	202.0	21	295	13	N/A	N/A
			FN	Aluminum	202.1	21	295	20	N/A	N/A
			SFN	Aluminum	202.1	26	295	20	N/A	N/A
XVI	8	222.25	FN	Ferrous	164.0	24	280	13	N/A	N/A
				Aluminum	164.1	24	280	20	N/A	N/A

⁽¹⁾ Disc thickness and fastener type are not included in ISO 4107.

⁽²⁾ N/A signifies a number not applicable to the given configuration.

⁽³⁾ This value is 221.2 in ISO 4107.

5.2 Hub or Drum Interface Dimensions

5.2.1 Definitions of Hub or Drum Interface Dimensions

See Figure 3.

A = Number of studs or bolts

B = Bolt circle diameter

C1 = Wheel pilot diameter

D2 = Stud or bolt size

E1 = Diameter of wheel backup - hub or outboard drum (usually not coincident with hub flange outside diameter)

F1 = Wheel pilot length (does not include lead in radius or chamfer)

G = Stud or bolt standoff beyond wheel mounting face of hub or outboard drum. This is calculated with the maximum wheel thickness plus the maximum nut thickness to permit full thread engagement.

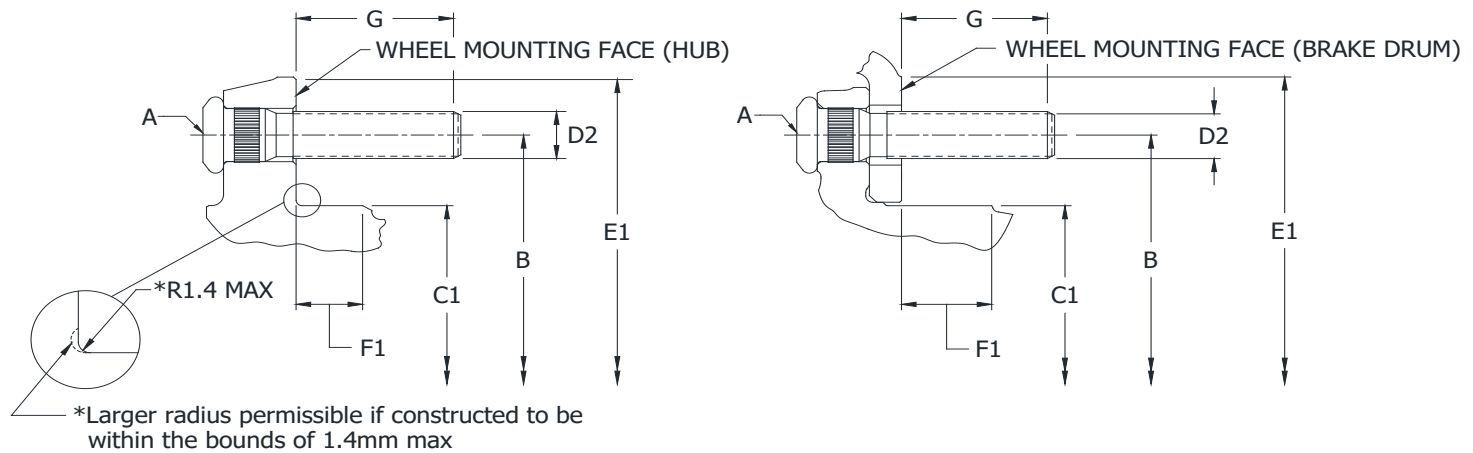


Figure 3 - Hub or drum interface dimensions

5.2.2 Interface Dimensions and Tolerances of Hubs or Drums

5.2.2.1 Metric System Mountings - Hub Dimensions

All dimensions are in millimeters. See Table 2.

Table 2 - Metric system mountings - hub dimensions

Mounting System	Mounting Systems No. of Studs or Bolts A	Mounting Systems Bolt Circle Diameter B ± 0.40 $\varnothing$	Mounting Systems Fastener Type ⁽¹⁾	Mounting Systems Wheel Material ⁽¹⁾	Stud or Bolt Diameter D2	Wheel Pilot Diameter C1 +0, -0.2	Wheel Backup Diameter E1	Wheel Pilot Length Single ⁽¹⁾ F1 Minimum	Wheel Pilot Length Dual ⁽¹⁾ F1 Minimum	Standout Single G ^(1,2) Minimum ≤ 8.25 Rim Width	Standout Dual G ^(1,2) Minimum ≤ 8.25 Rim Width	Standout Single G ^(1,2,3) Minimum 8.5&9.0 Rim Width	Standout Dual G ^(1,2,3) Minimum 8.5&9.0 Rim Width	Standout Single G ^(1,2,3) Minimum >9.0 Rim Width
II	8	275	FN	Ferrous	20	220.8	315/320	13	20	42	55	N/A	N/A	N/A
			FN	Aluminum	20	220.8	315/320	13	35	55	80	N/A	N/A	N/A
			SFN	Aluminum	20	220.8	315/320	13	35	See 5.3.2.2		N/A	N/A	N/A
III	10	285.75	FN	Ferrous	22	219.8	335/340	13	20	48	62	50	66	50
			FN	Aluminum	22	219.8	335/340	13	35	60	85	60	85	64.6
			SFN	Aluminum	22	219.8	335/340	13	35	See 5.3.2.2				
IV	10	335	FN	Ferrous	22	280.8	380/385	13	20	48	62	50	66	50
			FN	Aluminum	22	280.8	380/385	13	35	60	85	60	85	64.6
			SFN	Aluminum	22	280.8	380/385	13	35	See 5.3.2.2				
XIII	6	205	FN	Ferrous	18	160.8	245/250	10	20	40	53	N/A	N/A	N/A
			FN	Aluminum	18	160.8	245/250	10	30	47	67	N/A	N/A	N/A
			SFN	Aluminum	18	160.8	245/250	10	30	See 5.3.2.2		N/A	N/A	N/A
XV	6	245	FN	Ferrous	18	201.8	285/290	10	20	40	53	N/A	N/A	N/A
			FN	Aluminum	18	201.8	285/290	10	30	47	67	N/A	N/A	N/A
			SFN	Aluminum	18	201.8	285/290	10	30	See 5.3.2.2		N/A	N/A	N/A
XVI	8	222.25	FN	Ferrous	20	163.8	272/277	10	20	42	55	N/A	N/A	N/A
			FN	Aluminum	20	163.8	272/277	10	30	49	69	N/A	N/A	N/A

