



SERVICE MANUAL
FOR ALCOA® WHEELS

Service Manual for Alcoa® Wheels¹ Edition 3

Europe, Latin America, Asia and Oceania, Edition 3

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1. Manual

Please read the following instructions carefully. This manual should be retained for later use. This manual gives detailed information and is available online on our [website](#).



This manual applies to Alcoa® Wheels produced by Howmet-Köfém Kft. ("Company") as listed in the current European Specification Sheet for Alcoa® Wheels or older generation wheels from previous Specification Sheet publications. Hard copies are also available from Howmet Wheel Systems and authorized distributors of Alcoa® Wheels upon request. Contact your regional Howmet Wheel Systems location.

2. Limited warranty for Alcoa® Wheels¹

(April 2020)

This limited warranty applies to Alcoa® Wheels, including forged aluminium wheels for medium duty and heavy-duty trucks, truck trailers, bus, RV or motorhome wheels ("Wheels") and the Howmet surface or rim flange treatments applied to the Wheels. The warranties set forth in this document apply to all Alcoa® Wheels ("Wheel(s)") manufactured by Howmet and sold by Howmet or its authorized distributor to an original purchaser of the Wheel or the end user of the Wheel.

Howmet warrants that the Wheel is free from defects in material and workmanship for 60 months from the date of manufacture as shown on the Wheel, provided that Howmet does not warrant against and does not provide remedies for immaterial cosmetic defects such as minor discoloration, buffing marks, or nicks. Howmet agrees, without charge, to repair or replace a Wheel that fails in normal use (see the qualifications below) because of defects in material and workmanship. Howmet warrants the Alcoa Dura-Flange® rim flange treatment against wear which creates a sharp edge that would require maintenance for 24 months from the date of manufacture as shown on the Wheel. Howmet warrants the Alcoa Dura-Bright® surface treatments against:

- (i) filiform corrosion (worm or hair like lines, underneath surface protective treatment and emanating from damage to the surface treatment); and
- (ii) blistering or peeling due to loss of adhesion of the surface treatment.

The foregoing Alcoa Dura-Bright® surface treatment is warranted for 60 months from the date of manufacture as shown on the Wheel. If the Alcoa Dura-Flange® rim flange treatment or Alcoa Dura-Bright® surface treatment fail in normal use or service (see the qualifications section below) to meet the foregoing warranties on a Wheel, Howmet agrees, without charge, to replace the Wheel with a like or similar Wheel. Wheel replacement does not include replacement of items manufactured by third parties, such as tire pressure monitoring systems and valve filters. Repair or replacement, as provided for in this limited warranty, are subject to adherence to Howmet's return material authorization process.

Qualifications:

Howmet is not liable for, does not warrant, and will not repair or replace or make adjustment with respect to any Wheel or surface or rim flange treatment on such Wheel that has been subjected to misuse, abuse or improper modification, including the following:

- (a) Using a tyre which is oversized according to standards recommended by the Tyre and Rim Association, Inc. or other recognized tyre and rim agencies such as ETRTO (Europe);
- (b) Failure to install, use and maintain Wheels in strict conformity with all applicable laws, regulations, codes and industry standards;
- (c) Loading the Wheel beyond the applicable maximum Wheel load as specified by Howmet;
- (d) Inflating tyres beyond the applicable maximum pressure as specified by Howmet;
- (e) Except as permitted by the Service Manual for Alcoa® Wheels ("Service Manual"), changing the original condition of the Wheel by alteration or by subjecting it to any processing or changes, such as welding, straightening, painting, coating, installing a new tire valve, or heat treating;
- (f) Accidents or abnormal or severe operating conditions including and without limitation tyre fires, brake fires, severe brake system drags or seizures or running with a flat tyre;
- (g) Failure to follow maintenance, instructions or warnings set forth in the Service Manual, Technical Bulletins or other literature for Wheels. Recommended maintenance includes, without limitation, using proper torque, periodic cleaning, polishing, replacing the valve, inspecting rim flange wear and following rim flange maintenance procedures, and periodically inspecting tyres and system components connected to the Wheel for damage and loose lug nuts;
- (h) Nicks, scratches and other surface blemishes resulting from neglect, road salt, harsh conditions, improper maintenance, cleaning, road debris, curbing, accident or operation;
- (i) Rim flange wear (unless the rim flange has been treated with Dura-Flange®);
- (j) Using a spacer or adaptor of any kind;
- (k) Damaging the surface during tyre mounting and installation of the wheel [or] of the wheel on the vehicle due to the use of improper tools or balancing with wheel weights;
- (l) Damage due to cleaning with strong chemicals (acids or alkaline) or abrasives, such as abrasive brushes, steel wool, or scouring pads; or
- (m) further use of a Wheel after discovery of a defect.

THERE IS NO WARRANTY THAT THE WHEEL SHALL BE MERCHANTABILITY OR OF SATISFACTORY QUALITY OR FIT FOR ANY PARTICULAR PURPOSE, NOR IS THERE ANY OTHER EXPRESS WARRANTY, EXCEPT SUCH AS IS EXPRESSLY SET FORTH HEREIN. ANY TERMS OR WARRANTIES IMPLIED BY APPLICABLE LAW ARE, TO THE FULLEST EXTENT PERMITTED BY LAW, EXCLUDED IN RELATION TO THE SALE OF WHEELS. SAVE FOR ANY LIABILITY WHICH CANNOT BE EXCLUDED OR LIMITED BY APPLICABLE LAW, HOWMET SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT OR SPECIAL DAMAGES FOR ANY BREACH OF WARRANTY. HOWMET'S LIABILITY AND THE EXCLUSIVE REMEDY AVAILABLE TO ANY PARTY RIGHTFULLY SEEKING WARRANTY COVERAGE IS LIMITED TO REPAIR OR REPLACEMENT OF THE WHEEL AS STATED IN THIS LIMITED WARRANTY.

THIS LIMITED WARRANTY DOES NOT APPLY TO AND HOWMET MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO GOODS MANUFACTURED BY THIRD PARTY SUPPLIERS, SUCH AS TIRE PRESSURE MONITORING SYSTEMS AND VALVE FILTERS. ANY WARRANTIES WITH RESPECT TO SUCH GOODS ARE LIMITED TO THOSE WHICH ARE OFFERED BY SUCH SUPPLIERS AND ARE TRANSFERABLE.

This limited warranty should be used in conjunction with the Service Manual and the Dura-Bright® Wheels Cleaning Guide. The Service Manual contains important safety information and warnings. Failure to read and understand that information may result in serious injury or death.

Latest version of the limited warranty can be found here



The Service Manual and cleaning guide are available at www.alcoafleet.eu or by contacting Howmet Wheel Systems Europe at the address below:



Howmet-Köfém Ltd.
Fleet Service Center
1-15 Verseci út
H-8000 Székesfehérvár
Hungary

Warning



Wheels that are not properly installed or maintained may not be safe.

Failure to follow proper wheel installation or maintenance practices may result in injury or death.

Follow the proper wheel installation and maintenance practices as contained in this Service Manual for Alcoa® Wheels.

For the most recent update of the Service Manual and other useful documents, contact your Howmet Wheel Systems location or go to the [web page](#)



Publications available for download from Howmet:

- Service Manual for Alcoa® Wheels
- Specification Sheet of Alcoa® Wheels
- Cleaning of Alcoa® Wheels
- General Brochure for Alcoa® Wheels
- ... and many more

Information available through industry:

DIN (German Institute for Standardization)
Info available at www.din.de/en

ETRTO (European Tyre and Rim Technical Organisation) Info available at www.etrto.org

EUWA (Association of European Wheel Manufacturers) Info available at www.euwa.org

ISO (International Organization for Standardization) Info available at www.iso.org

JATMA (Japan Automobile Tyre Manufacturers Association) Info available at www.jatma.or.jp

SAE International (Society of Automotive Engineers) Info available at www.sae.org

TIA (Tire Industry Association)
Info available at www.tireindustry.org

TMC (Technology and Maintenance Council) Info available at <http://tmc.trucking.org>

TRA (Tire and Rim Association) Info available at www.us-tra.org

3. Safety

Warning



An inflated wheel and tyre assembly contains enough air pressure to cause an explosive separation.

Unsafe handling or failure to follow approved mounting and demounting procedures can lead to serious injury or death.

Study, understand and follow the procedures contained in this manual.

3

Safety is serious and everyone's business. Do not attempt to service any wheel assembly without proper training.

Proper equipment is important. Be sure to have the recommended tools and equipment on hand and use them according to manufacturers' instructions.

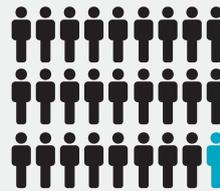
Tubeless wheels and tyres require equal care. Even though tubeless assemblies have fewer parts than multi-piece wheels, they still require respect and proper handling.

Pay particular attention during crucial steps:

- Removal of tyre and wheel assemblies from vehicles
- Demounting tyre from wheel
- Wheel inspections
- Mounting of tyre to wheel
- Inflation of tyre
- Handling and storing of inflated assembly
- Mounting of the assembly to the vehicle

Safety and service information is readily available. Wheel, tyre, and service equipment manufacturers offer service manuals and other training materials. Stay up to date on proper procedures and keep current instructional materials readily available in the shop. Study safety and service information and practice it on the job.

Statistics show that in most industries, at worst only one in 1000 serious accidents results in a fatality. But when the accident involves tyres and wheels, statistically one in every 10 serious accidents is a fatality. That's 100 times more often than in most other industries.



1 in 1000
TYPICAL INDUSTRY



1 in 10
THE SERVICE INDUSTRY

Graphic 3-1

Introduction

As the leading manufacturer of aluminium wheels, we advanced the transportation industry with the first forged aluminium wheel in 1948 and have been reinventing it ever since. Find more information on our website: www.alcoawheels.eu

Alcoa® Wheels is the best solution for your business. We offer a wide range of forged aluminium wheel dimensions. Our high-quality Alcoa® Wheels can be selected in the truck, bus and trailer manufacturer's option books as well as they are available through our wide network of authorized Alcoa® Wheels distributors.

Find the most nearby to you here:



Alcoa® Wheels is a brand and product of the Howmet Wheel Systems business unit, which is part of Howmet Aerospace Inc. (formerly known as Alcoa Inc.).

4. Wheel selection

4.a. Specification Sheet for Alcoa® Wheels

Wheel specifications listed in the Specification Sheet are subject to change without prior notice. For information consult the latest 'Specification Sheet' for Alcoa® Wheels, contact Howmet Wheel Systems or an authorized distributor of Alcoa® Wheels. To view the document online or download go to:



The Specification Sheet for Alcoa® Wheels contains the current part number availability and complete specifications such as wheel dimension, offset (inset), half dual spacing (outset) and load rating. It is recommended to keep old Specification Sheets for later reference.

Note: Dura-Bright® wheels produced after November 2002 have the part number for Alcoa® Wheels ending with "DB". The Dura-Bright® surface treatment is available on most wheel sizes.

Note: Dura-Flange® wheels have the part number for Alcoa® Wheel ending with "DF". The Dura-Flange® rim flange treatment is also available on Dura-Bright® surface treated Alcoa® Wheels.

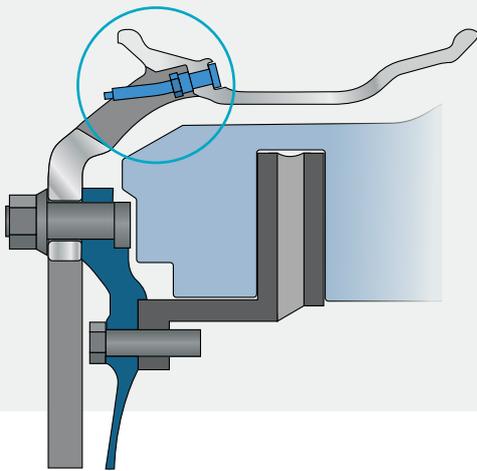
Note: the part number for Alcoa® Wheels ending with "DD" indicates a Dura-Bright® and Dura-Flange® surface treated wheel.

4.b. Disc brake equipped axles

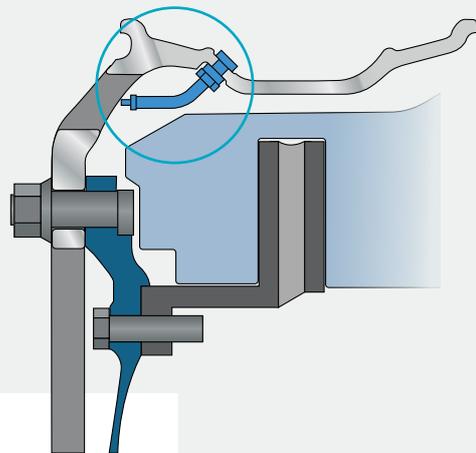
Most Alcoa® Wheels come with a protected or outboard valve design that reduces the risk that during rotation foreign parts like stones entered in the inner wheel area can be taken up by the valve. Objects striking the static brake caliper of a disc brake system can lead to damages on the valve or brake caliper. Objects getting stuck between the static brake caliper and rotating wheel can also lead to damage and premature failure of the wheel.

Europe:
All current produced 22.5" and 19.5" Alcoa® Wheels have a protected or outboard valve design that can be mounted on axles with disc brakes. Some 17.5" Alcoa® Wheels do not have a protected valve design (inboard valve) and can be fitted on axles with drum brakes only. See Specification Sheet for Alcoa® Wheels.

Asia, Latin America and Oceania:
Consult the regional Howmet location for details with regards to use of inboard valve design wheels with disc brake operated vehicles or disc brake operated axles.



Graphic 4-1 Outboard valve



Graphic 4-2 Inboard valve

4.c. General characteristics

Wheel material:	forged aluminium alloys
Approvals by:	LBF, TÜV, KBA, JWL-T and all European MD and HD commercial vehicle manufacturers, INMETRO
Certificates from:	ISO 14001: 2015 (Environmental Management System) IATF 16949: 2016 (Quality Management System)
Tyre sizes:	All ETRTO approved sizes
Maximum inflation pressure:	900 kPa, 130 psi (cold), unless stated otherwise
Nuts:	2-piece nut or 2-piece sleeved nut following DIN 74361-3 standards
Mounting:	Hub centred following DIN 74361-3 standards
Valve torque:	12 to 15 Nm (9 to 11 Ft-Lb)
Wheel nut torque:	Recommended by vehicle - or axle manufacturer
Availability wheels:	Through all vehicle manufacturers or authorized distributors of Alcoa® Wheels

4

4.d. Identification of Alcoa® Wheels

Since 1977, all Alcoa® Wheels are identified with a roll stamp that shows the wheel load rating, maximum inflation pressure, date of manufacture, part number, wheel description and United States Department of Transportation (DOT) marking designation.

Prior to June 1996, all heavy-duty vehicle Alcoa® Wheels had the Alcoa® identification symbol [symbol Alcoa® identification] on the outside of the disc near the hand hole in line with the valve location. This marking was phased out on heavy duty vehicle wheels manufactured after June 1996.

Identification of Alcoa® Wheels is usually located 180 degrees from the valve stem on the open side of the wheel.

IMPORTANT

Wheel identification must be legible. Wheels should be taken out of service and scrapped if this identification is not legible or does not meet requirements.

Alcoa® Wheels may have markings in the roll stamp to designate certification in other regions as follows:

- Wheels approved by INMETRO, the Instituto Nacional de Metrologia, are marked with the symbol [symbol INMETRO].
- Wheels approved by the Japanese Ministry of Transportation, are marked with the symbol [symbol Japanese Ministry of Transportation].

All Dura-Bright® surface treated wheels have the letters "DB" after the part number e.g., 89U513DB.

All Dura-Flange® wheels have the letters "DF" after the part number e.g., 88U520DF.

Wheels treated with both Dura-Bright® and Dura-Flange® have the letters "DD" after the part number e.g., 88U513DD.

Symbol Alcoa® identification



Graphic 4-3

Symbol INMETRO



Graphic 4-4

Symbol Japanese Ministry of Transportation



Graphic 4-5

Wheels made between 1996 and 2009

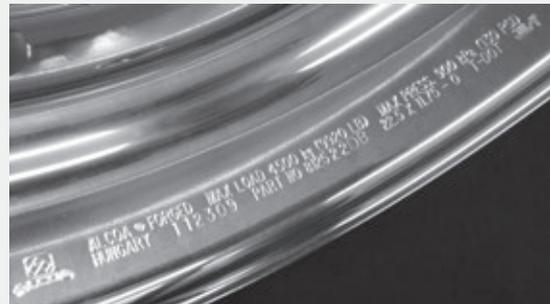
- ALCOA® FORGED
- MAX LOAD 3550 Kg (wheel load rating)
- MAX KPa 952 (maximum inflation pressure)
- T-DOT (FMVSS 120 designation)
- JWLT (symbol Japanese impact test)
- MADE IN HUNGARY (can also be: JAPAN / MEXICO / U.S.A.)
- 021703 (date of manufacture month/day/year, in this case February 17, 2003) (prior to 2000, wheels may have month/year only)
- PART NO 874503 (part number)
- 22.5 X 7.50 15° DC (wheel size for tubeless heavy-duty tyres)
- 1 (2 or 3) (packing line)



Picture 4-6

Wheels made between 2009 and 2012

- ALCOA® FORGED
- MAX LOAD 4500 kg (9920 LB) (wheel load rating)
- MAX PRESS. 900 kPa (130 PSI) (maximum inflation pressure)
- HUNGARY (made in...) (can also be: JAPAN / MEXICO / U.S.A.)
- 112309 (date of manufacture month/day/ year, in this case November 23, 2009)
- PART NO 812522DB (part number)
- 22.5 X 11.75 - 0 (wheel size and offset (inset) or half dual spacing (outset))
- T-DOT (FMVSS 120 designation)
- JWLT (symbol Japanese impact test)



Picture 4-7

Wheels made between 2012 and 2017

- 22.5 X 9.00 - 176 (wheel size and offset (inset) or half dual spacing (outset))
- MAX LOAD 4125 kg (9090 LB) (wheel load rating)
- MAX PRESS. 900 kPa (130 PSI) (maximum inflation pressure)
- ALCOA® FORGED
- MADE IN HUNGARY (made in...) (can also be: CHINA / JAPAN / MEXICO / U.S.A.)
- REG 000809/2012 (Inmetro registration number/year) (preceded by Inmetro logo)
- T-DOT (FMVSS 120 designation)
- JWLT (symbol Japanese impact test)
- 011416 (date of manufacture month/day/ year, in this case January 14, 2016)
- PART NO 892510 (part number)



Picture 4-8

Wheels made as from 2017

- 22.5 X 9.00 - 176 (wheel size and offset (inset) or half dual spacing (outset))
- MAX LOAD 4125 kg (9090 LB) (wheel load rating)
- MAX PRESS. 900 kPa (130 PSI) (maximum inflation pressure)
- FORGED
- MADE IN HUNGARY (made in...) (can also be: CHINA / JAPAN / MEXICO / U.S.A.)
- REG 000809/2012 (Inmetro registration number / year preceded by Inmetro logo)
- T-DOT (FMVSS 120 designation)
- JWLT (symbol Japanese impact test)
- 120516 (date of manufacture month/day/ year, in this case December 5, 2016)
- PART NO 892513DB (part number)



Picture 4-9

4.e. Table: matching tyre to rim according to ETRTO standard

Before mounting a tyre to a wheel check if tyre and wheel size match.

Contact the manufacturer of the tyre as:

- There may be additional rim to tyre matches not shown here
- Specific tyre manufacturers may have other or supplementary recommendations

Contact Howmet Wheel Systems or an authorized distributor of Alcoa® Wheels as:

- Some wheel dimensions listed in this table may not be available in certain continents

Note:

- Do not load wheel beyond its maximum load capacity
- Do not inflate assembly beyond the maximum inflation pressure as indicated in the roll stamp. See 4.d.

Rim width to tyre matching chart for commercial vehicle tyre sizes according to ETRTO Standards Manual 2021

Tyre size / section code	Approved rim contours (dimensions in inches)		
Normal Section Sizes			
8 and 8.5	5.25	6.00	6.75
9 and 9.5	6.00	6.75	
10	6.75	7.50	
11	7.50	8.25	
12	8.25	9.00	
13	9.00	9.75	
'70', '75', '80' and '90' Series			
205	5.25	6.00	6.75
215	6.00	6.75	
225	6.00	6.75	
235	6.75	7.50	
245	6.75	7.50	
255	6.75	7.50	8.25
265	6.75	7.50	8.25
275	7.50	8.25	
285	7.50	8.25	9.00
295	8.25	9.00	
305	8.25	9.00	
315	9.00	9.75	
365	9.75	11.75	10.50*
375	9.75	11.75	
445	13.00	14.00	
605	18.00		

*standardized by TRA for 365/70

Chart 4-10

Table: matching tyre to rim (continued)			
'65' Series			
205	6.00	6.75	
385	11.75	12.25	
425	12.25	13.00	14.00
445	13.00	14.00	
525	16.00		
'60' Series			
265	7.50	8.25	
285	8.25	9.00	
295	9.00	9.75	
305	9.00	9.75	
315	9.00	9.75	
555	16.00	17.00	
'55' Series			
265	8.25		
295	9.00	9.75	
385	11.75	12.25	
445	14.00		
455	14.00	15.00	
'50 Series'			
355	11.75		
375	11.75	12.25	
445	14.00	15.00	
'45 Series'			
315	9.75		
355	11.75		
375	11.75	12.25	
415	13.00	14.00	
435	14.00	15.00	
455	14.00	15.00	
495	16.00	17.00	

Chart 4-11

Rim width to tyre matching chart for Free Rolling Tyres (FRT*) sizes according to ETRTO Standards Manual 2021

Tyre size / section code		Approved rim contours (dimensions in inches)			
Normal Section Sizes FRT					
9.5	R 17.5	6.00	6.75		
10	R 17.5	6.75	7.50		
11	R 22.5	7.50	8.25		
12	R 22.5	8.25	9.00		
'75' Series FRT					
215/75	R 17.5	6.00	6.75		
235/75	R 17.5	6.75	7.50		
'70' Series FRT					
245/70		6.75	7.50		
255/70	R 22.5	6.75	7.50	8.25	
265/70	R 17.5	6.75	7.50	8.25	
265/70	R 19.5	7.50	8.25		
275/70	R 22.5	7.50	8.25		
285/70	R 19.5	8.25	9.00		
'65' Series FRT					
205/65	R 17.5	6.00	6.75		
385/65	R 19.5	11.75	12.25		
425/65	R 22.5	12.25	13.00	14.00	
445/65	R 22.5	13.00	14.00		
'60' Series FRT					
255/60	R 19.5	7.50	8.25		
275/60	R 19.5	8.25	9.00		
'55' Series FRT					
265/55	R 19.5	8.25			
385/55		11.75	12.25		
425/55	R 19.5	13.00	14.00		
'50' Series FRT					
435/50		14.00	15.00		
'45' Series FRT					
445/45	R 19.5	14.00	15.00		
455/45	R 22.5	14.00	15.00		
'40' Series FRT					
365/40	R 19.5	11.75			
455/40	R 22.5	15.00	16.00		

FRT* or Free Rolling Tyres: commercial vehicle tyres restricted to the equipment of non-driven axles, excluding motor vehicle front steering axles

Source: European Tyre and Rim Technical Organisation -Standards Manual- 2021

Chart 4-12

4.f. Wheel measurement

4.f.i. How to measure minimum dual spacing (for dual mounted wheels)

Minimum dual spacing measurement is determined by tyre manufacturers and may be obtained from the tyre manufacturers' handbooks. To determine if an assembly with dualled Alcoa® Wheels have adequate minimum dual spacing for the selected tyres, double the wheel half dual spacing or outset measurement of the Alcoa® Wheels used.

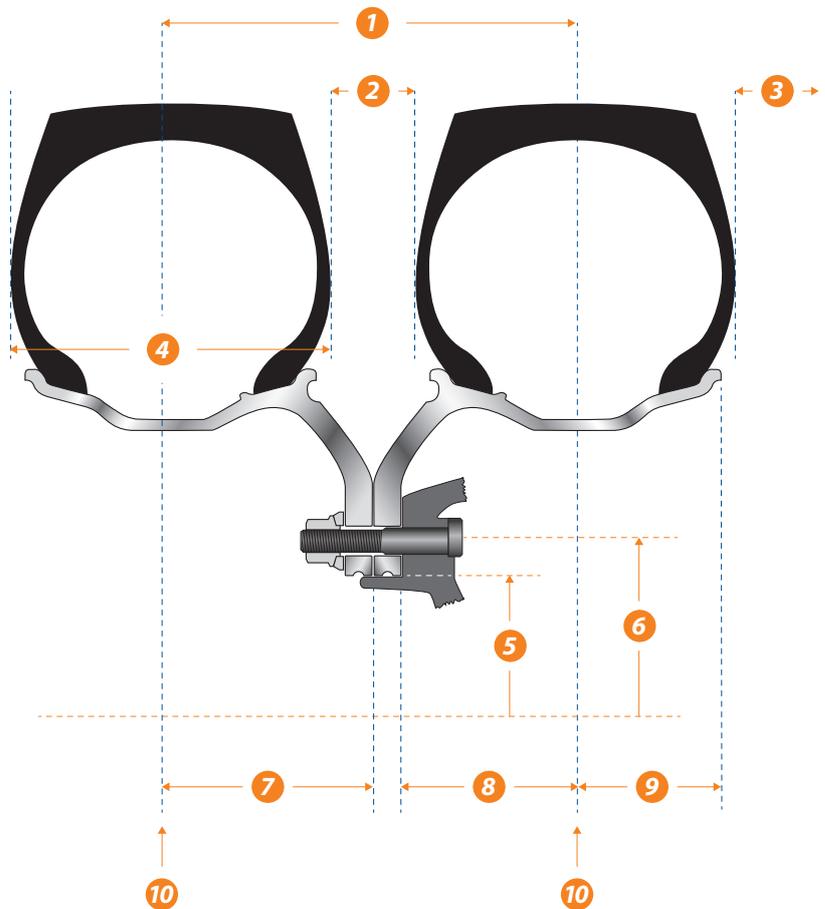
If the doubled half dual spacing or outset measurement is equal to or greater than the tyre manufacturers' recommendations,

there will be enough minimum dual spacing. Wheel half dual spacing (outset) and offset (inset) is given for each wheel on the Specification Sheet for Alcoa® Wheels.

Both offset (inset) and half dual spacing (outset) of wheels are measured from the mounting surface of the wheel to the centreline of the rim. Maintaining correct tyre inflation and load ratings are essential to maintain enough minimum dual spacing.

4

1. Dual spacing
2. Tyre clearance
3. Vehicle clearance
4. Tyre section width
5. Hub bore
6. Bolt circle
7. Wheel outset, or half dual spacing
8. Wheel inset, or offset
9. Back space
10. Tyre / rim centreline



Graphic 4-13

Alcoa® Wheels that can be mounted in dual position show the Half Dual Spacing (HDS) behind the wheel dimension (e.g., 22.5 x 9.00 - 176) in the roll stamp. This means the HDS is 176 measured in millimetres.

HMA: abbreviation of Halber Mittenabstand, commonly used on German made wheels, stands for Half Dual Spacing (HDS).

DUAL MOUNTING

DO NOT mount wheels with a different Half Dual Spacing (HDS), unless vehicle or trailer axle manufacturer approved:

- Never mount wheels with a smaller Half Dual Spacing as there is a risk of tyres "kissing" in loaded condition. This will generate heat and may cause tyres to blow out.
- Mounting wheels with a smaller Half Dual Spacing reduce the track width. The stability and/or suspension components of the vehicle may be compromised especially when loaded or curving.

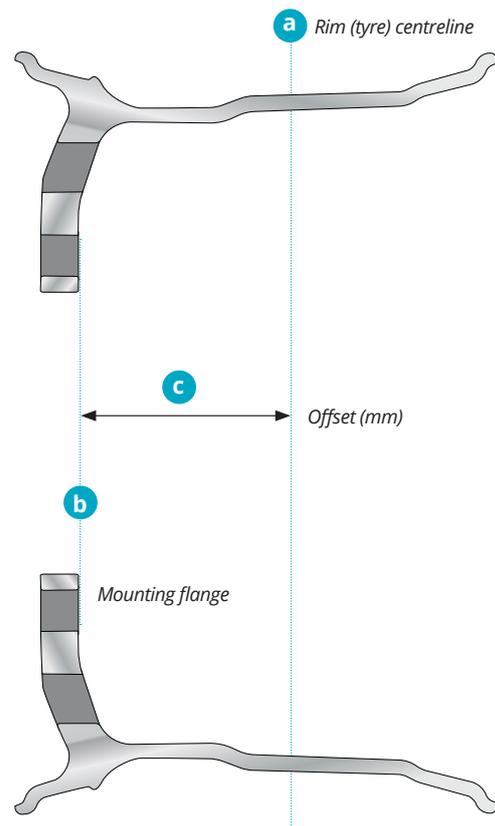
4.f.ii. How to measure offset (for single mounted wheels)

The offset (or inset) measurement is determined by the vehicle or (trailer) axle manufacturer and may be obtained from the vehicle or axle manufacturers' handbooks. To determine if the wheel matches the recommended offset (or inset) of a vehicle or trailer axle, consult the Specification Sheet for Alcoa® Wheels.

Alcoa® Wheels that can be mounted in a single position only, show the offset (or inset) after the wheel dimension (e.g., 22.5 x 11.75 - 120) in the roll stamp. This means the offset is 120 measured in millimetres.

ET: abbreviation of Einpresstiefe, commonly used on German made wheels, stands for offset (or inset).

- a) Rim (tyre) centreline
- b) Mounting flange, wheel disc
- c) Offset or inset:
distance rim centreline to mounting flange
measured in Millimetres



Graphic 4-14

SINGLE MOUNTING

DO NOT mount wheels with a different offset (or inset), unless vehicle or trailer axle manufacturer approved: e.g., do not fit 22.5 x 11.75 with offset (or inset) 120 at axle where offset 135 is standard, or do not fit 22.5 x 11.75 with offset 135 where offset 120 is standard.

Offset / inset higher

- Wheel or tyre may contact parts of brakes, steering, suspension or chassis. This may cause a tyre blow out, damage to components with the risk of accidents causing injuries or death.
- The stability and/or suspension components of the vehicle may be compromised especially when loaded or curving.

Note:

Offset (Inset) + wheel disc thickness = Half Dual Spacing (Outset). For reference consult Specification Sheet for Alcoa® Wheels or wheel data specification sheets of other steel or alloy wheels if used.

Offset / inset higher / lower

- Alteration of the tyre / rim centreline will distribute loads differently on the bearings. It may shorten the service life or cause failure of bearings. It may generate heat to one or the other bearing, causing or igniting a fire.
- Geometry of the alignment of axles can be influenced causing different manoeuvrability of the vehicle.

Offset / inset lower

- The wheel tyre assembly may exceed the allowed maximum vehicle width voiding road and traffic regulations.

4.g. Mixed application of Alcoa® Wheels

Changes to design and specifications may result in a mix of Alcoa® Wheels on one vehicle or one axle.

When mixing Alcoa® Wheels on one axle, wheel dimension, bolt hole diameter and offset for single mounting or half dual spacing for dual mounting must match.

The combined load rate of the wheels must meet or exceed the load rating of the axle. Consult the vehicle - or axle specification.

Trucks, buses, and trailers may have a variety of wheel load ratings on one vehicle. It is mandatory to respect the vehicle or axle OEM's homologation as well as local and national road vehicle legislation.

4

4.h. Mixed application of Alcoa® Wheels and steel wheels

Alcoa® Wheels can be operated in dual mounting with a steel wheel mounted at the inner position. In the event a steel inner wheel is used, extreme care must be taken to properly mount both wheels to the hub.

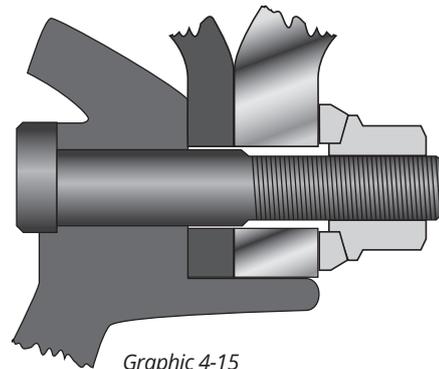
The selection of correct hardware i.e., nuts, sleeved nuts and studs are crucial to obtain a safe fitment as well as enough pilot tab length on the hub to properly centre the outer aluminium wheel.

Both wheels, steel and Alcoa® Wheels, must match wheel size and half dual spacing (outset), wheel load index, as well as being fitted with identical tyres and tread of the same depth.

A mixed dual fitment is subject to all recommendations and guidelines that apply for safe and proper fitment of a steel dual and aluminium dual fitment referring to manuals of steel wheel manufacturer and the Service Manual for Alcoa® Wheels.

IMPORTANT

Consult and respect the vehicle or axle OEM's homologation as well as local and national road vehicle legislation for the application of mixed assemblies e.g. steel and aluminium wheels on one axle or one vehicle.



Graphic 4-15

Warning



When mounting painted steel wheels with Alcoa® Wheels, in dual application, be cautious of excessive paint build-up on the steel wheel.

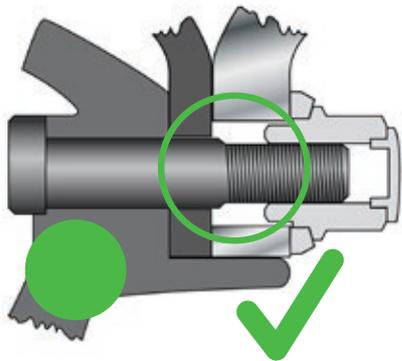
Excessive paint (> 90 µm or 3.5 mil) can reduce the clamping force and allow the wheels to become loose, which can lead to serious injury or death.

Follow the proper wheel installation and maintenance practices as described in this Section.

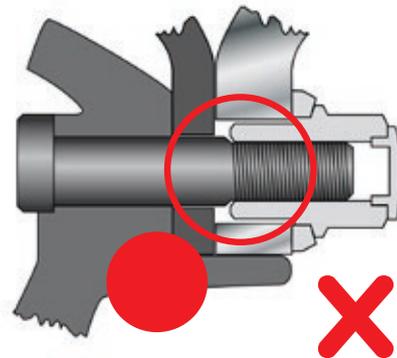
For more information about mounting and hardware for Alcoa® Wheels see Sections 10, 11 and 12

When mounting a steel wheel at the inside position and an aluminium wheel with sleeved nuts on the outer position it is important to

- a) Determine the amount of threading engaged as set forth in Section 11.b.
- b) Check if no 'bottom out' condition occurs when using long sleeved nuts as described in Section 11.b.ii.



Graphic 4-16



Graphic 4-17

Warning

The use of a wrong selection of wheels and hardware may result in improper fitment of wheels.

Improper mounting of wheels may lead to separation of wheels or loss of assemblies from the vehicle.

Separating wheels or loss of assemblies from the vehicle can lead to injuries or death.

For more information about mounting and hardware for Alcoa® Wheels see Sections 10, 11 and 12

HUB ENGAGEMENT

1. Stud standout and thread engagement (hardware)

- | | |
|--|---|
| <p>A.
For use with 2-piece flange nuts and replacing (with longer) studs the minimal stud standout must be:
1x disc thickness steel wheel + 1x disc thickness Alcoa® Wheel + height of nut + 3 mm for use with M22, M20 or M18 x 1.5 threads (or 2 full threads in case of other type of threading such as BSF or UNF).</p> <p>Example: the disc thickness of 1x steel wheel and 1x Alcoa® Wheel added with a regular 2-piece flange nut M22 x 1.5 must result in a minimal stud standout of $14 + 22 + 27 + 3 = 66$ mm.</p> | <p>B.
For use with 2-piece sleeved nuts and maintaining the original studs the minimal number of thread engagement between stud and nut must be:</p> <ul style="list-style-type: none"> • 14 full turns for M22 x 1.5 (Metric, Volvo from 2005) • 13 full turns for M20 x 1.5 (Metric) • 12 full turns for M18 x 1.5 (Metric) • 10 full turns for 7/8"-11 BSF (Scania) • 12 full turns for 7/8"-14 UNF (Volvo up to 2004) |
|--|---|

2. Piloting

Hubs designed for steel hub piloted wheels may not have enough pilot length to locate dualled Alcoa® Wheels or with a wheel from Alcoa® Wheels at the outer position and a steel wheel at the inner position.

Pay close attention to the pilot tab length, particularly when converting from dualled steel wheels to dualled aluminium wheels. Measure the hub pilot tab to make sure the hub has a minimum pilot tab length that allows no less than 5 mm for the outer wheel to be centred, excluding the bevelled edges.

For example:

The horizontal part of the pilot tab should be at least 27 mm in case the inner aluminium wheel's disc thickness is 22 mm. The horizontal part of the pilot must be at least 19 mm for a mixed dual in case the inner steel wheel's disc thickness is 14 mm.



Picture 4-18

3. Torque

When dualing steel wheels with Alcoa® Wheels, follow the vehicle manufacturers' recommendations regarding the proper torque and use of thread lubricants to mount the wheel.

IMPORTANT

On occasion Alcoa® Wheels are dualled with steel wheels: it is recommended that Discmates for Alcoa® Wheels or nylon protection gaskets are used to help prevent corrosion. See picture 4-19.

In the event a steel wheel is used at the inner position, extreme care must be taken to properly seat it to the hub or drum before mounting the aluminium wheel at the outer position.

Selection of the correct hardware is required as providing adequate thread length, to secure the outer aluminium dual wheel, is critical to a safe assembly.

Howmet Wheel Systems recommends the use of sleeved nuts for this purpose.

Caution



Steel wheels and forged aluminium wheels have different mechanical properties.

Due to the difference of mechanical properties, it may decrease the lifetime of one or the other.

It is therefore recommended not to use mixed fitments in vocational, heavy load hauling fleets and/or off-road applications.



Picture 4-19

4.i. Owner / in-service identification

Some fleets wish to identify wheels as to OWNERSHIP and IN-SERVICE dates. Howmet Wheel Systems advises fleets and owners to stamp wheels with the date they are put into service.

1. Use "Lo-Stress" stamps or equivalent.
2. Location of stamped areas on outside disc should be in space outward from a line between hand hole centres and a minimum of 2,5 cm or 1 inch from the periphery of any hand hole.
3. Location of stamped identification on inside of wheel should be as close to the factory identification stamping as possible.

Note: Use of an impression stamp on Dura-Bright® surface treated wheels can affect the appearance and performance of the Dura-Bright® surface treatment at the stamp and in the stamp area.

5. Putting wheels in service

Warning



- Do not exceed the maximum wheel load indicated on the wheel.
- Exceeding the maximum wheel load may cause the wheel / tyre to explode causing serious injury or death.
- Customer must compare vehicle and tyre load rating to maximum wheel load rating.

Warning



- Some wheels are not designed for use on axles with disc brake systems.
- Attempting to mount or use wheels that are not designed for axles with disc brake systems may cause wheel or vehicle components to fail causing injuries or death.
- For reference see part number on the wheel and Specification Sheet for Alcoa® Wheels to ensure the wheel can be used on disc brake operated axles / vehicles.

5

Before mounting the tyre, always perform a wheel fitment check to ensure proper clearance from any obstructions. See 'Wheel fitment check' Section 5.d.

Warning



- Do not over-inflate the tyre / wheel assembly.
- Exceeding the maximum wheel load may cause the wheel / tyre to explode causing serious injury or death.
- Refer to tyre and wheel manufacturers' recommendations for correct tyre pressure.

The maximum wheel load rating and inflation pressure is in the wheel's roll stamp. See Section 4.d.
Under no circumstances exceed cold inflation pressure listed by the tyre - and wheel manufacturer that is indicated on the tyre and wheel.

5.a. Putting wheels in service / hidden damage

Some forms of wheel damage can be hidden beneath the tyre, so whenever a tyre is removed, thoroughly examine the complete wheel. Remove all grease and road dirt. Use a wire brush or steel wool to remove rubber from the bead seats.

Check mounting holes for cracks, fretting, enlargement, and elongation which can occur if the nuts are not kept tight. See Section 12.a. Dirt streaks radiating from bolt and / or vent holes may indicate loose nuts. See picture 5-1.



Picture 5-1

5.b. Putting wheels in service / wheel alteration

Howmet Wheel Systems does not approve any form of alteration to wheels except minor cosmetic buffing for appearance purposes. Sanding and/or grinding is permitted to maintain the rim flange area of the wheel. See Section 13.g.

Do not alter wheels by welding, brazing or other heat application, e.g., powder coating, in an attempt to repair or straighten a wheel.

Use of adapter plates or bead-locks are not approved on Alcoa® Wheels.

Do not paint, powder coat or otherwise coat wheels in any way that may interfere with the mounting surfaces.

Any wheel that shows signs of alteration should be removed from service and scrapped.

Wheel identification must be legible. Wheels should be taken out of service if such identification is not legible or does not meet requirements.

Warning



Welding, brazing or otherwise heating any area of Alcoa® Wheels will weaken the wheels.

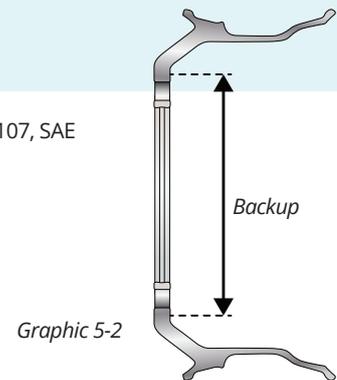
Weakened or damaged wheels can lead to an explosive separation of tyres and wheels or wheel failure on the vehicle. Explosive separations of tyres and wheels or wheel failure on the vehicle could cause serious injuries or death.

Never attempt to weld, braze, or heat any surface of Alcoa® Wheels.

5

5.c. Putting wheels in service / mounting area and support surface diameters

The support surface or backup of the hub should be flat to the diameter recommended (per ISO 4107, SAE J694 and DIN 74361-3) below to properly accommodate the wheel disc area.



Graphic 5-2

Applicable to hub pilot mounting type Alcoa® Wheels:

Bolt circle Ø mm	Nr of bolts	Thread size	ISO 4107 Backup Ø mm	SAE J694 Backup Ø mm	DIN 74361-3 Backup Ø mm	Howmet recommended backup Ø mm
205	6	M18 x 1.5	250 - 251	245 - 250	250	245 - 251
245	6	M18 x 1.5	290 - 291		290	285 - 291
275	8	M20 x 1.5	320 - 321	315 - 320	320	315 - 321
275	8	M22 x 1.5		334 - 343	320	334 - 343
225	10	M22 x 1.5			270	273 - 279
335	10	M22 x 1.5	385 - 386	380 - 385	385	380 - 386

Chart 5-3

Warning



- Due to the limited contact area of star shape hubs, proper maintenance and cleaning of hub, wheel and mounting hardware is important.
- As per recommendation from the Association of European Wheel Manufacturers, EUWA, wheels used on star shape hubs must be checked for cracks on the inner and outer attachment face each 50.000 km.
- In case cracks are detected wheels must be removed from service immediately and permanently.

5.d. Putting wheels in service / before tyre mounting / WHEEL FITMENT CHECK

- Do not exceed maximum wheel load. Customer must compare OEM vehicle axle load ratings to maximum wheel load ratings.
- Refer to tyre manufacturers' recommendations for proper tyre pressure.
- Before mounting the tyre, perform a wheel fitment check to ensure proper clearance from any obstructions. See 'Wheel fitment check'.
- Do not use a wheel that has been subjected to high pressure tyre and rim separation, run flat, excessive heat, or other physical damage. A wheel subjected to any of these conditions may no longer have a correct dimension and contour to retain the tyre bead while under pressure.
- A cracked or damaged wheel may cause the wheel to fail or come off the vehicle while the vehicle is moving.
- Do not straighten the wheels. Do not heat the wheels in an attempt to soften them for straightening or to repair other damage. The special alloy used in these wheels is heat-treated, and uncontrolled heating will weaken the wheel.
- Do not weld the wheels for any reason.
- When tyres are removed, the entire wheel must be cleaned and inspected. With a brush, remove any contamination from the wheel's bead seats (portions of the wheel that support the tyre).
- Check the wheel's flanges for wear with Alcoa® Wheels' Rim Flange Wear Gauge. REMOVE SHARP EDGES ON THE RIM FLANGE as explained in Section 13.g.iii.
- It is recommended that valves are replaced at every tyre change. See Section 5.e.iv.
- It is recommended to lubricate wheel flanges; wheel bead seats and tyre beads each time the tyre is mounted or demounted.

Wheel fitment check

1. Remove current wheel(s) from axle end(s) to perform fitment check as necessary.
2. Clean the mounting surface of the hub and mounting surface of the wheel to be installed (see Section 10.1. steps 1, 2 and 3).
3. Place the wheel for the fitment check over studs and hold the wheel on the hub and check for a flush mount. The mounting surface of the wheel (and balancing weights) must fit flush to the hub mounting surface. The backside of the wheel (and balancing weights) must not rest against any obstructions, such as the brake calliper, steering and suspension components, rivets, etc.
4. Install three nuts and hand tighten. Rotate the wheel (and turn the steering column fully in both directions if checking the steer position) to ensure clearance from any obstructions.
5. Repeat steps for each axle end as applicable.

5.e. Valves for Alcoa® Wheels

New Alcoa® Wheels come with valves fitted. All valves and valve nuts are nickel plated and come with a metal dust cap that includes a seal for air tightness. Metal valve caps are recommended.

Valves used by Howmet Wheel Systems for Alcoa® Wheels are standardized by ETRTO: the use of valves that do not meet these specifications or non-genuine valves may jeopardize the roadworthiness of the vehicle or safety.

Consult the Specification Sheet for Alcoa® Wheels for the correct and matching valve when ordering and replacing valves.



If the P/N of a wheel and matching valve is not found contact Howmet Wheel Systems or an authorized distributor of Alcoa® Wheels:



Original equipment valves and - replacement valves may be obtained from an authorized distributor of Alcoa® Wheels

Note: Metal valve stem caps are required per DOT (Department of Transportation) instead of plastic.

5.e.i. Valves with black / orange T-shape grommet with 1-piece nut

40MS-00N, 54MS-00N, 60MS-00N (not pictured), 70MS-07N2, 83MS-00N original equipment valves (Picture 5-4)

70MS-27N, 70MS-45N (not pictured), 70MS-60N (not pictured) replacement valves (Picture 5-5)

These valves come with a 1-piece nut with enlarged contact surface that evenly distributes the forces in the valve hole area.

It also reduces the chance of damaging the valve hole when applying too much torque to the valve nut.

These valves do not necessarily need lubrication or greasing when checking or replacing.

Lubrication or greasing helps to prevent corrosion and eases the insertion of the valve when mounting. See VALVEgrease.



Picture 5-4



Picture 5-5

VALVE grease



Picture 5-6

When mounting or replacing valves use VALVEgrease for Alcoa® Wheels or a non-water and non-metal-based lubricant.

DO NOT use tyre mounting paste when mounting or replacing metal valves.

VALVEgrease for Alcoa® Wheels is available from authorized distributors of Alcoa® Wheels.



Check the Specification Sheet for Alcoa® Wheels for the correct and matching valve. If the P/N is not found contact Howmet Wheel Systems or an authorized distributor of Alcoa® Wheels.

See the Specification Sheet for Alcoa® Wheels:

Original equipment valves and - replacement valves may be obtained from an authorized distributor of Alcoa® Wheels.



Caution



Valves with a T-shape grommet may get squeezed or folded upon installing.

As a result, the T-shape grommet may get cut or torn causing air loss.

Carefully insert the valve to avoid the T-shape grommet from being squeezed or folded. Lubrication or greasing helps to ease the insertion of the valve when mounting.

5.e.ii. Valve nuts and torque

Valves for Alcoa® Wheels have 14, 16 mm or 5/8" hex nuts. The recommended torque is 12 to 15 Nm (9 to 11 Ft-Lb).

5

5.e.iii. Valves, general recommendations

DO's

1. It is recommended that valves be replaced at every tyre change with an original / genuine valve for Alcoa® Wheels which are available from authorised Alcoa® Wheel distributors.
2. Before mounting the new valve, check if the valve corresponds with the wheel. Use the Specification Sheet for Alcoa® Wheels for reference.
3. To avoid loss of air by improper fitment, Alcoa® Wheels should be fitted with chrome- or nickel-plated valves that meet the standards and that are specially designed for Alcoa® Wheels.
4. When replacing O-rings or grommets, use silicone, Viton® or EPDM O-rings or grommets.
5. When replacing valve stems, it is recommended that the O-ring or grommet be lubricated with VALVEgrease for Alcoa® Wheels or with a non-water non-metal-based lubricant.
6. Use only dry air for tyre inflation. Be sure that the in-line air dryer is maintained properly. The use of moisture traps in the air compressor feed line is recommended.
7. Valve dust caps with an air seal are recommended.

DON'Ts

1. Do not fit valves for steel wheels. Valves for steel wheels may have different diameters, different bends (angles) and/or insufficient thread length.
2. Do not use brass valves without plating. Aluminium and brass cause accelerated galvanic corrosion. This corrosion may result in leakage.
3. Do not bend the standard valve to another shape.
4. Do not use rubber O-rings or grommets.
5. Do not use tyre mounting paste when installing or replacing valves.
6. Do not inflate the tyre with air coming from an air system, using lubrication for pneumatic power tools.
7. Do not use liquid tyre balancers or sealants. These products may cause extremely rapid corrosion of the valve hole area, bead seats and drop centre. Cracks may be initiated with air loss as a result.
8. Balancing with powder or granulates is not recommended. These products may cause malfunctioning of the valve core with air loss as a result.
9. Do not use metal or brass valve extensions without a solid support. Unsupported metal extensions accelerate fatigue to the valve base or valve hole area due to centrifugal forces. As a result, cracks may occur in the valve base and/or the valve hole areats, causing air loss.
10. Do not use extension tubes without a proper clamping installation attached to the outer wheel. Loose extension tubes may cause damage to the wheel and tube with air loss as a result.

5.e.iv. Replacing valves

The best occasion to check the valve is when tyres are replaced. It is recommended to fit a new valve every time when a new tyre is mounted.

Clean the valve seat and valve hole thoroughly after removal of the valve. Remove all dirt, grease, and oxidation. Make sure all contact areas are dry. Check for sharp edges or burrs. See picture 5-7.

Avoid using sharp tools and/or excessive force that could cause scratches or dents in the surface. Uneven or damaged surfaces can lead to leakage. Fine sandpaper, steel wool, a soft wire brush or Bristle discs for Alcoa® Wheels will help to clean the valve hole area without harming the surface.

5

Apply a layer of VALVEgrease for Alcoa® Wheels or non-water non-metal-based lubricant in the valve hole and the outer and inner side wheel surface, up to 2,5 centimetres or 1 inch in diameter around the valve hole. See picture 5-8.

Before installing the valve, apply a thin coat of VALVEgrease for Alcoa® Wheels or non-water non-metal-based lubricant at the base of the valve and the O-ring or T-shape grommet is located. See picture 5-9.

Do not use any other lubricants that are water-based or lubricants that contain metals.

Upon installing hold the valve in its position and check the alignment to be able to mount a valve extension for dual mounting applications. This applies to valves with a bend or angle.