⁽¹⁾ Wheel pilot length, stud or bolt standout, and fastener type are not included in ISO 4107.

⁽²⁾ For wheels with disc thicknesses that are outside the scope of this document, longer standouts than those shown may be required.

⁽³⁾ N/A signifies a number not applicable to the given configuration.

5.2.2.2 Interface Area of Wheel and Hub

There are applications that can reduce the contact area between the wheel and the hub. A typical application is the case of a disc brake rotor attachment. SAE J2696 defines rotor attachment methods for wheel hubs.

Figure 4 illustrates the least material condition of the most common areas of contact for mounting systems II, III, and IV. Only one option in Figure 4 can be used for each hub and wheel. Testing has demonstrated that for the most common mounting (system III), that there is no measurable degradation in wheel performance when tested per SAE J267. One assembly configuration was tested for each option. As part rigidity may vary, consult wheel manufacturers for specific configurations. The diameters specified represent holes where no contact is offered to mating wheels.

5.2.2.3 Definitions of Hub or Drum Interface Dimensions

See Figure 4.

- A = Basic angle of symmetry for rotor mounting pitch circle
- R1 = Maximum radius of rotor mounting holes for rotor mounted on wheel mounting pitch diameter
- R2 = Maximum radius of rotor mounting holes for rotor mounted below wheel mounting pitch diameter
- D1 = Rotor mounting pitch circle diameter (option 1)
- D2 = Rotor mounting pitch circle diameter (option 2)

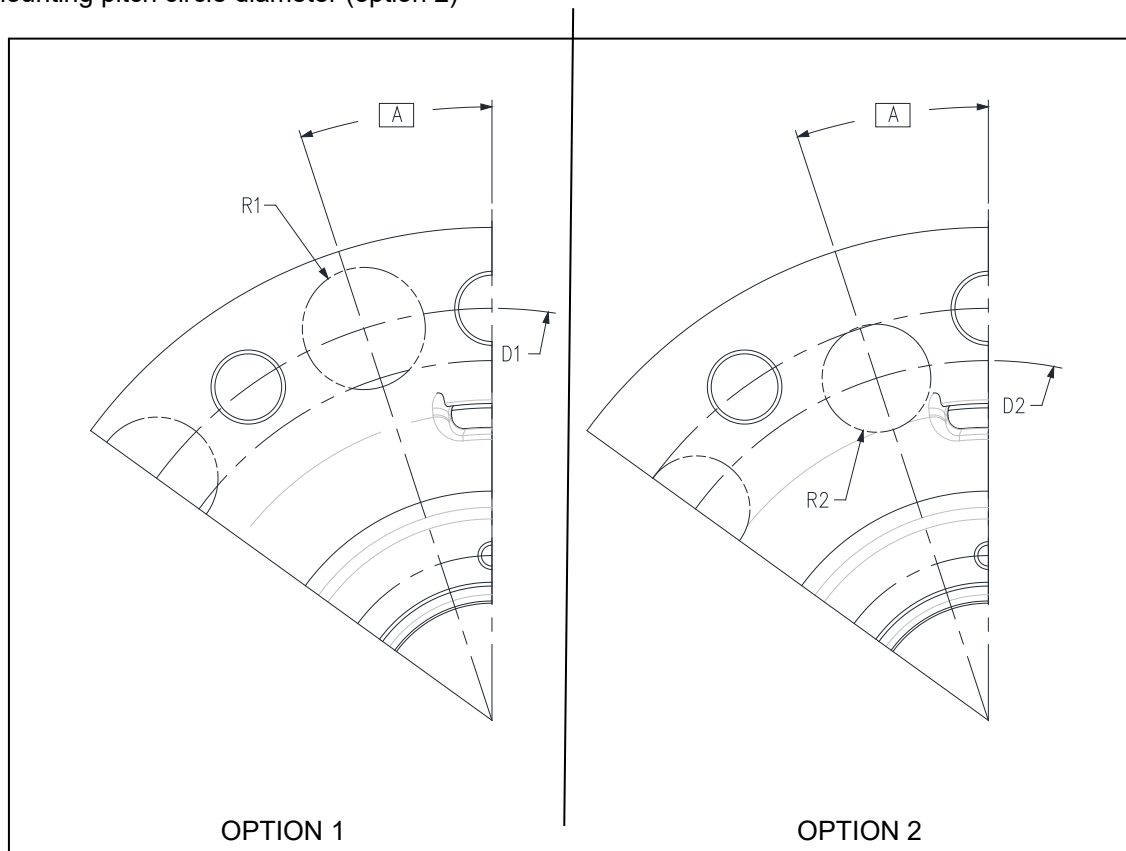


Figure 4 - Interface area of hub and wheel