Note:

Upon installing valves with T-shape grommet, insert the valve carefully to avoid the T-shape grommet from being squeezed or folded. As a result, the T-shape grommet may get cut or torn causing air loss.

Install the valve with care and do not over torque: the recommended torque is 12 to 15 Nm (9 to 11 Ft-Lb).

IMPORTANT

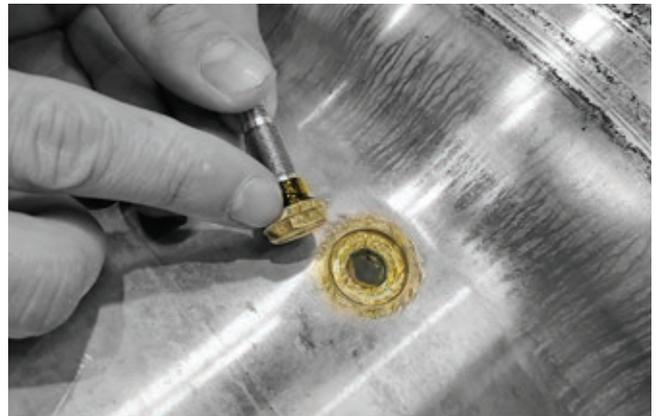
Refer to the vehicle OEM for installing or replacement of valves with tyre pressure monitoring system (TPMS) modules. For more information about valves with TPMS modules, consult Section 5.e.v.



Picture 5-7



Picture 5-8



Picture 5-9

5.e.v. TPMS valves and modules

Vehicle OEM may offer a Tyre Pressure Monitoring System (TPMS) on vehicles, replacing the Alcoa® Wheels valve. A TPMS is an electronic system designed to monitor the air pressure inside the tyres of vehicles.

Valves used for inboard versions i.e., the TPMS module is in the air chamber, use special valves designed by / for the vehicle manufacturer. **These TPMS valves are available through the vehicle manufacturer organization and authorized Alcoa® Wheels distributors.**

Outboard versions may be fitted or connected using the Alcoa® Wheels valve as a base. Care needs to be taken for correct fitment i.e., matching threading, correct torque, enough stabilizing or support to avoid additional stresses on the valve or valve bore.

Unless the vehicle / axle OEM recommends otherwise: apply a layer of VALVEgrease for Alcoa® Wheels or non-water non-metal-based lubricant in the valve hole and the outer and inner side wheel surface, up to 2,5 centimetres or 1 inch in diameter around the valve hole.

Application Guidelines for Alcoa® Wheels, with TPMS for individual vehicle OEM, are available from Howmet Wheel Systems.

Caution



When de- or mounting tyres avoid contact between tyre beads and inboard TPMS module to prevent from damaging tyre and/or inboard TPMS module.

A damaged TPMS module may cause malfunctioning of the system or cause a tyre blow-out with serious injury or death as a result.

Consult the vehicle OEM network for proper installation, parts and tools required.

5

5.f. Valve extensions

Authorized distributors of Alcoa® Wheels offer different valve extensions. A quality extension of 150 mm (6 inches) will enable tyre pressure checks and adjustment of the inflation of the inner tyre of a dual fitment.

A valve stem stabilizer must be used if metal valve extensions are used.

The mass of metal valve extensions and rotation may cause forces that can lead to cracks in the valve hole area of the wheel or the valve stem.

POM plastic valve stem extensions (Picture 5-10) are recommended and can be obtained from an authorized distributor of Alcoa® Wheels.

When using extension tubes, attach the tube with a proper clamping bracket (Picture 5-11) attached to a vent hole of the outer wheel.

ATTENTION: Use of stabilizers or clamping brackets on Dura-Bright® surface treated wheels can affect the appearance and performance of the Dura-Bright® surface treatment at the area of contact with the stabilizer or clamping bracket.



Picture 5-10



Picture 5-11

Valves availability

Only use original valves for Alcoa® Wheels. These valves are specially made to fit Alcoa® Wheels and are not available in the aftermarket / replacement market. Howmet Wheel Systems offers all listed valves for Alcoa® Wheels through its distributor network. For more info, please contact an authorized distributor of Alcoa® Wheels or Howmet Wheel Systems.

6. Before mounting tubeless tyres

6.a. Safety and compliance

Warning



Tyre and wheel servicing can be dangerous.

Failure to read and comply with all of these procedures and practices may result in serious injury or death.

Tyre and wheel servicing must only be performed by trained personnel using proper procedures and tools.

Tyres and wheels that are not properly fitted or maintained may not be safe.

Always comply with the procedures in the tyre and wheel manufacturers' catalogues, instruction manuals or other industry and government instructional materials.

Follow the proper tyre fitment and maintenance practices as contained in the tyre manufacturers' manuals and Sections 6.b. to 7.c. of this manual.

Always wear adequate protective eyewear (or face shield), protective foot and hand wear and hearing protection while servicing tyres and wheels to avoid injury.

6

6.b. Tools and machines

Warning



If you do not know how to use tyre servicing tools: Stop!

Failure to follow proper procedures can result in serious injury or death.

Tyre servicing must only be performed by trained personnel.

Always:

- Use those tools recommended by the tyre or wheel manufacturer
- Keep tools clean and inspect them frequently

Never:

- Use a tyre tool for anything except for demounting and mounting tyres
- Use an extension bar with tyre irons
- Use tools with a loose or cracked handle
- Use bent, cracked, chipped, dented, or mushroomed tools
- Alter or apply heat to any service tool

Typical tyre service tools:

- Bead unseating tools
- Tubeless tyre iron set
- Clip-on air chuck / in-line gauge with enough hose length
- Safety restraint / tyre cage

Not all tyre mounting / demounting machines work the same. Be sure to read the operating or instruction manual for your machine before attempting to mount or demount tyres.

6.c. Inspection

1. Do not gouge or nick the wheel during inspection.
2. Do not use a wheel that has been exposed to excessive heat from tyre fires, brake fires, severe brake system drags or seizures or other causes. See Section 13.d. Heat damage.
3. Do not use a damaged tyre or damaged wheel. Inspect them carefully before mounting. See Section 13 Wheels in service.
4. Do not use a severely corroded wheel. See Sections 13.i. and 13.j.
5. REMOVE SHARP EDGES ON THE RIM FLANGE. See Section 13.g. Rim flange wear.

Note:

- For inspection of tyres refer to the manufacturers' documentation.
- For inspection of Alcoa® Wheels refer to Sections 13 of this manual.

Warning



Use of inner tubes in tubeless wheels will hide slow leaks. Slow leaks may indicate cracked or damaged wheels which lead to wheel failures. See Section 13.h.iv.

Wheel failures can cause accidents which may result in serious injury or death.

Never use an inner tube on tubeless Alcoa® Wheels. Immediately and permanently remove cracked or damaged wheels from service and scrap.

Warning



Mounting damaged tyres or wheels can lead to an explosive separation of tyres and wheels.

Explosive separations of tyres from wheels can cause serious injury or death.

Inspect tyres and wheels for damage before mounting the tyres. If damage is found, immediately and permanently remove damaged tyres or wheels from service.

6

6.d. Matching of tyre, wheel, and axle load

1. Use only the appropriate tyre size, matching the rim width, according to ETRTO and/or tyre manufacturers' recommendations. Refer to the OEM vehicle documentation and tyre manufacturers' documentation. See Section 4.e. Tables: matching tyre to rim.
2. Alcoa® Wheels for commercial vehicle tubeless tyres have a 15° bead seat angle and accommodate tubeless tyres. Never use tube type tyres on Alcoa® Wheels.
3. Do not exceed maximum wheel load. Customer must compare OEM vehicle axle load ratings to maximum wheel load rating.
4. Before mounting the tyre, perform a wheel fitment check at the vehicle to ensure proper clearance from any obstructions. See 'Wheel fitment check' Section 5.d.
5. Refer to tyre manufacturers' recommendations for proper tyre pressures. The recommended tyre pressure may not exceed the maximum inflation pressure of the wheel.

Mismatching tyre and wheel diameters are dangerous. A mismatched tyre and wheel assembly may separate and can result in serious injury or death. This warning applies to 15" and 15.5", 16" and 16.5", 17" and 17.5", 19" and 19.5", 22" and 22.5", 24" and 24.5" tyre and wheel assemblies as well as other sized assemblies.

Warning



Never assemble a tyre and wheel unless you have positively identified and correctly matched the tyre and wheel diameter.

If an attempt is made to seat the tyre bead by inflating on a mismatched wheel, the tyre bead will break, or tyre will separate from the rim with explosive force and may result in serious injury or death.

Before assembling a tyre and a wheel be sure to identify if the tyre - and the wheel diameter match.

6.e. Valve

1. Check if the matching valve is mounted in the right way with proper torque. See Section 5.e. of this manual (Valves for Alcoa® Wheels).
2. When match-mounting tyres on Alcoa® Wheels, locate the valve adjacent to the low point mark on the tyre.
3. For matching valves and additional information see Specification Sheet for Alcoa® Wheels, column 'Valves'



6.f. Lubricant

1. When selecting a lubricant, it is preferable to use a non-water-based lubricant for tyre mounting that also does not contain metals and is pH neutral.
2. Alternatively use a non-flammable vegetable or soap-based rubber lubricant, always pH neutral, on the tyre beads and rim surfaces.

6

Lubricating bead seats and drop well:

- Preferably use a non-water-based lubricant for tyre mounting that does not contain metals and is pH neutral.
- Water-based lubricants accelerate corrosion on the bead seats and drop well surface.
- Corroded bead seats may not be airtight. Corrosion in the bead seats may initiate cracks with air loss as a result.
- Corrosion at the drop well may initiate cracks with air loss as a result.

Lubricating valve and valve hole area:

- Use VALVEgrease for Alcoa® Wheels or a non-water-based lubricant that does not contain metals and is pH neutral.
- Water-based and / or metal-based lubricants may cause and accelerate corrosion at the valve and valve hole area.
- Corrosion at the valve and valve hole area may result in losing air tightness of the valve O-ring or grommet.
- Corrosion may initiate a crack in the valve hole area with air loss as a result.

Warning



Never use starter fluid, propane, ether, gasoline, or other flammable materials and/or accelerants to lubricate the beads of a tyre or bead seats of the rim.

This practice can cause the explosive separation of the tyre / the wheel during servicing or during road use, which may result in serious injury or death.

Use appropriate and designated lubricants for lubrication of the beads of a tyre and/or bead seats of the rim.

6.g. Mounting tyres on symmetrical and non-symmetrical drop well wheels

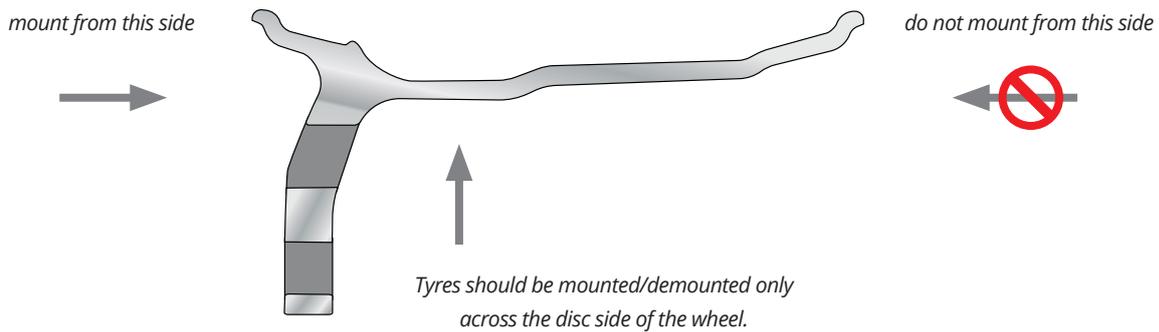
Alcoa® Wheels may contain a symmetrical drop well with a narrow ledge on both sides of the rim. This feature allows mounting of the tyre from either side of the wheel.

However, some Alcoa® Wheels are non-symmetrical and contain a non-symmetrical drop well or narrow ledge on only one side of the wheel (see graphic 6-1). Reduced well wheels as well as some

other wheel designs feature an increased under well diameter and also have a non-symmetrical sloping rim profile which provides additional brake clearance.

In order to minimize the possibility of tyre bead damage, mounting and demounting of the tyre should be performed only from the narrow ledge side of the wheel.

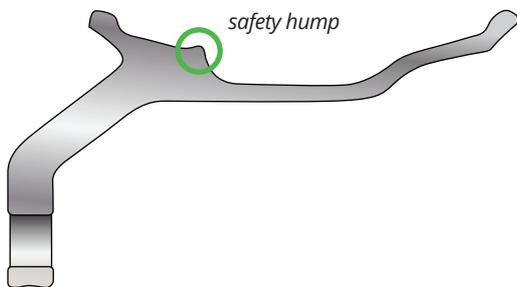
Graphic 6-1



6.h. Symmetrical drop well wheels with safety hump

Alcoa® Wheels often contain a safety hump on one bead seat of the rim. This design feature is requested by European vehicle manufacturers. It prevents the tyre bead from slipping into the drop well when tyres are operated at low or deflating tyre pressure when curving.

In case of a symmetrical drop well mounting and demounting of the tyre may be performed from the side of the wheel without the safety hump by preference.



Graphic 6-2



Graphic 6-3

7. Mounting tubeless tyres on Alcoa® Wheels

7.a. Mounting tyre to rim

IMPORTANT

- Not all tyre mounting / demounting machines work the same. Be sure to read the operating or instruction manual for your machine brand before attempting to mount or demount tyres. Follow your machine brand operating and instruction manual.
- Use special fixtures for aluminium wheels on the machine's chuck for clamping aluminium wheels. See for example picture 7-1 .
- Use a plastic or nylon mounting aid for mounting tyres on Alcoa® Wheels. See for example picture 7-2.

Before mounting:

- Inspect the tyre for damage. Refer to tyre manufacturers' documentation and guidelines.
- Clean the beads of the tyre. Be sure the beads and inside of the tyre are dry before it is mounted.
- Do not exceed the maximum wheel load. Compare vehicle/ axle load rating to maximum wheel load rating.
- Perform a wheel fitment check on the vehicle/axle to ensure proper clearance from any obstructions.
- See 'Wheel fitment check' Section 5.d.



Picture 7-1



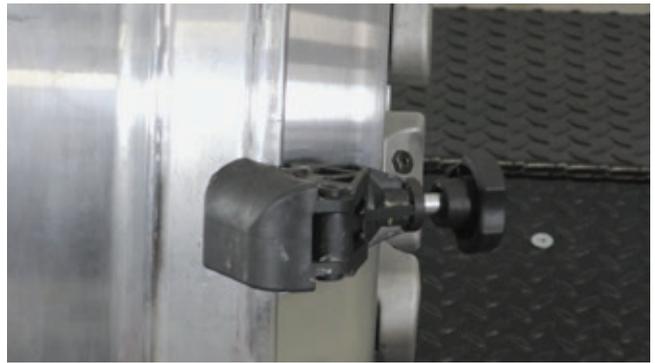
Picture 7-2

1. Do not gouge or nick the wheel.
Note: Additional care should be used when mounting Dura-Bright® surface treated wheels since minor nicks and scratches cannot be polished out. See Section 14.b. for specific cautions, care and maintenance procedures.
2. Inspect the wheel for damage. Do not use a damaged or severely corroded wheel. See Section 13. REMOVE SHARP EDGES ON THE RIM FLANGE. See Section 13.g.
3. Identify the short side of the drop centre well. Single-piece tubeless rims and wheels must be mounted from the short side of the drop centre well. I.e. tyre beads should be mounted over the rim flange closest to the wheel well.
Note: Aluminium wheels typically have symmetrical drop centres so tyres can be mounted from either side. However, certain aluminium wheels, have a non-symmetrical drop centre, or the short side of the drop centre well is located on the disc side. See Section 6.g.
4. Before mounting a new tyre, clean the bead seats thoroughly until a smooth and clean surface is reached. For reference see Section 10, pictures 10-2, 10-3 and 10-4.
Note: Avoid using strong abrasive tools and/or excessive force that could cause dents in the surface. Uneven or damaged surfaces can lead to leakage.
Note: Frequent changing of tyres in undesirable conditions, use of water-based lubricants or lubricants with a pH value other than neutral for tyre fitting, as well as neglecting to clean the surface of the bead seat, can lead to loss of air caused by corrosion, oxidation of the aluminium and dirt build up.
Note: Certain types of rubber can "fuse" to the bead seat of the wheel. If this rubber and other residues are not removed before the fitment of a new tyre the uneven surface can lead to loss of air.
After cleaning the bead seats, insert a wire down the valve stem to ensure it is not blocked.
5. Position the wheel on the machine. Lubricate wheel bead seats and tyre beads using an approved lubricant. Tyre beads should be mounted starting over the rim flange closest to the wheel well.
Note: When match-mounting tyres on Alcoa® Wheels locate the valve stem adjacent to the low point mark on the tyre.

6. Attach the mounting aid to the front rim flange.

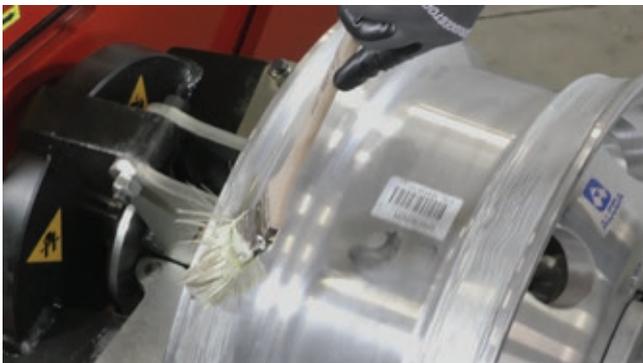


Picture 7-3



Picture 7-4

7. Be sure the bead seats, and drop centre are dry before applying tyre mounting lubricant. Generously lubricate wheel rim flanges, bead seats and drop well using an approved lubricant (see Section 6.f.) immediately before mounting the tyre while rotating at the machine. Position the mounting aid at 10 o'clock position.



Picture 7-5



Picture 7-6

8. Lubricate both tyre beads and inside of the second bead just before mounting the tyre. Avoid letting the lubricant to dry.



Picture 7-7



Picture 7-8



Picture 7-9

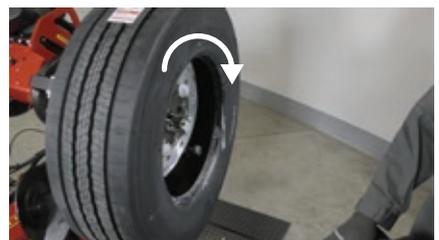
9. Position the tyre on the wheel with the rear bead positioned on the mounting aid. Position the "tool arm" (picture 7-11) in level with the rim flange (without contacting it) making sure the "tool arm" engages the bead completely. Rotate the wheel clockwise until the rear bead is completely mounted and seated in the drop well. Remove the mounting aid.



Picture 7-10



Picture 7-11



Picture 7-12

- Position the “tool arm” to the front in level with the rim flange (without contacting it) making sure the “tool arm” engages the bead completely. Position the valve location on top. Attach the mounting aid a little above the “tool arm”, below the valve location. Turn the wheel clockwise until the second bead is properly mounted. Detach the mounting aid and disengage the “tool arm”.

IMPORTANT

Do not cut or damage the bead of the tyre.



Picture 7-13

7.b. Manual operation mounting and demounting tubeless tyres

7

Please refer to instructions and guidelines of suppliers and/or manufacturers of tools used for manual de- and mounting of tubeless tyres.

Note:

When hand mounting and demounting tyres, placing aluminium wheels on a clean wooden floor or rubber mat is recommended.

Additional care should be used when mounting and demounting Dura-Bright® surface treated wheels since minor nicks and scratches cannot be polished out. See Section 14.b.



See Alcoa® Wheels' YouTube channel (from left to right):
 Mounting / demounting tyres, 22.5 x 9.00
 Mounting / demounting tyres, 22.5 x 11.75 offset 0
 Mounting / demounting tyres, 22.5 x 11.75 offset 120



7.c. Inflation and bead seating check

Warning



A pressurized tyre/wheel assembly can explode and separate violently.

This violent separation can cause serious injury or death.

Always contain the tyre/wheel assembly in an approved inflation cage during inflation.

Warning



Never use a volatile or flammable material, such as ether or gasoline, as an aid to seating the tyre beads on the wheel. Such use can lead to an uncontrolled pressure build-up in the tyre and may result in an explosion.

Explosive separation of the tyre from the wheel can occur while seating beads in this manner, while adding pressure to the tyre on or off the vehicle, or later, on the road. Loss of vehicle control can result, which can cause serious injury or death.

Only use approved mechanical or pneumatic bead seating devices.

Warning



An inflated tyre and wheel assembly contains enough air pressure to cause an explosive separation.

Unsafe handling or failure to follow approved mounting and demounting procedures can lead to serious injury or death.

Study, understand and follow the procedures contained in this manual to ensure your safety.

Note:

Picture 7-14 is an example of one type of a restraining device or tyre cage. Manufacturers recommend that approved restraining devices or tyre cages be free standing and located away from any vertical flat or solid surface. The restraining device or tyre cage should not be bolted to the floor.

1. Before inflating any tyre rim/wheel assembly, be sure to read, understand and comply with ALL WARNINGS.
2. **Use only dry air for tyre inflation. Be sure that the in-line air dryer is maintained properly. The use of moisture traps in the air compressor feed line is recommended.**
3. After mounting the tyre on the wheel, if needed use a compressed air tank with a quick release valve to seat the beads. Do not exceed 20 psi / 140 kPa / 1.4 bar before placing the assembly in an approved restraining device or tyre cage.
4. Inflate the tyre, with the valve core removed, using a clip-on air chuck with an in-line valve or pressure regulator and a sufficient length of hose. Inflate the assembly to 20 psi / 140 kPa / 1.4 bar.

IMPORTANT

Look for distortions, undulations, or other irregularities in the tyre sidewalls. Pay attention to any popping or snapping sounds. If ANY of these conditions are present: STOP! DO NOT approach tyre. Before removing the assembly from the approved restraining device or tyre cage, completely deflate the tyre remotely. Remove the clip-on air chuck. Mark the tyre as damaged for a potential "blow out". Mark the tyre immediately unserviceable, non-repairable and scrap.

5. Continue to inflate until the beads are seated on the wheel. Inspect both sides of the tyre to be sure that the beads are evenly seated. Visually inspect tyre rim/wheel assembly throughout the inflation process for improper seating. Do not exceed 20 psi / 140 kPa / 1.4 bar before placing the assembly in an approved restraining device or tyre cage.

NEVER inflate beyond 20 psi / 140 kPa / 1.4 bar to seat any tyre beads. If the beads are not seated at 20 psi / 140 kPa / 1.4 bar: STOP! Completely deflate the tyre, remove the assembly from the restraining device or tyre cage, and demount the tyre to determine the cause. Reposition the tyre on the rim, re-lubricate, and re-inflate.

NEVER re-inflate any tyre that has been operated in a run-flat or underinflated condition i.e., operated at 80% or less of the recommended operating pressure. Demount, inspect, and match all tyre and rim components before re-inflating in a safety cage.

If an emergency puncture repair inflating gas was used on a tubeless tyre, deflate and re-inflate the tyre several times to remove potentially explosive propellant before servicing the tyre.



Picture 7-14

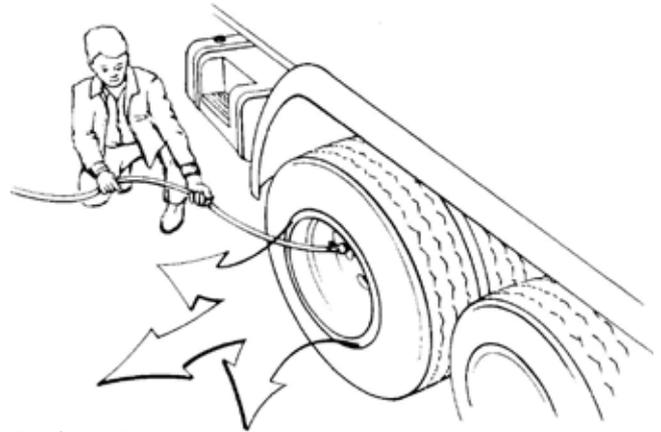
6. Place tyre/wheel assembly inside an approved restraining device or tyre cage after the tyre beads are seated. See picture 7.14.
7. Continue to inflate the tyre to its recommended inflation pressure. Refer to tyre manufacturers' recommendations for proper tyre pressures. Using a clip-on air chuck or a self-locking straight chuck with remote valve and pressure gauge, inflate the tyre/wheel assembly to proper pressure.

IMPORTANT

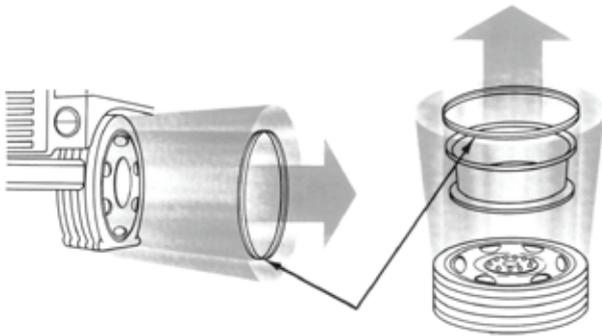
When inflating a tyre, stay out of the trajectory. See graphics 7-15, 7-16 and 7-17. DO NOT stand or lean any part of your body against, or reach over, the approved restraining device or tyre cage during inflation.

IMPORTANT

Look for distortions, undulations, or other irregularities in the tyre sidewall. Pay attention to any popping or snapping sounds. If ANY of these conditions are present: STOP! DO NOT approach tyre. Before removing the assembly from the approved restraining device or tyre cage (picture 7-14), completely deflate the tyre remotely. Remove the clip-on air chuck. Mark tyre as damaged for a potential "blow out". Mark tyre immediately unserviceable, non-repairable and scrap.

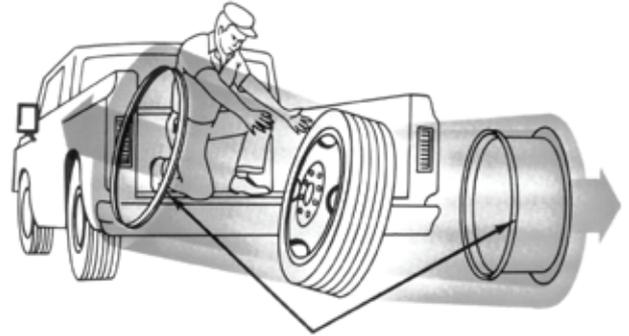


Graphic 7-15



Trajectory

Graphic 7-16



Trajectory

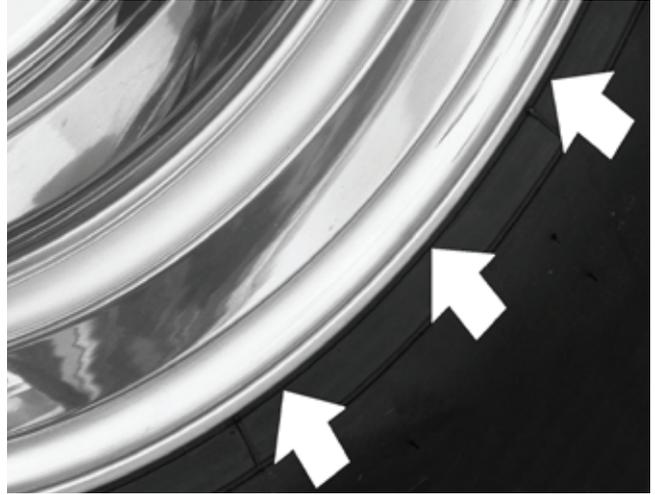
Graphic 7-17

8. Do not over-inflate. Use the tyre or vehicle manufacturers' recommended pressures, but under no circumstances exceed cold tyre pressure as roll stamped on the wheel. If no popping or snapping sounds are present, remove the clip-on air chuck, install the valve core, and adjust the inflation pressure to the recommended operating inflation pressure.
9. Before removing the tyre wheel assembly from the restraining device or tyre cage, always visually inspect for proper and concentric seating of the beads and all parts.
10. Conduct a final inspection. Heavy-Duty vehicle tyres have a "guide rib" or "mounting ring" moulded into the sidewalls next to the tyre beads. See picture 7-18. When the tyre is inflated, this moulded ring should be evenly spaced from the rim flange all the way around the wheel. See picture 7-19. Check the position of the mounting ring before removing the assembly from the approved restraint device or tyre cage.

If the rib or ring and wheel are not concentric, deflate the assembly in the cage. After demounting the tyre re-lubricate, re-mount and re-inflate the tyre in the approved restraint device or tyre cage. Repeat step 4 to 9.



Picture 7-18



Picture 7-19

11. Check the tyre/wheel assembly for air leaks. Install a suitable valve dust cap. Valve dust caps with an air seal are recommended.

8. Deflating and demounting tubeless tyres from Alcoa® Wheels

8.a. Before deflating and demounting

If there is known or suspected damage to the tyre or wheel or if the tyre has been operated at 80% or less of its recommended operating pressure, let the assembly cool down to ambient temperature first. Completely deflate any tyre by removing the valve core before removing the tyre/wheel assembly from the axle.

8.b. Machines, tools, and lubricants

Warning



Demounting damaged tyres or wheels can lead to an explosive separation of tyres and wheels.

Explosive separations of tyres from wheels can cause serious injury or death.

Inspect tyres and wheels for damage before removing from vehicle. If damage is found, the tyre must be completely deflated before loosening nuts. Immediately and permanently remove damaged tyres or wheels from service.

Warning



An aluminium wheel can be structurally weakened by excessive heat. See Section 13.d. Heat damage.

Tyre/wheel assemblies, using wheels that have been exposed to excessive heat, may experience a sudden and unpredictable tyre/wheel separation causing serious injury or death.

Immediately and permanently remove any wheel from service that has been subjected to excessive heat such as a tyre fire, wheel bearing failure or braking system drag / seize or a high-pressure tyre/wheel separation.

8

8.b.i. Machines

IMPORTANT

- Not all tyre mounting / demounting machines work the same. Be sure to read the operating or instruction manual for your particular machine before attempting to mount or demount tyres. Follow the particular operating and instruction manual.
- Use special fixtures for aluminium wheels on the machine's chuck for clamping aluminium wheels. See for example pictures 8-9 and 8-10.
- If using a tyre mounting / demounting machine on aluminium wheels, care should be taken to prevent gouging the wheel.
- Contact of parts of the machine with the wheel while operating can cause deformation of the metal or wheel.
- Impacts or forces can structurally damage the rim or wheel and cause cracks with air loss as a result.

8.b.ii. Tools

Use the proper tools to demount or mount tyres and wheels. Refer to "Typical Tyre Service Tools". See Section 6.b.

- NEVER strike the tyre and/ or the wheel with a hammer to unseat the beads.
- DO NOT use slide impact bead unseating tools with the risk of damaging bead seats, safety hump or drop well.
- Keep tyre tools smooth. Use them with care.

8.b.iii. Lubricants

Use a non-flammable, vegetable or soap-based lubricant on bead seats and other rim surfaces which is pH neutral. Lubricate the tyre beads and the bead seats of the wheel to make tyre demounting easier after deflating and before demounting the tyre from the wheel.

8.c. Deflating and demounting

IMPORTANT

Always completely deflate the tyre/wheel assembly before attempting to demount a tyre from the wheel. Remove the valve core and insert a wire down the valve stem to ensure complete deflation. Never demount a tyre from a wheel unless it is completely deflated.

Note:

Most Alcoa® Wheels typically have symmetrical drop centres so tyres can be demounted from either side. However, on certain aluminium wheels, the short side of the drop centre well is located on the disc side. See Section 6.g.

1. Identify the short side of the drop centre well. Single-piece tubeless rims and wheels must be demounted from the short side of the drop centre well. I.e. tyre beads should be demounted over the rim flange closest to the wheel well.
2. Remove valve core to deflate the tyre, prior to remove the assembly from the vehicle. Insert a wire down the valve stem to ensure complete deflation.
3. Position the assembly on the machine. Lift the assembly to enable the bead breaker disc to contact the back bead of the tyre without contacting the wheel rim flange.
4. Rotate the wheel while moving the bead breaker disc towards the drop well, without contacting the wheel. Apply an approved lubricant on the tyre bead and bead seat of the wheel while rotating the wheel.
5. Move the bead breaker disc to the front and repeat step 4.



Picture 8-1



Picture 8-2



Picture 8-3

6. Position the “tool arm” in level with the rim flange (without contacting it) making sure the “tool arm” engages the bead completely. Insert the “lever” just below the “tool arm” and rotate the wheel clockwise until the rear bead is completely demounted.
7. Move the “tool arm” to the back and position it in level with the rim flange in the front (without contacting it) making sure the “tool arm” engages the back bead completely. Insert the “lever” just below the “tool arm” and rotate the wheel clockwise until the front bead is completely demounted.

IMPORTANT

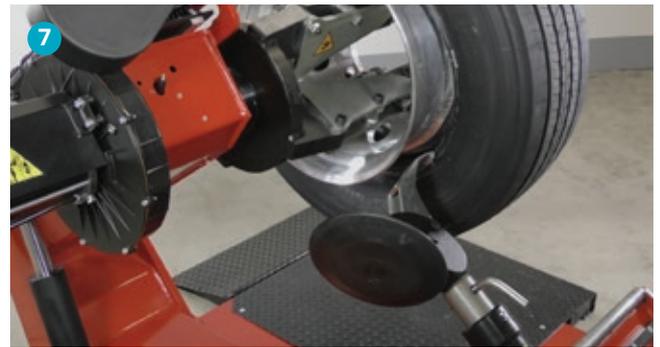
Do not cut or damage the bead of the tyre.



Picture 8-4



Picture 8-5



Picture 8-6

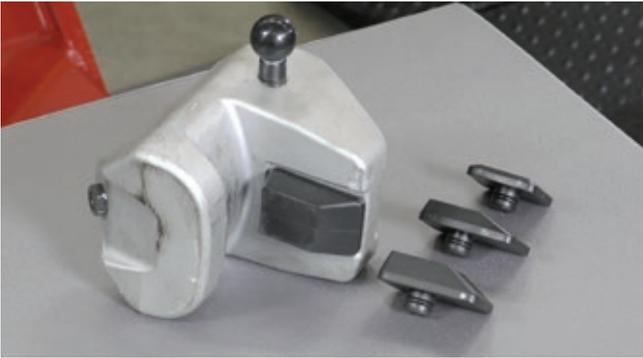


Picture 8-7



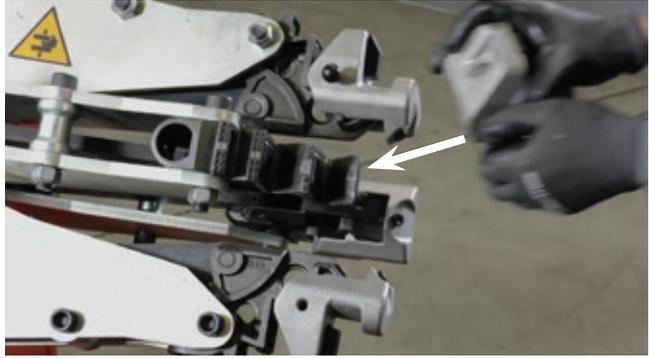
Picture 8-8

Fixture for clamping aluminium wheels



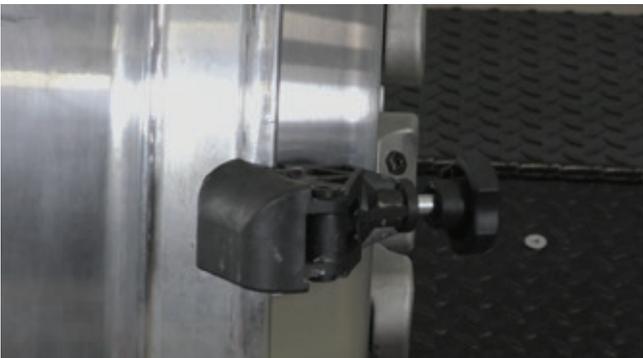
Picture 8-9

Fixtures attachment to machine's chucks



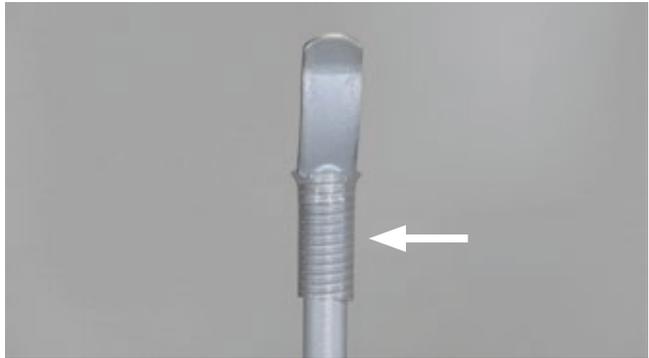
Picture 8-10

Plastic mounting aid used when mounting



Picture 8-11

Lever - with plastic protection- used when demounting



Picture 8-12

Caution

Do not use a hammer or a slide impact tool on wheels to avoid damage of rim flanges, bead seats, safety hump or drop well of a wheel.

Impacts on rim flanges, bead seats, safety hump or drop well of the wheel may cause cracks at a later stage with air loss as a result.

Make sure to unseat tyre beads without damage to rim flanges, bead seats, safety hump or drop well.

Caution

Demounting tyres with tyre changer

Do not contact the wheel, i.e. rim flange, bead seat, safety hump or drop centre, with the bead breaker disc while pushing the beads of the tyre towards the drop well.

Damaging, carving, denting, or deforming the metal with the "bead breaker disc" may cause cracks at a later stage with air loss as a result.

Make sure to unseat tyre beads without contacting rim flanges, bead seats, safety hump or drop well with the "bead breaker disc" or other parts from the tyre changer.

9. Balancing Alcoa® Wheels with adhesive weights

Alcoa® Wheels are fully machined and do not require balancing. However, the tyre-wheel combination may need to be balanced. Internal balancing compounds (powder or liquid) are not recommended. Use of coated balancing weights is recommended to avoid staining and corrosion of wheel surface.

Regulations from the European Commission (2000/53/EG) banned use of lead for balancing of cars and vans up to 3.5T GVW as from 2005. At the time of writing this service manual, balancing weights used for commercial vehicles over 3.5T GVW may still contain lead.

NOTICE

- Always follow the recommended procedures of the balancing weight manufacturer. It may be necessary to reduce the tyre pressure when installing clip-on weights to allow clearance for the weight's clip between the tyre and rim flange.
- Adhesive weights should be applied only to a clean surface per the recommended procedures of the balancing weight manufacturer. Balance weights should be installed in a location where they will not contact the brake -, steering - or suspension components during vehicle operation.
- Proper pre-cleaning is an essential factor for adhesive balance weights. It is recommended to evaluate the surface cleaning techniques and products with the manufacturer or supplier of balancing weights. Relocating wheels from a cold place to a warmer place may cause condensation on wheel surfaces which can affect the adhesion negatively.

Improperly installed weights could 'come off' during use and damage the vehicle and/or surrounding objects or cause personal injury. Excessive rim flange wear (see Section 13.g.) could dictate the use of 'stick-on' or adhesive balancing weights if there is inadequate rim flange to properly hold a clip-on (knock on) style weight.

Powder, granulate, liquid balancers or liquid sealants

- Balancing with powder, granulates or liquids are not recommended, nor sealing with liquid sealants. Powder, granulate or liquid balancers as well as liquid sealants may harm the inner liner of tubeless tyres. For information consult the tyre manufacturers' recommendations.
- The use of liquid tyre balancers or sealants in Alcoa® Wheels may cause extremely rapid corrosion of the valve hole area, drop centre and bead seat areas. Wheels with severe corrosion at the valve hole, drop centre and bead seat areas are unsuitable for service.
- The policy of Howmet Wheel Systems is not to endorse any specific brand or entity of balancing powder or balancing granulates. The use of powder or granulate balancers in Alcoa® Wheels may cause clogged valves. A filtered valve core is recommended when using balancing powder or granulates.

NOTICE

The use of balancing powders and granulates will not void the limited warranty (See Section 2), unless inspection of the wheel shows anomalies related to its use.

Alcoa® Wheels corroded by the use of liquid tyre balancers or sealants will not be replaced under the Howmet Aerospace limited warranty. See Section 2.

Caution



The usage of clip-on style balancing weights will not adequately engage at the hardened Dura-Flange® surface.

Clip-on balancing weights are not recommended for Dura-Flange® Alcoa® Wheels and may disengage from the wheel causing serious injury or death.

Howmet Wheel Systems recommends adhesive style balancing weights for Dura-Flange® Alcoa® Wheels.

Caution



The use of liquid tyre balancers or sealants in Alcoa® Wheels may cause galvanic corrosion at the valve hole area. It may also corrode the valve and/or may cause extremely rapid corrosion of the wheel rim surface.

Corrosion can initiate hairline cracks and air loss.

Do not use liquid tyre balancers or sealers. Always inflate tyre/wheel assemblies with dry air only.

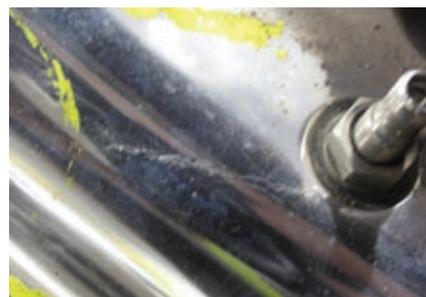
The valve or valve hole may not function properly due to corrosion and allow loss of air pressure.



Picture 9-1



Picture 9-2



Picture 9-3

Corroded bead seats are not airtight and will allow loss of air pressure.



Picture 9-4



Picture 9-5

Severely corroded wheels are unsuitable and should be permanently removed from service.

NOTICE

Alcoa® Wheels corroded by the use of liquid tyre balancers or sealants will not be replaced under the Howmet Wheel Systems limited warranty. See Sections 2, 13.i.ii. and 13.i.iii.

10. Wheel installation

10.a. Wheel installation preparation

Warning



Wheels that are not properly installed or maintained may not be safe.

Failure to follow proper wheel installation or maintenance practices may result in serious injury or death.

Follow the proper wheel installation and maintenance practices as contained in this Service Manual for Alcoa® Wheels.

For free training on proper installation and maintenance or for the most recent updates of online materials, contact Howmet Wheel Systems via web page www.alcoawheelseurope.com.

STEP 1

Clean the mating face of the hub / axle, remove dirt, oxidation, and paint. Do not apply any rust inhibitor, surface coating, grease, oil, or paint. Follow the recommendations of axle / vehicle manufacturers.



Picture 10-1

10

STEP 2

Clean the mating face of the wheel (disc), remove dirt, oxidation, and paint. Do not apply any rust inhibitor, surface coating, grease, oil or paint. If the mating face(s) of wheel(s) is (are) severely corroded, remove wheel(s) from service.



Picture 10-2

STEP 3

Clean the inner side of the hub bore of the wheel. Remove dirt, oxidation, and other foreign residues.



Picture 10-3

Picture 10-4:

The abrasive tools used in pictures 10-2 and 10-3 are available from authorized distributors of Alcoa® Wheels, reference: Bristle Discs for Alcoa® Wheels.

For documentation contact Howmet Wheel Systems at: www.alcoawheelseurope.com



Picture 10-4



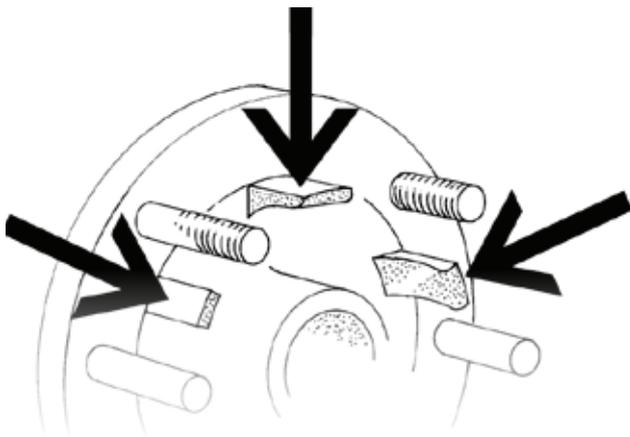
STEP 4

Apply a layer of HUB grease, or another grease that does not contain metal or water, on the inner side of the hub bore of the wheel. See Picture 10-5.

Alternatively apply the same product at the pilot tabs, spigots or centring edge of the hub / axle. See Graphic 10-6.



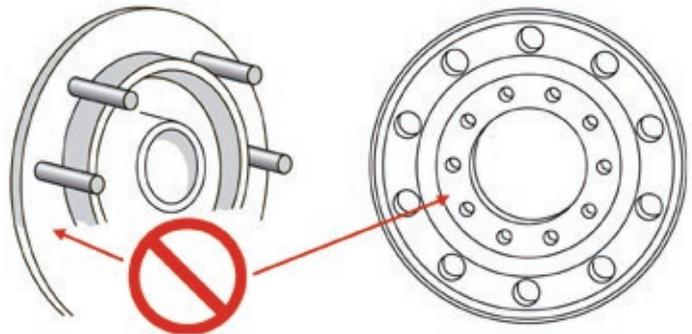
Picture 10-5



Graphic 10-6

Note:

Do not apply any rust inhibitor, surface coating, grease, oil or paint on either mating face of hub or mating face of wheel (disc). In case of an inner dual fitted wheel this applies to both sides of the wheel disc. See graphic 10-7.



Graphic 10-7

HUBgrease for Alcoa® Wheels is available from authorized distributors of Alcoa® Wheels. See picture 10-8.

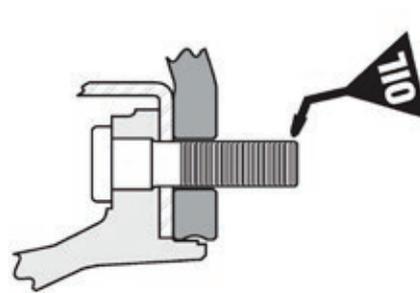


Picture 10-8

STEP 5

For nuts used on hub piloted wheels apply two drops of motor oil to the first two threads of the tip of each stud (see graphic 10-9) and between the nut and the integrated washer (see graphic 10-10). This will minimize corrosion between the mating threads. Lubrication is not necessary with new hardware.

Check if the integrated washer freely rotates on nut applying some pressure on the integrated washer towards nut while rotating. Fit nut onto the stud and check if the nut can freely rotate by hand turning the nut towards the hub.



Graphic 10-9



Graphic 10-10

10

NOTICE

Do not use any lubricants that are water based or greases containing metals (e.g. copper grease). Water based products can lead to accelerated corrosion and products containing metals allow galvanic corrosion.

For information contact Howmet Wheel Systems via webpage www.alcoawheelseurope.com



Picture 10-11: Torque wrench

STEP 6

1. Refer to the owner's manual of the vehicle or axle for correct torque value: Nm (kgf).
2. Hand tighten all nuts.
3. Impact wrenches, if used, should be carefully adjusted to apply torques within or below the limits recommended. See section 12.b.
4. Tighten to the recommended torque with a calibrated torque wrench (Picture 10-11) following the proper sequence. See graphics 10-12, 10-13, 10-14 and Section 12.b.
5. After each wheel mounting, torque should be checked with a calibrated torque wrench (Picture 10-11).

IMPORTANT

After 8 - 80 kilometres or 5 - 50 miles of operation torque should be rechecked unless vehicle/axle manufacturer or your documented fleet practices determine otherwise.

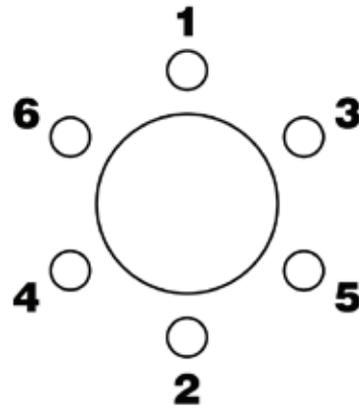
Check torque frequently from then on.

NOTICE

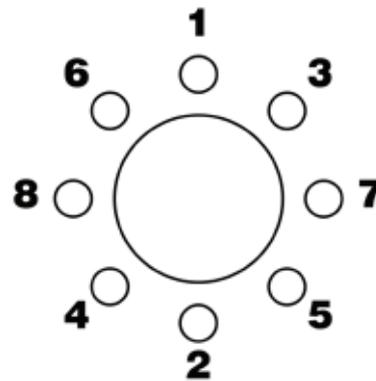
If nuts require frequent tightening, studs break frequently, wheel nut washers break or bolt holes are pounding out, hardware and mounting practices should be reviewed.

For free training on proper installation and maintenance or for the most recent updates of online materials, contact Howmet Wheel Systems via web page www.alcoawheelseurope.com

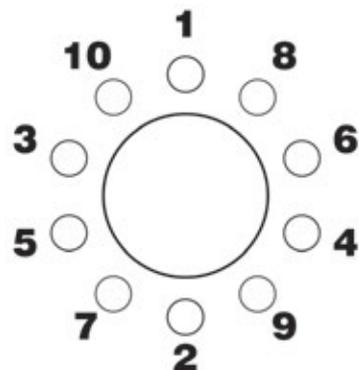
For additional information see Section 12.a.



Graphic 10-12



Graphic 10-13



Graphic 10-14

10.b. At wheel installation

Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud.

If two or more studs are broken, replace all the studs for that wheel position. Check with the stud manufacturer for regular maintenance and stud replacement practices.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturers' recommendations when replacing studs. See Section 11.b.iii.

Warning



Wheels that are not properly installed or maintained may not be safe.

Failure to follow proper wheel installation or maintenance practices may result in injury or death.

Follow the proper wheel installation and maintenance practices as described in this Section.

IMPORTANT

- Perform a wheel fitment check to ensure proper clearance from any obstructions. See 'Wheel fitment check' Section 5.d.
- Do not exceed maximum wheel load. Customer must compare OEM vehicle axle load ratings to maximum wheel load rating.
- Refer to tyre manufacturers' recommendations for proper tyre pressure, before mounting the tyre.

10

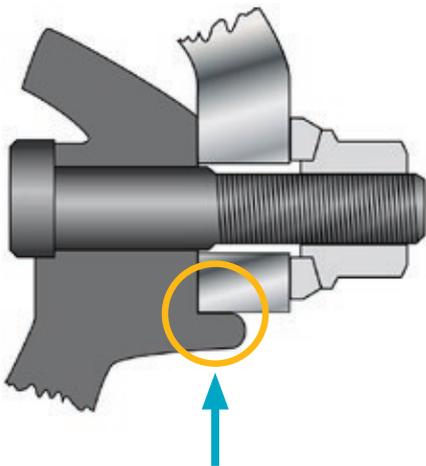
1. Make sure all wheel nuts are properly torqued. Check them often. See Section 12.a. If the wheel is loose, the holes will pound out or deform. If some nuts are tight and others are loose, the wheel may develop cracks or studs may break. This condition may cause wheels to loosen and disengage from the vehicle. Dirt streaks or rust radiating from bolt holes and / or vent holes can indicate loose nuts. See Section 13.h.
2. Ensure the end of the wheel wrench is smooth or cover the wheel mounting surface with a protective shield prior to tightening the nuts. The wheel wrench end will mar the wheel around the nuts if it is not smooth.
3. Keep all component contact surfaces smooth and clean. Dirt or projections on mounting surfaces may lead to lose or loosing wheels. Remove all projections resulting from burrs, nicks, etc. Take care that loose dirt does not fall onto mounting surface during assembly.
4. Do not introduce any foreign objects such as spacers or top hats (hub caps or covers) into the contact surface areas of the mounting system unless approved by Howmet Wheel Systems. **Do not paint, powder coat, or otherwise coat Alcoa® Wheels.**
5. Additional care should be used when mounting Dura-Bright® surface treated Alcoa® Wheels, since minor nicks and scratches cannot be polished out. See Section 14.b. for specific cautions, care, and maintenance procedures.
6. Discmates for Alcoa® Wheels or nylon protection gaskets are designed to be placed between wheels and hub or brake drum contact surfaces and as well as between the dual mounted wheels contact surfaces. See Section 4.h. Discmates for Alcoa® Wheels or nylon protection gaskets are recommended to be replaced when the tyre/wheel assemblies are removed and reinstalled.

10.c. Hub centring

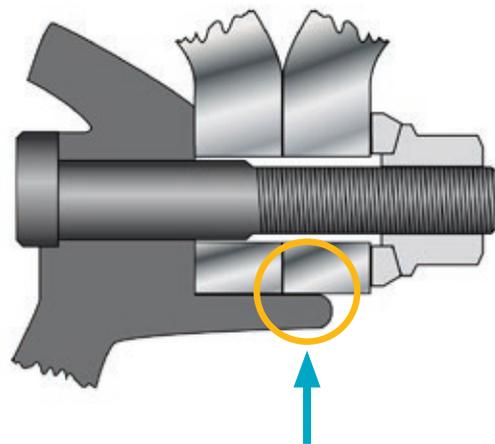
All European type Alcoa® Wheels for medium and heavy-duty commercial vehicles are hub centred wheels. European type Alcoa® Wheels have cylindrical bolt holes and are not suitable for bolt centring with conical or spherical nuts: never use any kind of this type of hardware on wheels with cylindrical bolt holes. For reference consult the Specification Sheet for Alcoa® Wheels available from the web or consult Howmet Wheel Systems.

Hubs designed for steel hub piloted wheels may not have enough pilot tab length to locate dual aluminium wheels. Pay close attention to pilot tab length, particularly when converting from steel to aluminium duals.

Measure the hub pilot tab length to make sure the hub properly centres the wheels. The pilot tab length for sufficient centring must be 5 mm or more for single mounting (Graphic 10-15) and 1x disc thickness + 5 mm or more for dual mounting (Graphic 10-16). In both cases dimensions are excluding bevelled edges. Longer spigots make mounting easier.



Graphic 10-15



Graphic 10-16

NOTICE

Always apply HUBgrease for Alcoa® Wheels or another grease that does not contain metal or water, on the pilot tabs or spigots (Picture 10-17) to reduce corrosion and make it easier to remove wheels when replacing tyres or other components for service.



Picture 10-17

10.d. Disc thickness and thread engagement

The mounting flange or disc of Alcoa® Wheels for medium and heavy-duty vehicles is thicker (19.1 to 28.6 mm) than the mounting flange of steel wheels (9 to 16 mm) and therefore requires different mounting hardware.

For correct mounting of Alcoa® Wheels use:

- Longer (replacement) studs with standard nuts, as described in Section 11.a., or
- Sleeved nuts (available from Howmet Wheel Systems) with standard length studs, as described in Section 11.b.

For reference see the latest Specification Sheet for Alcoa® Wheels with details about wheel sizes, part numbers, dimensional properties such as disc thickness, bolt hole diameters and more.

Warning



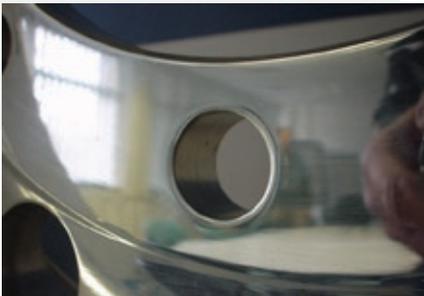
Insufficient engagement of threading between stud and nut may cause cracking or breaking of the stud.

Cracking or breaking studs may result in separation of the tyre/wheel assembly from the vehicle resulting in serious injury or death.

Follow the proper wheel installation and maintenance practices as described in this Section.

11. Mounting hardware

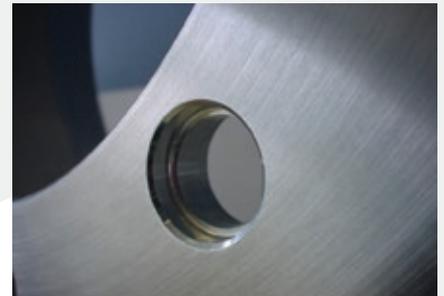
Depending on the mounting hardware or type of mounting an Alcoa® Wheel may be offered with different bolt hole diameters:



Picture 11-1



Picture 11-2



Picture 11-3

From left to right various bolt hole diameters for M22 or 7/8" bolt / stud diameters:

- Picture 11-1 26 mm bolt hole for standard nuts and longer studs. See Section 11.a.
- Picture 11-2 32 mm bolt hole for sleeved nuts and standard studs. See Section 11.b.
- Picture 11-3 Bolt hole a.k.a. 'dual hole' for Volvo OEM hardware only. See Section 11.d.

Warning



Use of chrome-plated wheel nuts, which have chrome plating on the surfaces that contact the wheel, can cause reduced and inconsistent wheel clamping.

This condition can cause wheels to loosen and disengage from the vehicle, causing serious injury or death.

Never use wheel nuts with chrome-plated contact surfaces. Use only recommended hardware on Alcoa® Wheels. See Sections 4.c. and 11.b.iii.

IMPORTANT

1-piece flange nuts are not approved for use on any Alcoa® Wheels application. See picture 11-4.



Picture 11-4

Stud standout is critical to understand for the proper application of the various nuts used for these three different bolt hole diameters. The stud standout must be checked very carefully.

The stud standout is measured from the flat mounting surface of the hub, or drum brake, which is in contact with the disc of the wheel, to the outer end of the stud.

The stud standout on steer axle / single mounting (picture 11-5) and stud standout on drive axle / dual mounting (picture 11-6) must be checked both for sufficient length.



Picture 11-5



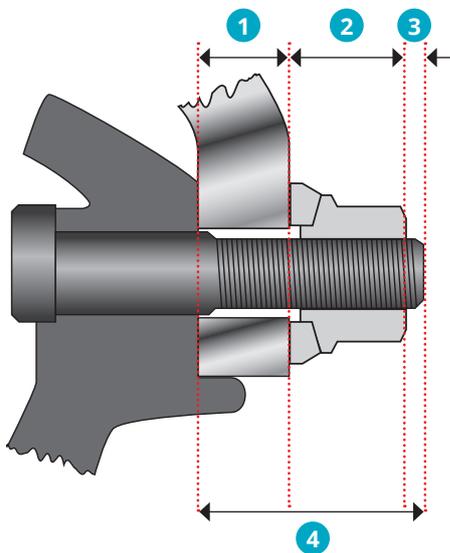
Picture 11-6

11.a. Mounting Alcoa® Wheels with standard 2-piece flange nuts and replacing wheel studs

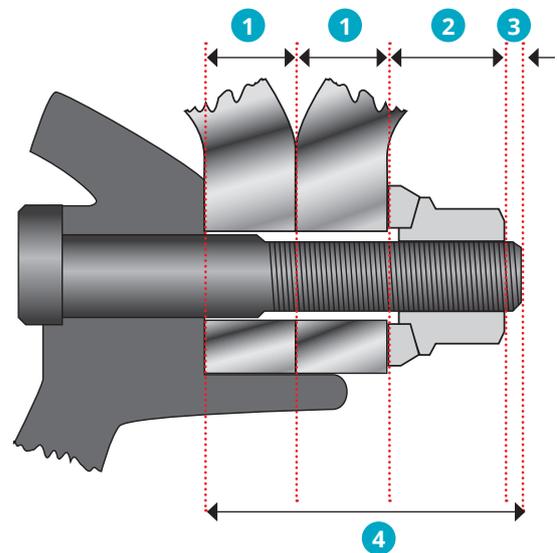
Alcoa® Wheels with this type of mounting system require longer studs than for steel wheels. The stud standout must be long enough to cover the disc thickness of single or dual mounted aluminium wheels, the height of the wheel nut and an additional two threads of the stud protruding from the top of the nut.

For single mounting the minimum stud standout required = 1x disc thickness of the Alcoa® Wheel + height of standard nut + 2 full threads, 3 mm** with M22, M20 or M18 x 1.5 studs. See graphic 11-7.

For dual mounting the minimum stud standout required = 2x disc thickness of the Alcoa® Wheel + height of standard nut + 2 full threads, 3 mm** with M22, M20 or M18 x 1.5 studs. See Graphic 11-8.



Graphic 11-7



Graphic 11-8

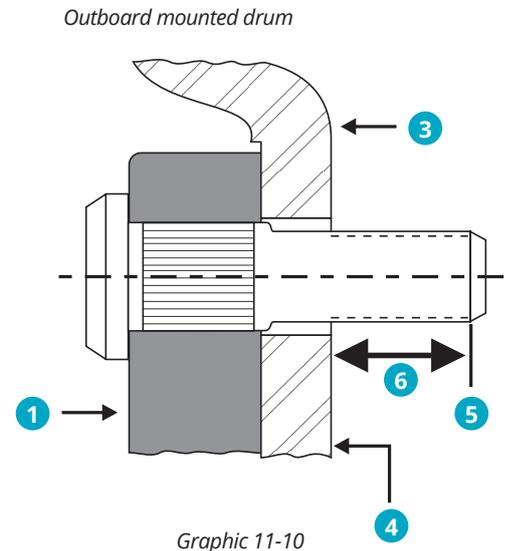
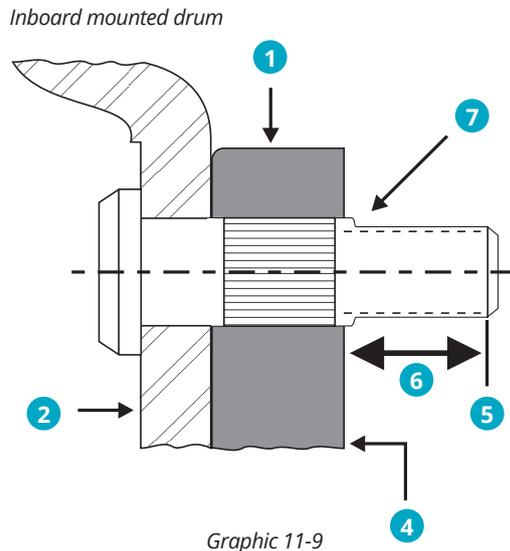
1. Disc thickness of the Alcoa® Wheel
2. Height of standard nut
3. 2 full threads
4. Total stud standout

** or 2 full threads in case of 7/8"-11 BSF studs (Scania) or 7/8"-14 UNF studs (Volvo >2004)

11.a.i. How to measure stud stand out (axles with drum brakes)

Stud stand out is measured from the axle end mounting surface:

- I.e., from the hub for disc brake operated axles and inboard mounted drums of drum brake operated axles to the first complete thread at the outside end of the stud. See graphic 11-9.
- I.e., from the drum for outboard mounted drums of drum brake operated axles to the first complete thread at the outside end of the stud. See graphic 11-10.



1. Hub
2. Inboard drum
3. Outboard drum
4. Mounting surface
5. First full thread
6. Stud stand out
7. Exposed shoulder

IMPORTANT

Check for 'bottom out' when using sleeved nuts at exposed shoulder. See graphic 11-9 (7).

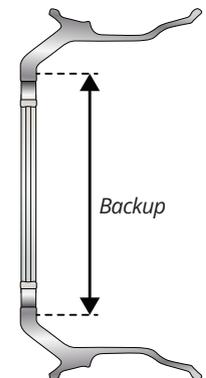
- The (sleeved) nut must be able to clamp the wheel or wheels.
- See Section 11.b.ii. for reference and information about 'bottom out' condition.

Measure the diameter of the exposed shoulder (See graphic 11-9 (7)) and compare with bolt hole diameter of wheel:

- The diameter of the exposed shoulder must measure less than the diameter of bolt hole.
- The wheel mating face must be flat and in full contact with the hub- or drum mating faces.

Check the shape and measure the diameter of the mounting face. See graphic 11-11.

- Wheels mounted on hub- or drum mating faces that are not circumferential need to be checked regularly. See section 13.h.i.
- The hub- or drum mating face must comply with the recommended diameters. See section 5.c. chart 5-3 or section 13.h.i. chart 13-44.



Graphic 11-11

11.a.ii. Confirming proper stud stand out

For safe mounting the stud stand out must meet the following conditions. If not met, then the wheel studs must be replaced with wheel studs that will meet the requirement. For use with standard 2-piece flange nuts and replacing studs the minimal stud stand out must be:

Single mounting:

- 1x disc thickness of an Alcoa® Wheel + height of nut + 3 mm for use with M22, M20 or M18 x 1.5 threads (or 2 full threads in case of other type of threading such as BSF or UNF).
- Example 1x 22.5 x 14.00 Alcoa® Wheel with 28.6 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud stand out of $28.6 + 27 + 3 = 58.6$ mm. See graphic 11-7.

Dual mounting:

- 2x disc thickness Alcoa® Wheels + height of nut + 3 mm for use with M22, M20 or M18 x 1.5 threads (or 2 full threads in case of other type of threading such as BSF or UNF).
- Example 2x 22.5 x 7.50 Alcoa® Wheels with 22.2 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud stand out of $2x 22.2 + 27 + 3 = 74.4$ mm. See graphic 11-8.

Mixed mounting:

For use with standard 2-piece flange nuts and replacing studs the minimal stud standout must be:

- 1x disc thickness wheel of Alcoa® Wheels + 1x disc thickness steel wheel + height of nut + 3 mm for use with M22, M20 or M18 x 1.5 threads (or 2 full threads in case of other type of threading such as BSF or UNF)
- Example 1x 22.5 x 9.00 Alcoa® Wheel with 20.5 mm disc thickness and 1x 22.5 x 9.00 steel wheel with 13 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud standout of $1 \times 20.5 + 1 \times 13 + 27 + 3 = 63.5$ mm
- See Section 4.h.

11.a.iii. Availability nuts

If hex nuts with greater overall height are used, more stud length is required. See picture 11-12.

Standard nuts delivered and fitted by vehicle or axle OEM can be used for mounting of Alcoa® Wheels.

Howmet Wheel Systems in Europe do not offer OEM nuts. Consult the manufacturers of vehicles or axles for availability of nuts.



Picture 11-12

11.a.iv. Availability studs

Prior to retrofitting Alcoa® Wheels (with standard nuts and longer studs) consult your truck, trailer, or axle OEM for the availability of longer replacement studs with proper standout.

11.a.v. Extra-long studs



Picture 11-13

Some vehicle manufacturers offer axles with “combined” or extra-long stud lengths, suitable for both thinner disc steel wheels and thicker disc aluminium wheels. In some cases, Alcoa® Wheels can be mounted without replacing studs or use of sleeved nuts. To determine correct and safe fitment follow the procedures as described in this Section.

Warning



Use of chrome-plated (sleeved) wheel nuts which have chrome plating on the surfaces that contact the wheel can cause reduced and inconsistent wheel clamping.

This condition can cause wheels to loosen and disengage from the vehicle, causing serious injury or death.

Never use wheel nuts with chrome-plated contact surfaces. Use only recommended hardware on Alcoa® Wheels. See Sections 4.c. and 11.b.iii.

IMPORTANT

1-piece flange nuts (Picture 11-4) are not approved for use on any Alcoa® Wheels application.

The standard wheel stud length can accommodate Alcoa® Wheels, with more disc thickness compared to steel wheels, when a special sleeved nut is used. The shank or sleeve of these nuts extends into the larger diameter mounting holes and compensates the standard stud length securing sufficient thread engagement.

Only use the Alcoa® Wheels with an appropriate mounting hole diameter to allow the sleeve of the nut to easily pass through it.

Sleeved nuts are available for:

Wheels with **32 mm** mounting hole diameter for mounting with sleeved nut:

- M22 x 1.5 (Metric, Volvo 2005 >)
- 7/8"-11 BSF (Scania)
- 7/8"-14 UNF (Volvo > 2004)

Wheels with **30 mm** mounting hole diameter for mounting with sleeved nut:

- M20 x 1.5 (Metric)

Wheels with **26 mm** mounting hole diameter for mounting with sleeved nut:

- M18 x 1.5 (Metric)

For reference consult the Specification Sheet for Alcoa® Wheels for mounting hole diameters. If in doubt consult Howmet Wheel Systems.



Note:

Wheels with 26 mm mounting hole diameter, either use longer studs with standard nuts (M22 x 1.5, 7/8"-11 BSF or 7/8"-14 UNF) or use standard studs with sleeved nuts (M18 x 1.5). Check the specification of the studs on the vehicle.

To ensure correct mounting with sleeved nuts, there must be enough thread engagement with the stud:

The recommended length of engagement between the threads of the stud and the sleeved nut is equivalent to 95% or more of the diameter of the stud.

The minimum recommended number of threads engaged between the stud and sleeved nut is:

- 14 full turns for M22 x 1.5 (Metric, Volvo 2005 >)
- 13 full turns for M20 x 1.5 (Metric)
- 12 full turns for M18 x 1.5 (Metric)
- 10 full turns for 7/8"-11 BSF (Scania)
- 12 full turns for 7/8"-14 UNF (Volvo > 2004)



Picture 11-14



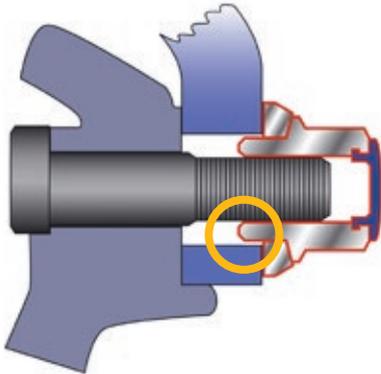
Picture 11-15

11.b.i. How to check sufficient thread engagement

Engage a single wheel or dualled wheels to the hub with at least two nuts securing the wheels. Tighten one nut by hand and count the number of full turns till the nut sits snugly.

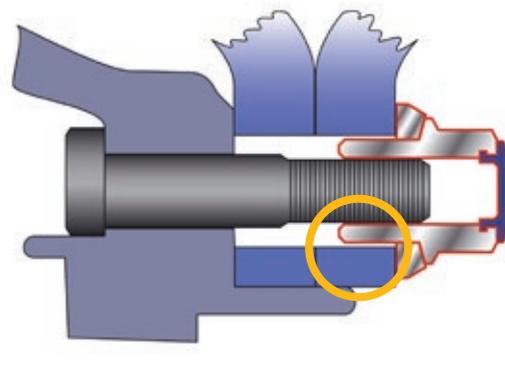
Do not centre hub piloted type wheels with sleeved nuts.

The sleeves of the nut do NOT centre the wheel(s); this mounting system still requires a hub piloting or hub centring axle. This applies to both single and dual mounted wheels. The pilot tab length for sufficient centring must be 5 mm or more for single mounting or 1x disc thickness (of the inner wheel) + 5 mm or more (for the outer wheel) for dual mounting, excluding bevelled edges of the pilot tabs.



Graphic 11-16

Single mounted wheels require sleeved nuts with a short sleeve



Graphic 11-17

Dual mounted wheels require sleeved nuts with a long sleeve

Short- and long-sleeved nuts are available from Howmet Wheel Systems in thread sizes for most European medium- and heavy-duty commercial vehicles. The torque to obtain the correct clamping force is recommended by vehicle, trailer, or axle manufacturers.

11.b.ii. Wheel studs with unthreaded part / 'bottom out' condition

Studs that have an unthreaded part or exposed shoulder can cause insufficient or no clamping of the wheel(s) at all. Sleeved nuts may 'bottom out' on the stud's unthreaded part or exposed shoulder even before the wheels are clamped correctly.

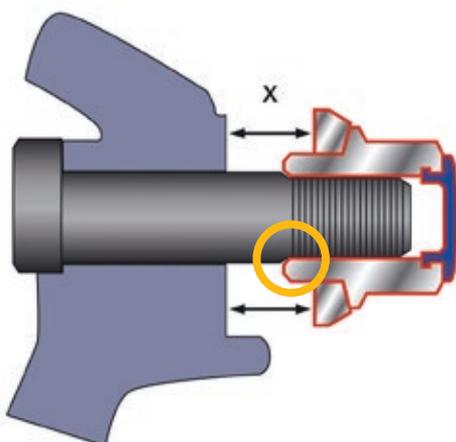
Before mounting Alcoa® Wheels on hubs with studs with unthreaded part or exposed shoulder, the space between the washer and the hubs mounting face must be determined.

This space (x) must be at least 2 mm less than the disc thickness(es) of the wheel(s) to be accommodated. Determine this space when the nut is 'bottomed out' at the stud without a wheel mounted.

Mixed mounting:

When mounting a steel wheel at the inside position and an Alcoa® Wheel with sleeved nuts on the outer position it is important to:

- Determine the amount of threading engaged as set forth in Section 11.b.
- Check if no 'bottom out' condition occurs when using long sleeve nuts as described in Section 4.g.



Graphic 11-18

Warning



The use of a wrong selection of wheels and hardware may result in improper fitment of wheels.

Improper mounting of wheels may lead to separation of wheels or loss of assemblies from the vehicle causing serious injuries or death.

Follow the proper wheel installation and maintenance practices as described in this Section.

11.b.iii. Wheel studs inspection

In service, stud dimensions and condition may change over time due to environmental conditions, multiple re-installations, improper torquing, and other factors.

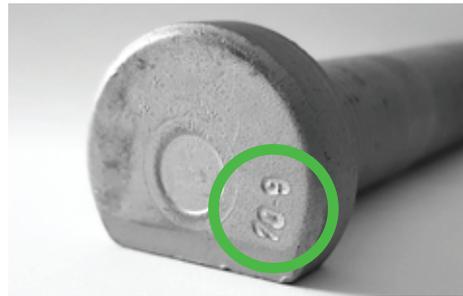
Consult your vehicle, hub or stud manufacturer for regular maintenance recommendations and stud replacement practices.

Check for and replace bent, broken, cracked or damaged studs. When replacing broken studs, always replace the studs on each side of the broken stud. If two or more studs are broken, replace all the studs for that wheel position.

All wheel fastener hardware should be grade 8 or metric conversion 10.9. Follow the hardware manufacturers' recommendations when replacing studs.



Picture 11-19



Picture 11-20

11.c. 2-piece hex head sleeved nuts for Alcoa® Wheels

Warning



Use of chrome-plated nuts which have chrome plating on the surfaces which contact the wheel, can cause reduced and inconsistent wheel clamping.

This condition can cause wheels to loosen and disengage from the vehicle, causing serious injury or death.

Never use nuts with chrome-plated contact surfaces. Use only recommended hardware on Alcoa® Wheels.

Design and specifications of nuts, washers and studs used for Alcoa® Wheels must comply with DIN standard 74361-3. Alcoa® Wheels in Europe are commonly used with 2-piece hex head nuts that have following threading:

- M22 x 1.5
- M20 x 1.5
- M18 x 1.5
- 7/8" - 11 BSF
- 7/8" - 14 UNF

NOTICE

- 1-piece nuts are not approved for use on any Alcoa® Wheels application for medium - and heavy-duty vehicles.
- Only 2-piece nuts or 2-piece sleeved nuts with an integral freely turning washer, designed for hub centring mounting systems, must be used for fastening European type Alcoa® Wheels for medium- and heavy-duty vehicles.
- Regular 2-piece nuts that come with truck, bus or trailer axles with steel wheels can also be used with Alcoa® Wheels with corresponding bolt hole diameters given the thread engagement is sufficient. See Section 11.a.
- The following 2-piece hex head sleeved nut types are available from Howmet Wheel Systems:
 - M22 x 1.5 (Metric, Volvo 2005 >)
 - M20 x 1.5
 - M18 x 1.5
 - 7/8"-11 BSF (Scania)
 - 7/8"-14 UNF (Volvo > 2004)
- Some vehicles come equipped with right-hand and left-hand threads. These vehicles have on the right-side right-hand threads and on the left-side left-hand threads. If an "R" or "L" is stamped on the studs and nuts, it indicates right and left-hand threads respectively.

Alcoa® Wheels 2-piece sleeved nuts:

Sleeved nut P/N**	Replaces**1	Thread size	For	Sleeve	Application
GAX687632G	GAX578032	M22 x 1.5	Metric & Volvo 2005 >	Short	Single
N/A	GAX57803201*2	M22 x 1.5	Metric, LH thread	Short	Single
GAX687732G	GAX578132	M22 x 1.5	Metric & Volvo 2005 >	Long	Dual
N/A	GAX57813201*2	M22 x 1.5	Metric, LH thread	Long	Dual
GAX614230G	GAX614230	M20 x 1.5	Metric	Short	Single
GAX614330G	GAX614330	M20 x 1.5	Metric	Long	Dual
GAX542026G	GAX542026	M18 x 1.5	Metric	Short	Single
GAX542126G	GAX542126*3	M18 x 1.5	Metric	Long	Dual
GAX688032G	GAX578432	7/8"-11 BSF	Scania	Short	Single
GAX688132G	GAX578532	7/8"-11 BSF	Scania	Long	Dual
GAX687832G	GAX578232*3	7/8"-14 UNF	Volvo > 2004	Short	Single
GAX687932G	GAX578332	7/8"-14 UNF	Volvo > 2004	Long	Dual

Table 11-21

*1 At the moment of editing this manual the current portfolio and stock were subject to change. Consult Howmet Wheel Systems or authorized distributors of Alcoa® Wheels for updates and specifications

*2 Available, as long as stocks last. The extension 01 on sleeved nut part numbers indicate left-hand thread versions.

*3 Available, as long as stocks last.

NOTICE

Though sleeved nuts are designed to compensate standard stud length sufficiently, a minimal stud standout i.e. thread engagement is required. See Section 11.b.

In case of mixed application, dualling steel wheels and Alcoa® Wheels, short sleeve nuts can be used. See Sections 4.g., 11.b.ii. and 12.c.

11.d. Mounting hardware for Alcoa® Wheels specifically made for Volvo

Stud thread specification:

- During the 4Q of 2004 and 1Q of 2005 Volvo trucks and busses changed stud thread specification from 7/8"-14 UNF to M22 x 1.5.
- When retrofitting wheels of Volvo vehicles, check the correct stud thread specification.
- Sleeved nuts for retrofitting wheels of Volvo vehicles are available from Howmet Wheel Systems.

Mounting holes and sleeved nuts:

1. Volvo vehicles may also be equipped with Alcoa® Wheels ex-works that have a different mounting system and consequently different hardware. See picture 11-22.
2. Alcoa® Wheels specifically made for Volvo have the Volvo logo/ name in the roll stamp of the wheel and have different Alcoa® Wheels part numbers.
3. Alcoa® Wheels specifically made for Volvo have different mounting holes a.k.a. 'dual hole' i.e., each mounting hole comes with two different diameters. See picture 11-23.
4. Alcoa® Wheels specifically made for Volvo are installed with longer studs and Volvo OEM sleeved nuts which differ from the sleeved nuts available from Howmet Wheel Systems.
5. Alcoa® Wheels specifically made for Volvo and Volvo hardware, i.e., studs and nuts, are available from the Volvo organization only.



Picture 11-22

Picture 11-22, from left to right:

- Volvo OEM sleeved nut for single and dual mounting: only suitable for Volvo 'dual hole' wheels
- Sleeved nut from Howmet Wheel Systems for single mounting
- Sleeved nut from Howmet Wheel Systems for dual mounting

Warning



DO NOT MIX Alcoa® Wheels specifically made for Volvo and Volvo OEM sleeved nuts with Alcoa® Wheels and sleeved nuts for Alcoa® Wheels.

Mixing Alcoa® Wheels specifically made for Volvo / Volvo OEM nuts and Alcoa® Wheels / sleeved nuts can result in incorrect installation and separation of wheels from the vehicle during operation, causing serious injury or death.

Follow the proper wheel installation and maintenance practices as described in this Section.

For more information consult the Volvo organization or contact Howmet Wheel Systems.



Picture 11-23

12. Wheel nuts

12.a. Tightening nuts

Studs with 2-piece flange nuts M22 x 1.5, M20 x 1.5, M18 x 1.5, 7/8" - 11 BSF or 7/8" - 14 UNF may be subject to different torque requirements.

Inquire at the manufacturer of the vehicle or axle for proper torque values or refer to the owner's manual of the vehicle.

IMPORTANT

Check all parts, including wheels, studs, and nuts. Check for paint, dirt, corrosion, or damage. Check mounting faces of wheels, hubs, and drums.

Friction caused by paint, dirt, corrosion, or damage on nuts and/or studs can absorb a substantial part of the torque applied on the nut and cause a reduced clamping force.

Remove paint, dirt, and rust; replace damaged parts. Follow correct tightening sequences and torque levels.

See Section 10.a.

Lubrication of nuts and studs:

Warning



Lubricants should not be applied to the nut's washer i.e. nut-to-wheel contact surface. Application of excessive lubricant to the threads of the stud and/or nut can cause excessive torque beyond the yield point of the stud.

Over-torque can stretch studs causing them to fail. Failed studs can cause the wheel to disengage from the vehicle, causing serious injury or death.

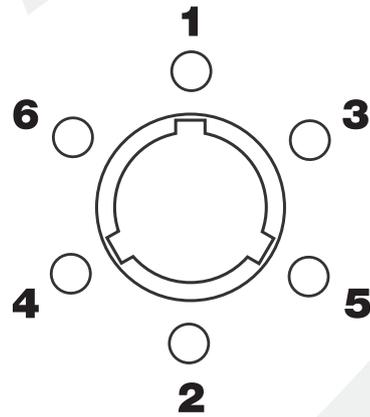
Follow the proper wheel installation and maintenance practices as described in this Section.

IMPORTANT

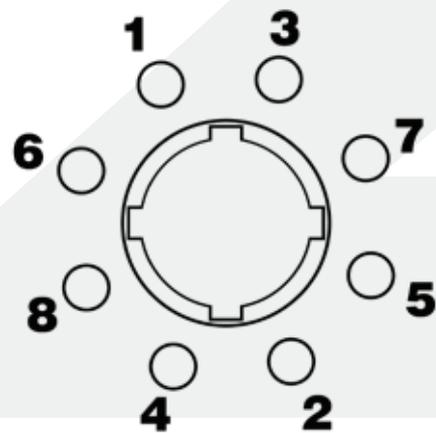
Lubricants must be completely removed from the nut's washer i.e. nut-to-wheel contact surface if applied accidentally.

Do not allow oil to contact mounting surfaces of the wheel, hub, drum, or brakes. Do not use aerosol cans for lubrication of stud threads. See Section 10.a. See graphics 10-9 and 10-10.

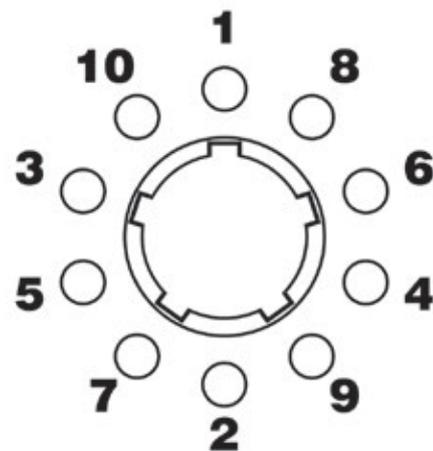
Position one of the hub's pilot tabs at the twelve o'clock position. After positioning wheels on the pilot tabs, hand tighten all 2-piece flange nuts, then tighten to the recommended torque, following the proper sequence shown for your wheel type. See graphics 12-1, 12-2 and 12-3.



Graphic 12-1 - Six Stud



Graphic 12-2 - Eight Stud



Graphic 12-3 - Ten Stud



Picture 12-4
Torque wrench

After 8 - 80 kilometres or 5 - 50 miles of operation, torque should be rechecked unless vehicle/axle manufacturer or your documented fleet practices determine otherwise. Check torque frequently from then on.

Nuts must be kept tight, and studs and nuts should be checked frequently.

Impact wrenches, if used, should be carefully adjusted to apply torques within or below the limits recommended.

Tighten to the recommended torque with a calibrated torque wrench. See picture 12-4.

Torquing of nuts should be done in recommended sequences. After each wheel mounting, nut torque should be checked with a torque wrench. Nuts should be retorqued if necessary.

At tyre changes, nuts and studs should be inspected to be sure they are in good condition. If cracks, stripped or damaged threads are found, remove these nuts from service. Check wheel studs accordingly.

NOTICE

If nuts require frequent tightening, studs break frequently (picture 12-5), wheel nut washers break (picture 12-6) or bolt holes are pounding out, hardware and mounting practices should be reviewed.



Picture 12-5

Under and over torque

Warning



Under torqued nuts allow wheels to run loose, pounding out (deforming) the bolt holes, fatiguing studs or losing nuts, as well as cause cracks in the bolt hole area. Over torquing can stretch studs (See Picture 11-19) causing them to fail with loss of clamping force.

Both under and over torquing can lead to wheel disengagement causing serious injury or death.

Follow the proper wheel installation and maintenance practices as described in this Section.



Picture 12-6

12.b. Keep wheel nuts tight

Nuts must be kept tight. Studs and nuts should be checked frequently. At tyre changes nuts and studs should be inspected to be sure they are in good condition. **If nuts require frequent tightening or studs break frequently, hardware and mounting practices should be reviewed.** Dirt streaks from nuts and / or vent holes may indicate looseness. See picture 12-7.

For proper installation of 2-piece flange nuts, two drops of motor oil should be applied between the nut and integrated washer and two drops to the first two threads at the tip of each stud. See Section 10.a.

IMPORTANT

For proper nut torque, always refer to vehicle or axle manufacturers' recommendations, prior to using chart 12-8.

Hub piloted wheels using 2-piece flange nuts

(nuts with integrated washer):

For	Thread Size	Torque Level Nm
Metric	M18 x 1.5	340 – 400
Metric	M20 x 1.5	380 – 450
Metric * ¹	M22 x 1.5	610 – 675
Scania	7/8" – 11 BSF	540 – 660
Volvo * ²	7/8" – 14 UNF	640 – 700

Chart 12-8

*¹ Including Volvo from 2005

*² Volvo up to 2004

For more details see Section 11.d. "Mounting hardware for Alcoa® Wheels specifically made for Volvo".

NOTICE

1. Tightening wheel nuts to their specified torque is extremely important. Under tightening can result in loose wheels, can damage wheels, studs, and hubs, and may result in wheel loss. Over tightening can damage studs, nuts and wheels and may result in loose wheels also.
2. All torque wrenches, air impact wrenches and any other tools should be calibrated periodically to ensure the proper torque is applied.
3. Refer to vehicle or axle OEM for torque range for any hardware that is noted above.



Picture 12-7

12.c. Dualling with steel wheels

When dualling steel wheels with Alcoa® Wheels, follow the steel wheel manufacturers' recommendations regarding the proper torque and use of thread lubricants to mount the wheel. See Section 4.g.

IMPORTANT

On occasion Alcoa® Wheels are dualled with a steel inner wheel. When this application occurs, it is recommended that Discmates for Alcoa® Wheels or nylon protection gasket is used, to prevent galvanic corrosion.

In the event a steel inner wheel is used, extreme care must be taken to properly seat it to the hub or drum before mounting the outer aluminium wheel.

Selection of the correct hardware is required as providing adequate thread length to secure the outer aluminium dual wheel is critical to a safe assembly.

Howmet Wheel Systems recommends the use of sleeved nuts for Alcoa® Wheels for this purpose:

- Short sleeve nuts can be used
- When using sleeved nuts, the minimal thread engagement required is indicated in Section 11.b.

Warning



Using long sleeve nuts for mixed duals may cause a 'bottom out' condition, see Section 11.b.ii.

A 'bottom out' condition may lead to loss of wheels causing serious injury or death.

Follow the proper wheel installation and maintenance practices as described in Section 4.g.

Warning



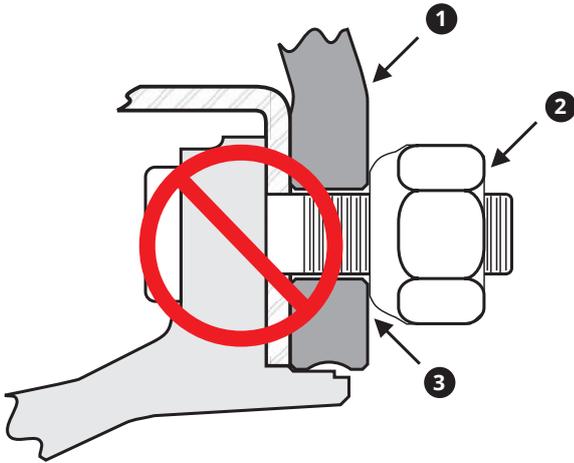
When mounting painted steel inner wheels with outer aluminium wheels, be cautious of excessive paint build-up on the inner steel wheel.

Excessive paint (> 90 µm / 3.5 mil) can reduce the clamping force and allow the wheels to become loose. Wheels separating from the vehicle can lead to serious injury or death.

Follow the proper wheel installation and maintenance practices as described in Section 10, 11 and 12.

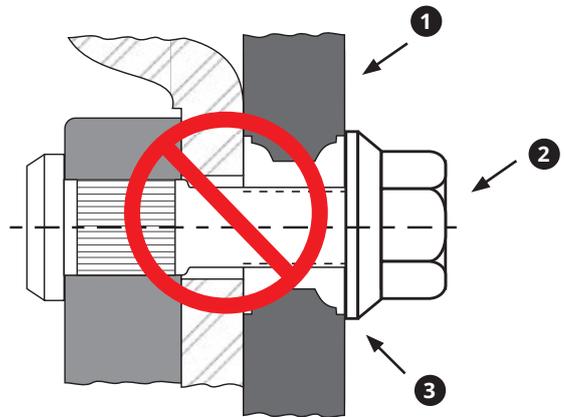
12.d. Incorrect assemblies

The following are examples of incorrect wheel assemblies.



Graphic 12-9

1. Hub piloted aluminium wheel
2. Ball seat or spherical nut
3. Insufficient contact area



Graphic 12-10

1. Stud located, ball seat aluminium wheel
2. 2-piece flange nut
3. Little (if any) contact area

- Do not use ball seat / spherical or conical seat nuts with hub piloted wheels.
- Do not use standard 2-piece flange nuts with stud located ball seat / spherical or conical seat wheels.
- Do not use sleeved nuts using too small or too large bolt holes.
- Do not use standard 2-piece flange nuts on wheels designed for use with sleeved nuts.
- Do not use Volvo OEM sleeved nuts on any other type of wheel.
- Do not use standard 2-piece flange nuts on Alcoa® Wheels specifically made for Volvo. See Section 11.d.

Warning



Using the wrong wheel nuts can cause loss of clamping force, broken studs or cracked wheels.

Loss of clamping force, broken studs or cracked wheels can lead to wheels separating from the vehicle causing serious injury or death.

Use only hardware designed specifically for each wheel type. See Section 11 for proper hardware assemblies.

13. Wheels in service

13.a. Inspect thoroughly and frequently

Safe operation requires thorough examination of wheels and attaching hardware, at frequent intervals, both on and off the vehicle.

Wheels that are in service need to be inspected at regular intervals to assure proper and safe performance.

It is not always possible to predict the useful life of a wheel. Wheels will eventually wear out. But generally, older wheels and wheels operating in extreme conditions should be examined more frequently for obvious signs that they should be removed from service.

Examine all exposed areas frequently. Clean wheels, inspect valves and look for cracks, corrosion, wear, or other damage. Also check the inner dualled wheel when the outer wheel is removed.

During tyre changes, thoroughly examine the entire wheel. Pay particular attention to the rim contour, the surfaces of the rim, the mounting flanges, and mounting holes.

Warning



Failure to inspect wheels and hardware thoroughly and frequently may cause wheels to fail unexpectedly.

Unobserved wear, corrosion or cracks may result in a wheel - or hardware failure or wheel loss causing serious injury or death.

Inspect wheels and hardware periodically for a safe operation of the vehicle.

13.b. Hidden damage

Do not exceed maximum wheel load. Customer must compare OEM vehicle axle load ratings to maximum wheel load rating and inflation pressure which is roll stamped onto the wheel. See Section 4.d.

Do not over-inflate. Use the tyre - and wheel manufacturers' recommended pressure, but under no circumstances exceed cold inflation pressure listed by the tyre - and wheel manufacturer which is on the tyre and wheel. Before mounting the tyre, perform a wheel fitment check to ensure proper clearance from any obstructions. See 'Wheel fitment check' Section 5.d.

Some forms of wheel damage can be hidden beneath the tyre, so whenever a tyre is removed, thoroughly examine the complete wheel. Remove all grease and road dirt. Use a wire brush or steel wool to remove rubber from the bead seats.

Check mounting holes for cracks, fretting, enlargement, and elongation which can occur if the nuts are not kept at proper torque. Dirt streaks radiating from bolt holes and / or vent holes may indicate loose nuts. See Section 12.b.



Picture 13-1

Warning



Damaged tyres or wheels can lead to an explosive separation of tyres and wheels. An explosive separation can result in serious injury or death.

Inspect tyres and wheels for damage before removing from vehicle.

If damage is found, tyres must be completely deflated before loosening wheel nuts. Remove damaged tyres or wheels from service.

13.c. Wheel alteration

Howmet Wheel Systems does not approve any form of alteration to wheels except minor cosmetic buffing for appearance purposes. Sanding and/or grinding is permitted to maintain the rim flanges of the wheel. See Section 13.g.

NOTICE

Buffing, polishing, sanding, grinding or other kind of abrasive handling of Dura-Bright® surface treated wheels will remove the Dura-Bright® surface treatment. For more information see Section 14.b.

Wheels must not be altered by welding, brazing or other heat application, e.g. powder coating in an attempt to repair or straighten a wheel.

Use of adapter plates or bead-locks are not approved on Alcoa® Wheels.

Wheels should not be painted, powder coated or otherwise coated in any way that may interfere with the mounting surfaces.

Any wheel that shows signs of modification, alteration or adaptation should be removed from service and scrapped.

The wheel identification must be legible. Wheels should be taken out of service if such identification is not legible or does not meet regulatory requirements. See Section 4.d. Identification of Alcoa® Wheels.

Warning



Welding, brazing or otherwise heating any area of an Alcoa® Wheel will weaken the wheel. Weakened or damaged wheels can lead to an explosive separation of tyres and wheels or wheel failure on the vehicle.

Explosive separations of tyres and wheels or wheel failure on the vehicle can cause serious injuries or death.

Never attempt to weld, braze, or heat any surface of Alcoa® Wheels.

See Section 13.d. Heat Damage.

13.d. Heat damage

Warning



Excessive heat from fire, brake malfunction, wheel bearing failure, tyre failure or other sources of heat may weaken the metal and cause the tyre/wheel assembly to separate explosively.

An exploding tyre/wheel assembly can cause serious injury or death.

Immediately and permanently remove from service any wheel that has been exposed to excessive heat.

Wheels must be inspected if they have been exposed to excessive heat before being returned to service. A wheel that has been exposed to excessive heat may appear charred or burned.

A wheel that has been exposed to excessive heat may appear to be in good condition if it has been cleaned.

Do not use any wheel that has been overheated regardless of appearance. Even if a wheel does not appear to be obviously burned, inspect labels, tyre beads, brake components and the Discmate for Alcoa® Wheels or nylon protection gasket and the Discmate for Alcoa® Wheels or nylon protection gasket for evidence of charring, melting, blistering, or burning.

Any wheel run with a flat tyre longer than the time necessary to immediately pull off the road, should be checked for excessive heat damage.

A wheel may discolour from excessive heat. It can show a dull greyish colour and will not polish to a bright finish as a typical wheel would.

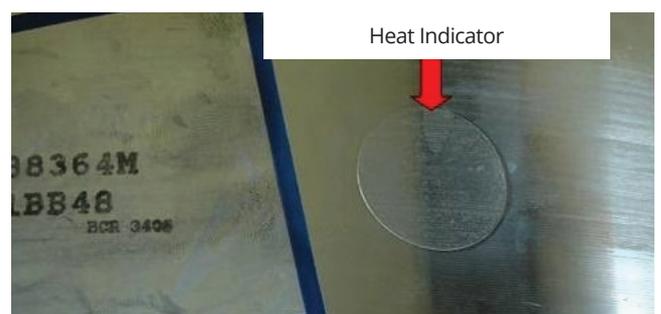
Starting in January 2009 the new Alcoa® Wheels logo sticker on the wheel may not show heat damage. Inspect all axle end components for signs of exposure to excessive heat.

Check the brake lining of drum brakes or brake pads of disc brakes, Discmates for Alcoa® Wheels or nylon protection gaskets and tyre beads for heat damage. If one of these components show signs of overheating, the entire assembly, including the wheel, should be replaced, and removed from service permanently.

Alcoa® Wheels manufactured from January 2009 and onwards have a 2.5 cm or 1 inch round clear heat indicator sticker located at the wheel flange next to the roll stamp along with a same sticker located on the tyre side drop well close to the valve hole as shown in pictures 13-2 to 13-5.



Picture 13-2 Heat Indicator at wheel flange



Picture 13-3 Heat indicator at wheel drop well



Picture 13-4 Heat indicator version 2 at wheel flange



Picture 13-5 Heat indicator version 2 at wheel drop well, close to serial number and valve hole

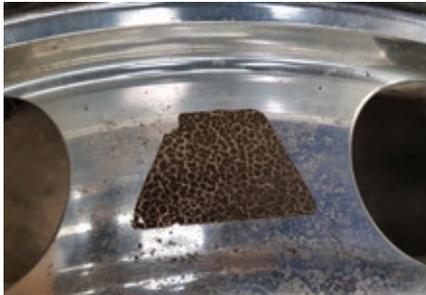
Wheels without heat indicator (prior to 2009):

A blistered, blackened or cracked looking logo decal on Alcoa® Wheels may indicate that the wheel has been exposed to excessive heat. Discolouration of the wheel and/or a charred Discmate for Alcoa® Wheels or other nylon protection gasket also may indicate that the wheel has been exposed to excessive heat. See pictures below.

Picture 13-6 Charred logo decal

Picture 13-7 Discolouration of rim with charred rubber

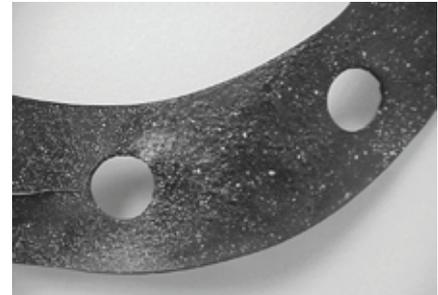
Picture 13-8 Charred Discmate for Alcoa® Wheels or other nylon protection gasket



Picture 13-6



Picture 13-7



Picture 13-8

Wheels with heat indicator (from 2009):

If either of these heat indicators show signs of blistering, charred, discoloured, or a cracked look, this may indicate that the wheel has been exposed to excessive heat.

Picture 13-9 Charred, discoloured heat indicator next to roll stamp

Picture 13-10 Charred, discoloured heat indicator next to roll stamp (close up)

Picture 13-11 Charred, discoloured heat indicator in drop well inside the wheel

NOTE

Wheels with ANY discoloration of the heat indicator should have dimensional checks performed before returning the wheel to service. See Section 13.e.



Picture 13-9



Picture 13-10



Picture 13-11

IMPORTANT

If any of the conditions as described and pictured on this page are observed, remove the wheel from service immediately and perform dimensional checks per Section 13.e.

This includes any heat damage to the tyre, discolouration to the wheel and/or brake parts, as well as any burnt or charred labels.

Do not attempt to mount and inflate a tyre on a wheel that shows conditions as described and pictured in this Section, until dimensional checks are performed per Section 13.e.

13.e. Dimension checks

Warning



Wheels that have run flat, been subjected to high pressure tyre and rim separation, excessive heat damage or have other physical damage, may no longer have the correct dimensions and contours to retain the tyre beads while under pressure.

Rims that lack proper dimension and contour can lead to explosive separation of the tyre and rim, causing serious injury or death.

Any wheel that has been in service must be inspected prior to mounting a tyre. Immediately and permanently remove from service any wheel that has been exposed to high pressure, tyre and rim separation or excessive heat.

IMPORTANT

Follow dimension check procedures described in this Section during each wheel inspection.

13.e.i. Dimension checks

Best inspection method: with a wheel rim ball tape



Picture 13-12

Picture 13-12 shows an example of a wheel rim ball tape.

Measure the circumference of the bead seat on the open side with a ball tape. See picture 13-13.

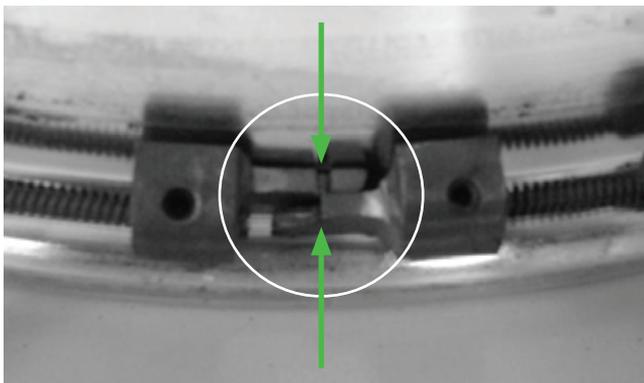
The circumference of the bead seat on the open side of the wheel should be checked at each tyre change. The open side is the side opposite the disc face.

In the case of centre flange wide base wheels, or wheels with offsets (or insets) less than 76 mm or 3 inches, both bead seats should be checked.

All wheels should be inspected prior to mounting.

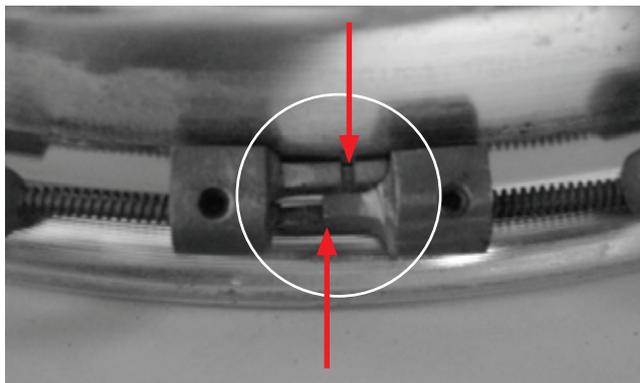


Picture 13-13



Picture 13-14
Correct dimension

If the circumference of the bead seat does not match the required dimension as indicated by the wheel rim ball tape, immediately and permanently remove the wheel from service and scrap.



Picture 13-15
Reject wheel from service

Wheel rim ball tapes or disk tapes used for measuring wheel circumference can be purchased from:

The Tire and Rim Association
4000 Embassy Parkway, Suite 390
Akron, OH 44333
T +1 330 666 8121
E tra@us-tra.org

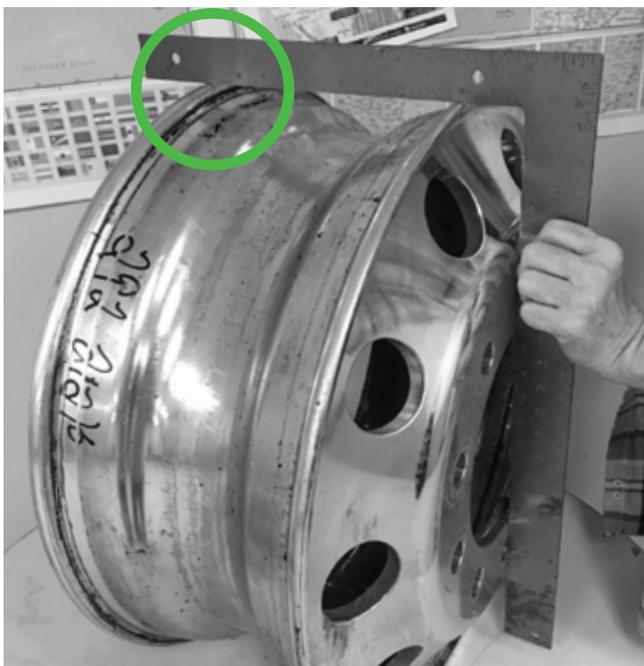


13.e.ii. Dimension checks

2nd best inspection method: if a ball tape is unavailable, use a carpenter square

ACCEPTABLE

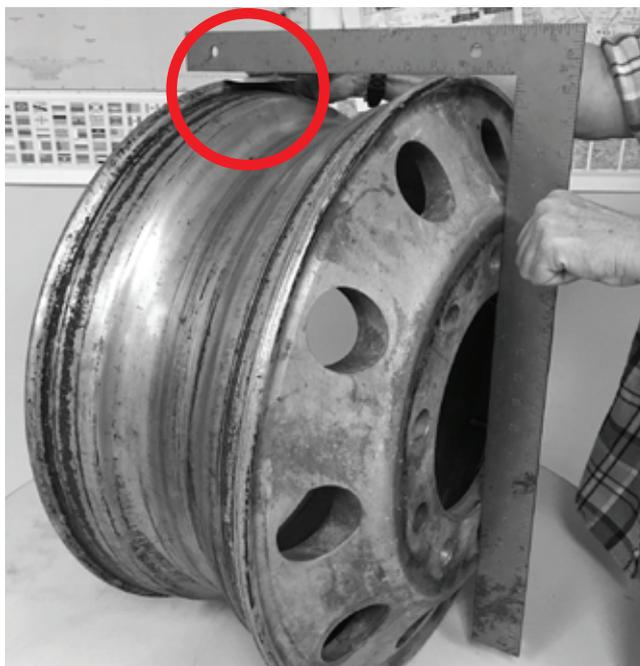
Picture 13-16 shows carpenter square even on both rim flanges.



Picture 13-16

UNACCEPTABLE

Picture 13-17 shows an undersized wheel diameter where a credit card (approx. 0,76 mm or 0.030 inches) can be placed easily between the square and the wheel flange.



Picture 13-17

THIS INSPECTION METHOD ONLY APPLIES TO DUAL OR DISC FACED WHEELS.

Check all wheels at each tyre change for proper contour of the open side of the rim.

1. Place the long leg of a carpenter square across and against the centre of the disc side of the wheel.
2. Extend the short leg across both rim flanges of the wheel as shown in pictures 13-16 and 13-17.
3. Repeat this process at four equidistant points around the wheel. The short leg should touch both rim flanges at each point.

If a distance greater than the thickness of a credit card (0,76 mm or 0.030 in. feeler gauge) appears between the short leg and the rim flange, the wheel should be permanently removed from service and scrapped.



Picture 13-18

Wheel that can be mounted in dual position



Picture 13-19

Wheel that can be mounted single only

13.e.iii. Dimension checks

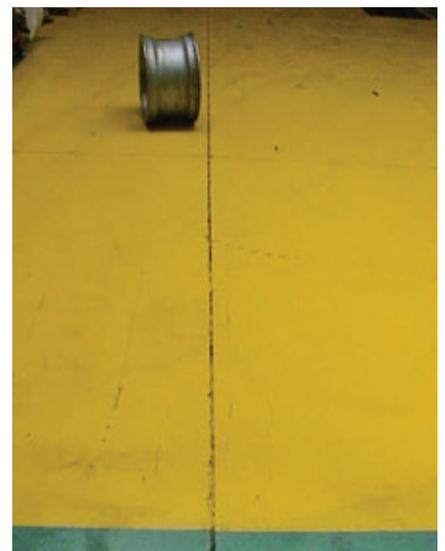
3rd best inspection method: rolling wheel as described below



Picture 13-20



Picture 13-21



Picture 13-22

If a ball tape or carpenter square is unavailable, roll the wheel, without a tyre, a minimum of 3 metres or 10 feet over a smooth, flat, level, clean surface, such as asphalt or concrete pavement. Any deviation from rolling in a straight line is an indication of a potential lack of proper dimension and contour. See pictures 13-20, 13-21 and 13-22. Remove the wheel from service until it can be properly checked with a wheel rim ball tape.

If you do not fully understand any of these inspection methods as described in this Section contact Howmet Wheel Systems.

13.f. Tyre wear or vibrations

If you experience irregular tyre wear or vibrations it may be helpful to check radial run out. Remove the wheel from the vehicle, deflate, and remove the tyre. See Section 8 for deflating and demounting tubeless tyres and Section 7.c. for inflation and bead seating check.

Remount the wheel on the vehicle without the tyre. Be sure to follow proper mounting procedures to assure the wheel is well centred on the hub. Place a dial indicator as illustrated in picture 13-23 to trace the bead seats of the wheel. Rotate the wheel noting the amount of variation shown on the dial indicator. Alcoa® Wheels should be tested for radial run out only at the bead seat surface. A total reading of 0.75 mm or 0.03 inch or less is acceptable.

Irregular tyre wear can also be caused by improperly seated tyres. Inspect the tyre for proper seating on the wheel. The tyre beads may not be seated properly. If so, remove the wheel from the vehicle, deflate the tyre and break the bead seats. See Section 8 Deflating and demounting tubeless tyres.

Adequately lubricate the bead seats and properly reseal the tyre beads. See Section 8.b.iii. Lubricants and Section 7.c. Inflation and bead seating check.

Re-inflate the tyre wheel assembly in a safety restraint or tyre cage. See Section 7.c. Inflation and bead seating check.

NOTICE

Run-out tolerance or total indicator reading may be 0.75 mm or 0.03 inch for a new wheel.

If the wheel has been in use it may already have been exposed to impacts. Some deformation may occur.



Picture 13-23

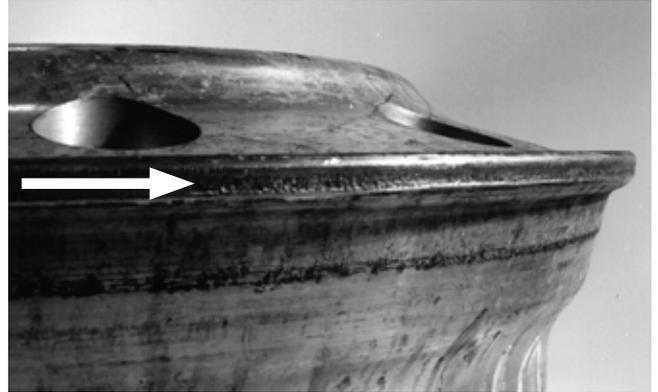
13.g. Rim flange wear

Rim flange wear is not a warrantable condition. Only Dura-Flange® wheels have a 24-month warranty period against wear which creates a sharp edge that would require maintenance.

Irregular wear on the surface of the rim flange is caused by abrasion from the tyre. Rim flange wear happens most often in applications with heavy or shifting loads.

If excessive rim flange wear is observed, consider using Dura-Flange® Alcoa® Wheels. These wheels have been specially treated to significantly reduce rim flange wear.

For information consult QR code



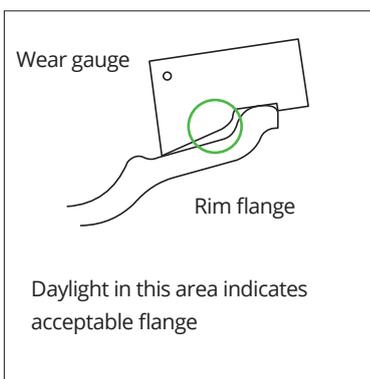
Picture 13-24

Remove wheels from service when rim flange wear is excessive. Excessive wear can be determined using a Howmet Wheel Systems approved wear gauge and procedures detailed under Section 13.g.ii.

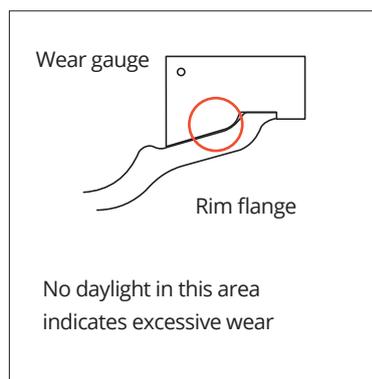
If rim flange wear creates sharp edges and/or cuts the tyre, see 'Rim flange maintenance / edge removal procedures' detailed under Section 13.g.iii.

13.g.i. Alcoa® Wheels rim flange wear gauge instructions

These gauges are to be used for Alcoa® Wheels and rim flange wear only. They are not a bead seat angle or diameter tool. For steel wheels and other aluminium wheels other regulations may apply.



Graphic 13-25
Rim acceptable



Graphic 13-26
Rim **NOT** acceptable

Alcoa® Wheels rim flange wear gauges are available from authorized distributors of Alcoa® Wheels.



13.g.ii. Determining rim flange wear

STEP 1

Remove the tyre/wheel assembly from the vehicle and remove the tyre from the wheel according to Section 8, Deflating and demounting tubeless tyres from Alcoa® Wheels.

STEP 2

After the tyre is removed from the wheel, verify if the circumference of the bead seat on the open side is acceptable. See Section 13.e. Dimension checks.

Check the rim flange with the Rim Flange Wear Gauge for Alcoa® Wheels to determine if the wheel must be removed from service for excessive rim flange wear. See pictures 13-27 and 13-28.

See Alcoa® Wheels rim flange wear gauge instructions, Section 13.g.i. and preceding graphics to make this determination.

Rim Flange Wear Gauges are available from authorized distributors of Alcoa® Wheels

STEP 3

If the rim flange wear gauge shows the wheel is serviceable, examine the wheel flange edge for sharpness by using a rubber sharpness gauge. These gauges are made by attaching a section of tyre side wall or a suitable piece of rubber to a block of wood.



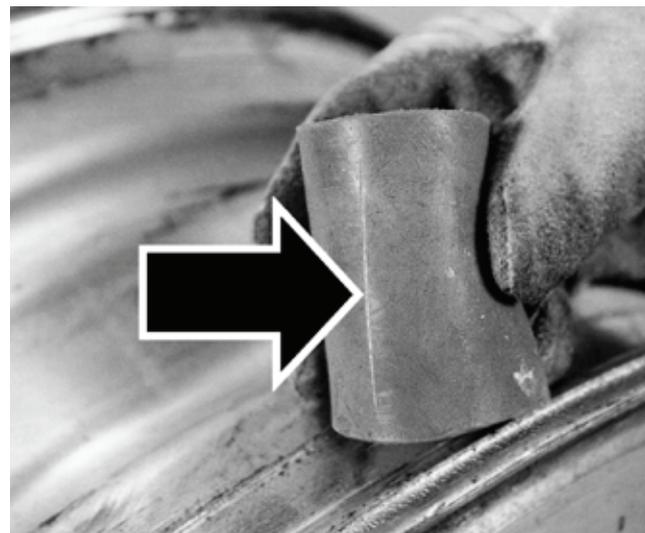
Picture 13-29
A rubber sharpness gauge or a suitable piece of rubber attached to a block of wood.



Picture 13-27 SERVICEABLE



Picture 13-28 NOT SERVICEABLE



Picture 13-30
Run the sharpness indicator gauge along the wheel at the area of the wear to determine if this wear is sharp enough to cut or damage the rubber on the sharpness indicator.

By running the sharpness indicator gauge along the wheel in the area of the wear, determine if this wear is sharp enough to cut or damage the rubber on the sharpness indicator. If the rubber is cut, then follow the edge removal instructions as described in Section 13.g.iii.

NOTICE

Examine the tyre for cuts in the bead areas and side walls. If no damage occurred to these areas, return the tyre to service. Cut tyres should be removed from service. The tyre should be inspected at this time for any other damage and be treated per normal tyre procedures recommended by the tyre manufacturer.

NOTICE

Check the wheel at every tyre change or minimum ONCE PER YEAR for rim flange wear and any sharp edges. Following this practice, it will significantly reduce the possibility of a rim flange cutting into the tyre.

If a rim flange cuts, or appears close to being sharp enough to cut, the rubber on the sharpness indicator gauge, the edge can be removed as per the edge removal procedures in following pages. If the rubber is not cut, then the wheel can be returned to service without further work for rim flange wear.

Caution



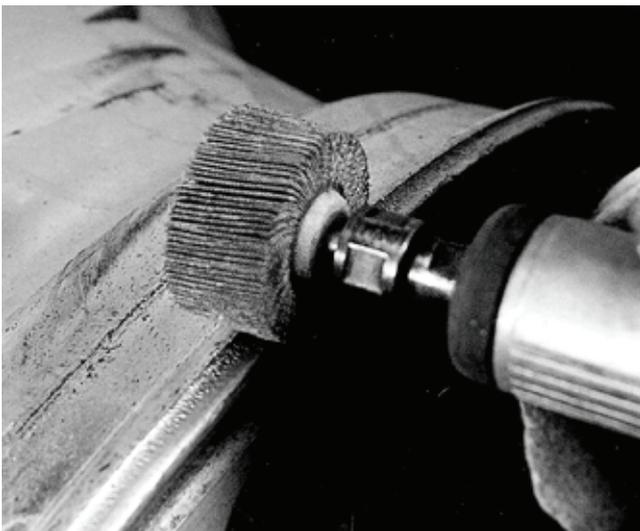
Do not run unprotected hands or fingers across worn rim flange areas of used wheels.

Worn rim flange areas are sharp and can cut hands or fingers.

Always wear gloves when handling used wheels or when checking for edge sharpness of rim flanges.

13.g.iii. Rim flange maintenance / edge removal procedures

There are many tools available to remove a sharp edge on the wheel caused by rim flange wear. Here are some examples of commonly used tools:



Picture 13-31 Air or electric power sander

A very quick and effective method of removing the sharp edge. Operators should use all care to keep a uniform rim flange when using these tools.



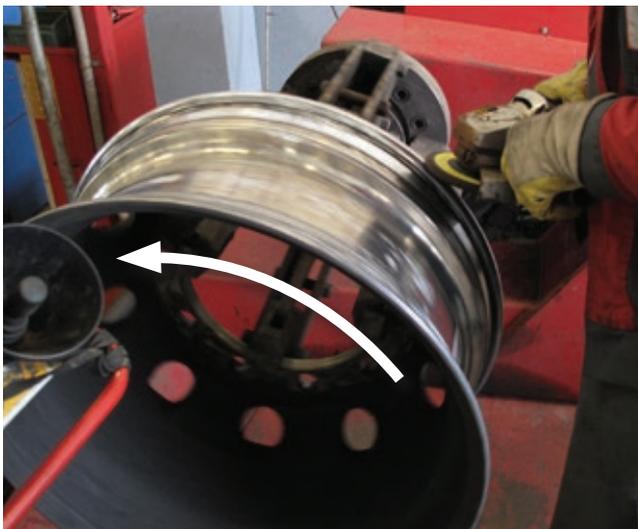
Picture 13-32 Air or electric power grinder

Another quick and effective method of removing the sharp edge caused by rim flange wear. Be careful as grinding pads may “gum up” from the aluminium that is removed. Avoid gouging the wheel.



Picture 13-33 Angle die grinder

Using with a sanding wheel, cutting stone, or grinding tool, this is a version of an electric grinder. This tool is very quick and effective as well. Remove metal as uniformly as possible and do not gouge the wheel.



Picture 13-34 Angle die grinder, tips

After removing the tyre from the wheel, leave the wheel on the tyre changer. Let the wheel rotate slowly and use the die grinder to remove the sharp edge from the wheel rim flanges. Remove the metal as uniformly as possible, without swinging, or adding force to, the angle die grinder. Do not gouge the wheel.

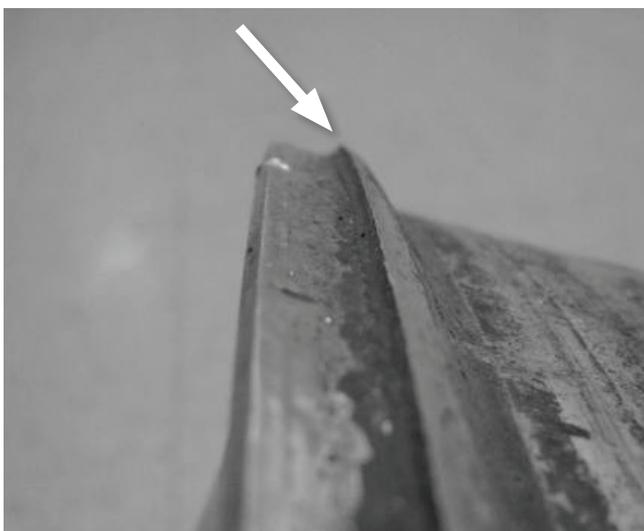
Caution



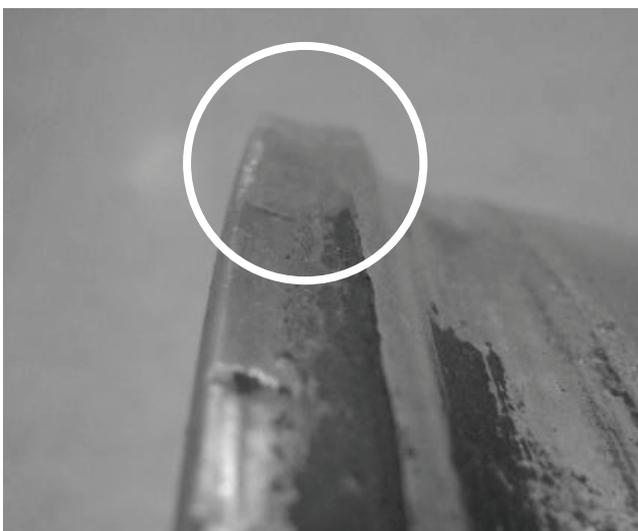
Removing sharp edges with hand or power tools produces metal filings and sparks. Power tools may have parts that are sharp. Some power tools produce excessive noise and may heat up during use.

Metal filings can be sharp and, when projected by the action of power tools, can cause serious skin or eye damage. Excessive noise from power tools can harm hearing. Sharp parts can produce cuts and hot surfaces can cause burns.

Always wear appropriate safety gear such as protective eye wear, gloves, protective clothing, and hearing protection when using hand or power tools.



Picture 13-35 Sharp edge before removal



Picture 13-36 Sharp edge removed

STEP 4

Pictures 13-35 and 13-36 show the result of removing the edge. With whatever tool is selected, work the tool around the wheel's circumference, removing only enough material to eliminate the sharp edge. This should only be a small amount of metal.

Perform this work on both flanges if there is evidence of sharpness. Make sure the edge removal is as uniform as possible. Avoid gouging the wheel.

STEP 5

After the sharp edge is removed, run the sharpness indicator gauge (Section 13.g.ii. STEP 3) along the area of edge removal to check for any remaining sharpness.

If the rubber is still cut, perform the previous steps again to remove the sharp edge. Always remove the minimum amount of material necessary to eliminate the sharp edge.

STEP 6

Check the rim flange height with the Rim Flange Wear Gauge for Alcoa® Wheels to make sure there is adequate height remaining to safely support the tyre. Section 13.g.ii. STEP 2 shows how the gauge is to be used. Move the gauge all around the wheel's circumference and make sure that no area of the flange is below what the gauge indicates as acceptable. If the entire wheel flange is within the limits of the rim flange wear gauge, the wheel may be returned to service.

STEP 7

Always inspect the wheel for any other conditions that would warrant removal from service. See all paragraphs of this Section.

IMPORTANT

Always follow safe mounting procedures as recommended in this manual and use an approved safety restraint or tyre cage when inflating a tyre/wheel assembly.

Rim flange wear could dictate the use of "stick-on" or adhesive balancing weights if there is inadequate rim flange to properly hold a clip-on style balancing weight.

NOTICE

Use Alcoa® Wheels Rim Flange Wear Gauge for Alcoa® Wheels only.

Warning



Welding or brazing the rim flange or any area of an Alcoa® Wheel will weaken the wheel. Weakened or damaged wheels can lead to an explosive separation of tyres and wheels or wheel failure on the vehicle.

Explosive separations of tyres and wheels or wheel failure on the vehicle can cause serious injury or death.

Never attempt to weld or braze any surface of an Alcoa® Wheel.

Warning



Returning wheels to service with inadequate flange height as determined by the Rim Flange Wear Gauge for Alcoa® Wheels can lead to an explosive separation of tyres and wheels.

Explosive separations of tyres and wheels can cause serious injury or death.

Wheels with a flange height that falls below the Rim Flange Wear Gauge have inadequate rim flange height to support the tyre on the rim. Immediately and permanently remove any wheel from service that has inadequate rim flange height.

Warning



Excessive heat from fire, brake malfunction, wheel bearing failure, tyre failure or other sources of heat may weaken the metal and cause the tyre/wheel assemblies to separate explosively.

Exploding tyre/wheel assembly can cause serious injury or death.

Immediately and permanently remove from service any wheel that has been exposed to excessive heat.

13.g.iv. Dura-Flange®

If excessive rim flange wear is frequently observed in your operation, consider using Dura-Flange® Alcoa® Wheels. These wheels are specially treated to significantly reduce rim flange wear. Only Dura-Flange® wheels have a warranty on rim flange wear. Dura-Flange® has a **24-month** warranty against wear which creates a sharp edge that would require maintenance as per foregoing Section 13.g.iii. Rim flange maintenance / edge removal procedures.

NOTICE

Minor wear or minor pitting is not a warrantable condition.

Edge re-conditioning cannot be performed on Dura-Flange® Alcoa® Wheels including those methods described in Section 13.g.iii. Rim flange maintenance / edge removal procedures.



Picture 13-37 Acceptable wear and pitting



13.h. Cracked or damaged wheel checks

Visually inspect wheels for cracks or damage. Remove wheels from service with known or suspected damage. See the following Sections for reference.

Warning



Cracked or damaged wheels may fail or come off the vehicle.

Wheels that fail or come off the vehicle while it is moving can cause serious injury or death.

Immediately and permanently remove cracked or damaged wheels from service.

13.h.i. Mounting area

Cracks in the mounting - or disc area are usually caused by improper installation (see Sections 10 and 11), excessive loading or insufficient mounting flange support (see Section 13.h.i.) by the hub or brake drum. Remove the wheel from service immediately and permanently.

The indication may be caused by, one or a combination of following conditions:

- Overloading, uneven distribution of load on axles and / or
- Improper fixation, lack of lubrication hardware and/or
- Insufficient maintenance (cleaning mating faces), and/or
- Application / use of non-spec / non-genuine hardware

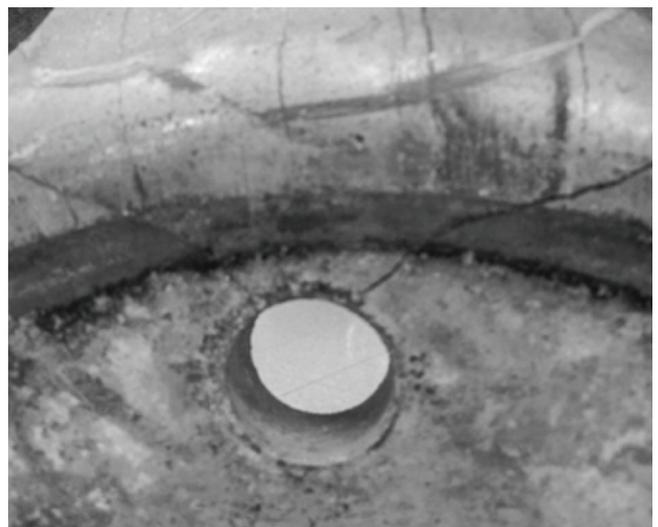
Pictures of examples below show cracks starting in the disc area.

Probable causes are:

- Incorrect attachment parts or mounting hardware, see Section 11 (Picture 13-38)
- Insufficient torque, see Sections 10 and 12 (Picture 13-39)
- Undersized diameter of wheel support surface (Picture 13-40)
- Presence of paint, dirt, and corrosion at mating faces of wheel and hub, when installing (Picture 13-41)
- Support surface not flat (Picture 13-42)



Picture 13-38



Picture 13-39



Picture 13-40



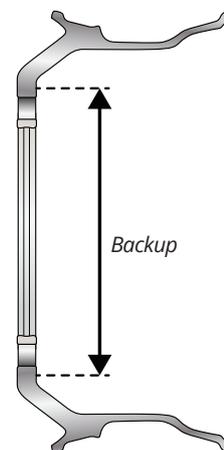
Picture 13-41



Picture 13-42

Inspect the hub / drum contact area of the wheel disc thoroughly for cracks or other damage. If any crack is observed in this area remove the wheel from service immediately and permanently.

The hub / drum wheel surface contact should be smooth and flat within the entire wheel support diameter as per recommendation in Chart 13-44 to properly support the wheel disc.



Graphic 13-43

Recommended backup diameter (See Graphic 13-43) applicable to hub pilot mounting type Alcoa® Wheels:

Bolt circle Ø mm	Nr of bolts	Thread size	ISO 4107 Backup Ø mm	SAE J694 Backup Ø mm	DIN 74361-3 Backup Ø mm	Howmet recommended backup Ø mm
205	6	M18 x 1.5	250 - 251	245 - 250	250	245 - 251
245	6	M18 x 1.5	290 - 291		290	285 - 291
275	8	M20 x 1.5	320 - 321	315 - 320	320	315 - 321
275	8	M22 x 1.5		334 - 343	320	334 - 343
225	10	M22 x 1.5			270	273 - 279
335	10	M22 x 1.5	385 - 386	380 - 385	385	380 - 386

Chart 13-44



Picture 13-45
Circumferential hub



Picture 13-46
Star shape hub

Warning



- Due to the limited contact area of star shape hubs, proper maintenance and cleaning of hub, wheel and mounting hardware is important.
- As per recommendation from the Association of European Wheel Manufacturers, EUWA, wheels used on star shape hubs (see picture 13-46) must be checked for cracks on the inner and outer attachment face each 50.000 km.
- In case cracks are detected wheels are to be removed from service immediately and permanently.

13.h.ii. Bolt holes

If wheels run loose, both stud-located wheels and hub-piloted wheels can be damaged.

Look for wallowed out or elongated bolt holes as well as damaged studs and nuts:

- On hub-piloted wheels look for damage at the disc face and thread marks on the inside diameter of the bolt holes.
- On stud-located wheels over torquing can also lead to damaged ball seats.

Remove wheels with damaged bolt holes from service immediately and permanently.



Picture 13-47



Picture 13-48

13.h.iii. Vent - or hand holes and disc area

Inspect both sides of disc area for vent - or hand hole cracks.

The indication may be caused by, one or a combination of following conditions:

- Overloading, uneven distribution of load on axles and / or
- Improper fixation, lack of lubrication hardware and/or
- Insufficient maintenance (cleaning mating faces), and/or
- Application / use of non-spec / non-genuine hardware

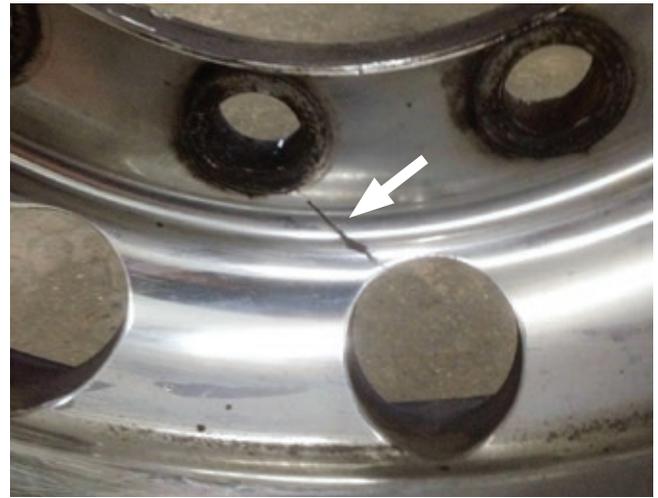
Exceeding wheel load capacity can cause damage to the vent - or hand hole. A crack originates from the vent - or hand hole propagating in the disc area.

Impacts on the rim flange or vent - or hand hole area, e.g., a collision with curb stone or other obstacles may cause cracks propagating from vent - or hand hole to vent - or hand hole.

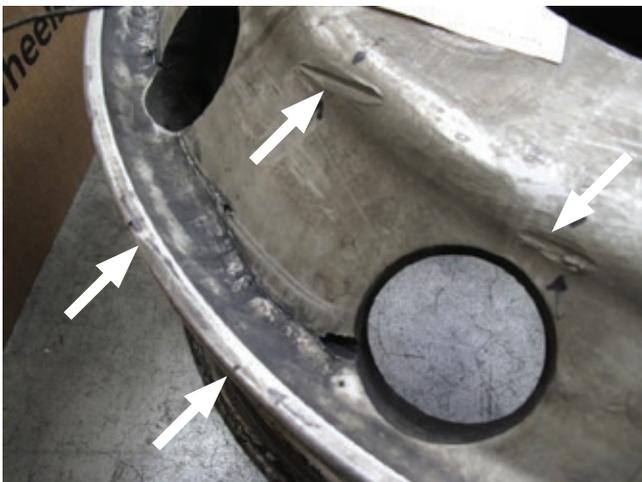
Remove damaged wheels from service immediately and permanently.



Picture 13-49



Picture 13-50



Picture 13-51

13.h.iv. Rim area (drop centre, valve hole area and bead seats)

Check the entire rim area for nicks, gouges, and cracks.
Cracks in the rim area are normally caused by overloading of the wheels.
If this type of wheel damage is observed, Howmet Wheel Systems recommends using WorkHorse® Alcoa® Wheels.



See Alcoa® Wheels Specification Data Sheet for part numbers.



Loss of air may be caused by cracks in areas throughout the drop centre, around the valve hole, and in the bead seat areas. Remove damaged wheels from service immediately and permanently.

DROP CENTRE

Possible causes of drop centre cracks:

- Rim is too narrow for the tyre used
- Exceeding load or inflation capacity
- Corrosion damaged the rim
- Tyre tool damage, see picture 13-52
- Damage from foreign parts stuck between static brake calliper and rotating wheel, see picture 13-55



Picture 13-52



Picture 13-53



Picture 13-54



Picture 13-55

VALVE HOLE AREA

Possible causes for valve hole area cracks:

- Exceeding load or inflation capacity
- Corrosion, see section 13.i.iii.
- Rough finish on the valve hole surface
- Use of non-spec or non-genuine valves, consult Specification Sheet for Alcoa® Wheels for correct valves
- Over-tightening the valve nut



Picture 13-56



Picture 13-57



Picture 13-58

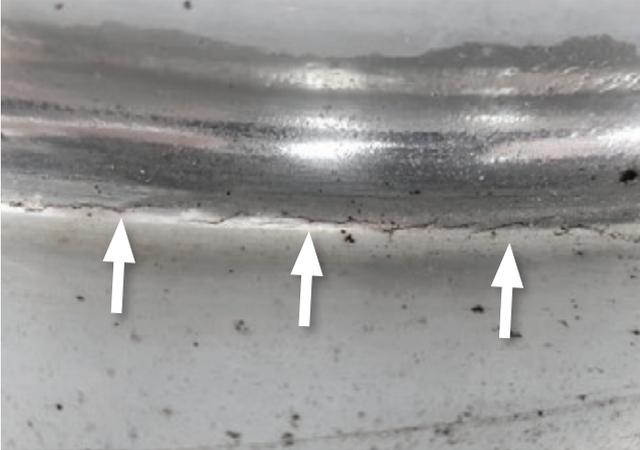


Picture 13-59

BEAD SEATS

Bead seat cracks may result from:

- Exceeding load or inflation capacity
- Corrosion (see picture 13-61)
- Tyre tool damage (see pictures 13-62, 13-63)



Picture 13-60



Picture 13-61



Picture 13-62



Picture 13-63

Warning



Use of inner tubes in tubeless wheels will hide slow leaks. Slow leaks may indicate cracked or damaged wheels which lead to wheel failures.

Wheel failures can cause accidents which may result in serious injury or death.

Never use an inner tube on an Alcoa® Wheels tubeless wheel. Immediately and permanently remove cracked or damaged wheels from service and scrap.

13.i. Corrosion

Certain environments can lead to corrosion, such as livestock haulage or food related transport subject to frequent disinfectant cleaning. Some of the more common corrosives are salt, magnesium chloride and calcium chloride compounds used for snow removal and highly acid or alkaline materials.

If the air used to inflate tubeless tyres, or the tyre, or the wheel itself, is not dry, the areas of the wheel, drop centre, valve hole area and bead seats, covered by the tyre can corrode severely.

Corrosion at the drop centre, valve hole area and bead seats (Section 13.h.iv.) and hub bore is often caused by entrapped moisture.

Mild corrosion should be removed thoroughly by wire brush and the tyre mounted with a non-water non-metal-based tyre lubricant.

Remove any severely corroded wheel from service.

Discolouring of the wheel part covered by the tyre is an indicator of entrapped moisture. See pictures 13-64 and 13-65.



Picture 13-64



Picture 13-65

13.i.i. Corrosion at hub bore and wheel disc or mounting face



Picture 13-66



Picture 13-67

After removal of corrosion:

- The hub bore diameter may not exceed 0.5 mm or 0.02 inch more than the dimension of the hub bore diameter as listed in the Specification Sheet for Alcoa® Wheels.
Remove wheels from service with severe hub bore corrosion.
- The wheel disc i.e., when measuring the thickness, between the mating areas with either hub or dualled wheel, may not be less than 0.5 mm or 0.02 inch than the disc thickness as listed in the Alcoa® Wheels Specification Sheet.

Specification Sheet for Alcoa® Wheels:



13.i.ii. Corrosion at drop centre

Corrosion at drop centre may result from:

- Entrapped moisture (see picture 13-68)
- Use of liquid tyre balancers or - sealants (see picture 13-69)



Picture 13-68



Picture 13-69



Picture 13-70

Caution



The use of liquid tyre balancers or - sealants in Alcoa® Wheels may cause extremely rapid corrosion of the wheel rim surface.

Severely corroded wheels are unsuitable for service.

Alcoa® Wheels corroded using liquid tyre balancers or - sealants will not be replaced under the Howmet Wheel Systems limited warranty.

13.i.iii. Corrosion at valve hole area

Corrosion at valve hole area may result from:

- Entrapped moisture
- Use of tyre mounting paste to lubricate valve
- Use of liquid tyre balancers or - sealants



Picture 13-71



Picture 13-72



Picture 13-73



Picture 13-74



Picture 13-75



Picture 13-76

Caution



The use of liquid tyre balancers or - sealants in Alcoa® Wheels may cause extremely rapid corrosion of the valve hole area.

Wheels with severely corroded valve hole areas are unsuitable for service.

Alcoa® Wheels corroded using liquid tyre balancers or - sealants will not be replaced under the Howmet Wheel Systems limited warranty.

13.j. Regular inspection and removal of corrosion

In addition to the recommendations provided in Section 14 Care and Maintenance of this manual, maintenance of aluminium wheels is required to ensure a safe and reliable service life.

Frequent cleaning of aluminium wheels and removing corrosion will not only contribute to the looks of the vehicle but -more important- will add to a safe and reliable operation of the vehicle during the wheels' service life.

Brushed, Mirror Polished and LvL ONE® Alcoa® Wheels are uncoated. The bare aluminium or non-surface treated and highly corrosion resistant alloy that is used for Alcoa® Wheels reduces oxidation to a minimum. Corrosion build up may occur on all surfaces if wheels are not cleaned regularly.

Dura-Bright® Alcoa® Wheels have a surface treatment that protects the wheels' surface against oxidation. The treatment may get damaged or erode during service life.

NOTE

The inside facing surface of non-reversible Dura-Bright® wheels have no surface treatment.

IMPORTANT

Oxidation will occur with corrosion build up as a result. If wheels are not cleaned regularly, excessive corrosion build up may contribute to cause wheels to fail either by initiating or accelerating hair line cracks.

Any excessive corrosion build-up must be removed at vehicle inspection intervals, before placing wheels in service again or upon tyre change or repair.

CLEANING MATING FACES (wheel disc and hub or drum):

After cleaning the mating faces, the disc (bolt hole) area of the wheel and the mounting area of the hub, must be dry, clean, smooth, and flat before mounting.

Consult section 10.a. Wheel installation preparation



Picture 13-77



Picture 13-78



Picture 13-79

The abrasive tools used in these pictures are available from authorized distributors of Alcoa® Wheels, reference: Bristle Discs for Alcoa® Wheels.

For documentation contact Howmet Wheel Systems or go to the web page



Picture 13-80

CLEANING NON-MATING FACES:

For more information about care and maintenance of untreated surfaces (Brushed, Mirror Polished and LvL ONE®) and Dura-Bright® surface treated Alcoa® Wheels refer to the following pages, Section 14, of this manual.

14. Care and Maintenance

Regular cleaning

Clean the wheels regularly with steam or high-pressure water. Do not use harsh acidic or harsh alkaline cleaners. Do not use hydrofluoric acid. Do not use abrasive products or tools to clean or polish Alcoa® Wheels.

14.a. Maintenance against corrosion for Brushed, Mirror Polished and LvL ONE® wheels (non-Dura-Bright® surface treated wheels)

These wheels can be identified by the blue Alcoa® logo on the sticker:



Picture 14-1



Picture 14-2



Picture 14-3



Picture 14-4

Use ALclean and ALpolish from Howmet Wheel Systems

Alcoa® Wheels with Brushed, Mirror Polished and LvL ONE® finish are uncoated. The highly corrosion resistant alloy that is used for Alcoa® Wheels reduces oxidation to a minimum. Maintaining the original lustre of the wheels is easy with ALclean and ALpolish. Regular and frequent maintenance will keep your wheels bright and shiny for years.

For reference see the 'How to Clean' page on our website:



The following information is for Alcoa® Wheels without the Dura-Bright® surface treatment.

See Section 14.b. for specific instructions on the care and cleaning of Dura-Bright® surface treated Alcoa® Wheels.

For Alcoa® Wheels with Brushed, Mirror Polished or LvL ONE® finish:

1. Clean frequently with steam or high-pressure water. The use of a mild detergent will speed the cleaning process. Use no harsh acidic or harsh alkaline cleaners. Do not use hydrofluoric acid.
2. When tyres are removed the entire wheel must be cleaned and inspected. See Sections 5, 6 and 13.

With Bristle Discs for Alcoa® Wheels or a wire brush, remove dirt and contamination from the tyre side of the rim. Do not use Bristle Discs for Alcoa® Wheels or a wire brush to remove dirt and corrosion from the appearance surface of the wheel. Bristle Discs for Alcoa® Wheels are available from authorized distributors of Alcoa® Wheels.



3. To maintain the original appearance of your Alcoa® Wheels, the following procedures are recommended:
 - a) After installing new wheels and prior to operating your vehicle, use the ALbrush for Alcoa® Wheels or a soft fibre brush to wash the visible wheel surfaces with a mild detergent and warm water solution.
 - b) Flush thoroughly with clean water.
 - c) Wipe dry to avoid water stains.
 - d) Clean your Alcoa® Wheels every week to maintain their appearance.

14.b. Maintenance and cleaning Dura-Bright® XBR® and Dura-Bright® EVO surface treated wheels

These wheels can be identified by the Alcoa® logo on the sticker, which is black for Dura-Bright® XBR® or black and green for Dura-Bright® EVO.

Dura-Bright® surface treated wheels' part number have extension DB or DD. See Section 4.d.



Picture 14-5



Picture 14-6



Picture 14-7

Dura-Bright® wheels are easy to clean and stay bright and shiny when properly maintained.

Dura-Bright® wheels are maintained best with Dura-Bright® Wheel Wash, a standard car wash soap or a near pH neutral detergent.

If soils and dirt attached to the surface do not come off with cold water, try warm water and wipe with a soft towel or chamois

material. If soils and dirt remain, use Dura-Bright® Wheel Wash or warm water and a mild detergent using high pressure power washer.

Always dilute the detergent according to the manufacturers' recommendations; never use the detergents straight without diluting with water.



Picture 14-8

Dura-Bright® Wheel Wash for Alcoa® Wheels is available from authorized distributors of Alcoa® Wheels.



For reference see the 'How to Clean' page of our website:



IMPORTANT

Dura-Bright® Alcoa® Wheels should NOT be polished with polishing compounds or ALpolish.

IMPORTANT

Do not use strong acidic or strong alkaline products on Dura-Bright® surface treated wheels.

Hydrofluoric acid (HF) should never be used on Dura-Bright® surface treated wheels.

The pH value of the cleaner can be found in the MSDS (Material Safety Data Sheet). If the cleaner is undiluted, consult your cleaning products supplier to determine pH levels and dilution.

Pictured an example of how to test pH value with pH indicator strips (See picture 14-9).

NOTE

Dura-Bright® Wheel Wash for Alcoa® Wheels can be used without diluting.



Picture 14-9

IMPORTANT

The Dura-Bright® surface treatment for Alcoa® Wheels is developed to enable effective cleaning wheels, with mild and environmentally friendly cleaning products, maintaining the looks and shine the easy way.

Professional cleaning products for commercial vehicles, stationary and mobile vehicle wash service providers may contain and use strong acidic and alkaline components that may harm the Dura-Bright® surface treatment for Alcoa® Wheels.

Before cleaning Dura-Bright® surface treated wheels it is recommended to check and evaluate following with the supplier or service provider:

1. Type of chemical components in product(s) used as per material safety data sheet (MSDS).
2. Dilution of the product(s) with clean water, or pH value.
3. Temperature, of both wheel surface and mating components.
4. Time of exposure recommended for the product(s) to be used safely and effectively to clean the surface.

NOTE

Cleaners that are safe to use on windows and painted panels and bodywork can be used on Dura-Bright® surface treated Alcoa® Wheels Consult the recommendations in this Section. In case of doubt contact Howmet Wheel Systems.

Examples of Dura-Bright® surface treated wheels exposed to aggressive cleaners. See pictures 14-10 to 14-14.



Picture 14-10



Picture 14-11



Picture 14-12



Picture 14-13



Picture 14-14

See Section 14.b.i. how to clean Dura-Bright® XBR® and Dura-Bright® EVO surface treated Alcoa® Wheels in 5 steps.

14.b.i. Maintenance and cleaning Dura-Bright® XBR® and Dura-Bright® EVO surface treated Alcoa® Wheels in 5 steps

STEP 1

Before cleaning, allow wheels to cool down to a temperature below 35°C or 95°F.



Picture 14-15

STEP 2

Flush the wheels thoroughly to remove any loose and visible dirt and debris. Flushing the wheels with water helps to help preventing scratching and abrasion. Use a water hose or power washer to remove soil, sand, etc.



Picture 14-16

STEP 3

Use undiluted Dura-Bright® Wheel Wash for Dura-Bright® Alcoa® Wheels, a standard car wash or a (near pH neutral) detergent. Add car wash or a mild detergent (e.g., common dish soap liquid) to the water at the specified dilution ratio before applying to the wheels.

- Do not use harsh acidic or harsh alkaline cleaners.
- Do not use hydrofluoric acid (HF).



Picture 14-17

STEP 4

Clean the wheels. Apply Dura-Bright® Wheel Wash for Dura-Bright® Alcoa® Wheels, soap, or detergent generously on wheel surface with the ALbrush for Alcoa® Wheels or a soft fibre brush. Do not use abrasive tools and scouring pads (e.g., 3M Scotch-Brite®).



Picture 14-18

STEP 5

Flush the wheels thoroughly with clean water and remove all remaining soap and dirt. Dry the wheels using a soft cloth free of debris.



Picture 14-19



14.b.ii. Additional care and tips for Dura-Bright® XBR® and Dura-Bright® EVO surface treated Alcoa® Wheels

Once in service, Dura-Bright® surface treated Alcoa® Wheels can become nicked or scratched by road debris and/or mechanical damage. If this occurs, continue to follow the normal washing and cleaning instructions provided in Section 14.b.i.

The mounting area on Dura-Bright® surface treated Alcoa® Wheels can become scratched, marred, or discoloured when mounted against another wheel, hub, or drum. Wheel mounting surface guards, such as Discmates for Alcoa® Wheels or other nylon protection gaskets, can be used.

NOTICE

For maintenance of Dura-Bright® surface treated Alcoa® Wheels that were and are subject to damage, handling marks, erosion and discolouring of the Dura-Bright® surface treatment, refer to 2. and 3. of this section, or contact:

Howmet Wheel Systems Fleet Service Center:



1. Regular conditions do not require special routines

Dura-Bright® wheels can be kept clean with Dura-Bright® Wheel Wash for Alcoa® Wheels, soap and water, or with mild acid washes that also can be used safely on the vehicles' painted surfaces.

How to clean:



Products for cleaning:



2. Conditions that may require an additional maintenance practice

Handling marks, traces of use

Dura-Bright® surface treated Alcoa® Wheels with handling marks or traces of use (e.g., scratches, nicks, dents, or gouges) build up disc brake dust on those parts of the surfaces where the Dura-Bright® surface treatment is missing. These surfaces will look as if they have not been treated with Dura-Bright®.



Picture 14-20



Picture 14-21

Erosion

Dura-Bright® surface treated Alcoa® Wheels mounted on vehicles used on gravel roads or on asphalt roads where sand, stones or other material erode the Dura-Bright® surface treatment, will gradually show a declining layer of treatment.

Due to the missing full coverage of Dura-Bright® surface treatment, the surfaces will show oxidation or a gradual build-up of disc brake dust at the rim flange area.



Picture 14-22

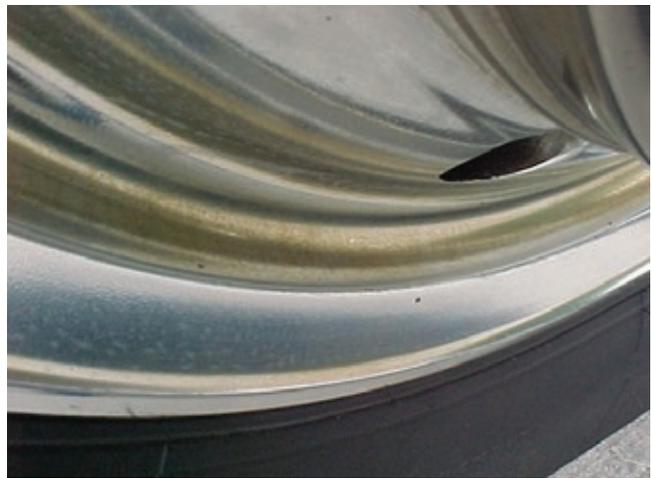


Picture 14-23

Discolouring

Dura-Bright® surface treated Alcoa® Wheels on axles with disc brakes may show a gradual discolouring over time. Mostly seen on front axles, wheels will develop a brownish, copper, or golden haze next or offset to the vent holes depending on the rotation direction. This discoloration is a tarnish, and the result of the substances released from the disc brake pads when braking.

The above-mentioned conditions may appear sooner after a winter period or at longer intervals between cleanings. More frequent cleaning with Dura-Bright® Wheel Wash for Alcoa® Wheels, soap, and water or a mild acid cleaner is recommended.



Picture 14-24

Notice

These conditions i.e., handling marks, traces of use, erosion and/or discolouring, are not warrantable.

Filiform corrosion (worm or hair like lines, underneath surface protective treatment and emanating from damage to the surface treatment) and blistering or peeling due to loss of adhesion of the surface treatment is warrantable for a period of 60 months from date of manufacturing.

See 'Limited Warranty' Section 2 for reference.

3. Additional maintenance practice

- Wheels or parts of wheels that show conditions as described above may require additional maintenance.
- The use of ALclean with the ALbrush is recommended to remove disc brake dust, corrosion, or discolouring, as with regular untreated surfaces.
- The Dura-Bright® surface treatment will not be affected using ALclean if it is used on limited occasions and time.

ATTENTION

Read the safety instructions on the label of the ALclean 1 litre bottle or 5 or 25 litres can.

Material Safety Data Sheets are available via 'Safety Data (MSDS)' link at the bottom of the Cleaning webpage:



Picture 14-25
ALclean 1 litre bottle



Picture 14-26
ALbrush2 soft fiber brush

ALclean and ALbrush2 are available from authorized distributors of Alcoa® Wheels.



How to proceed:

1. Allow the wheels to cool down before cleaning. The recommended temperature of the wheels should be below 35°C or 95°F.
2. Remove all nut covers if present.
3. Thoroughly remove dust, sand, with water from a hose or a high-pressure washer. Do not dry the wheel.
4. Use a limited quantity, 100 ml or 3.45 fl oz of undiluted ALclean with the ALbrush, or brush with soft fibres, and gently brush the wheel 2 to 3 times with short breaks for 2 to 3 minutes in total.
5. Flush the wheel thoroughly with cold or lukewarm water.
6. Repeat step 4 and 5 until disc brake dust, corrosion and/or discolouring are removed.
7. After the wheel has dried, refit the nut covers.

For regular cleaning of Dura-Bright® wheels, continue to use Dura-Bright® Wheel Wash for Alcoa® Wheels or soap and water frequently as described in Section 14.b.i.

Perform the additional maintenance using the ALclean as described in steps 1 to 7 on limited occasions only.

14.c. Maintenance Dura-Flange® wheels

These wheels can be identified by “DF” or “DD” after the 6-digit P/N. See Section 4.d.

Dura-Flange® wheels have blue logo Alcoa® Wheels stickers (DF) or black logo Alcoa® Wheels stickers (DD) and two additional stickers with Dura-Flange® Rim Wear Protected printed.

1. Dura-Flange® rim flange treated wheels have a 24-month warranty against wear which creates a sharp edge that would require maintenance.
2. Minor wear or minor pitting is not a warrantable condition. See Section 13.g.iv.
3. Rim flange reconditioning cannot be performed on wheels with a Dura-Flange® treatment including those methods described in Section 13.g.iii.

The surface of wheels treated with Dura-Flange® can be cleaned as described in Section 14.a. for non-surface treated wheels (DF), or as described in Section 14.b. for Dura-Bright® surface treated wheels (DD).



Picture 14-27

15. Out-of-Service Wheels

Identification of Out-of-Service Wheels and Proper Disposal and Recycling

Alcoa® Wheels are made of aluminium. Aluminium is almost 100% recyclable.

Out-of-Service Wheels

Wheels should be removed from service when inspection reveals out of service conditions that render a wheel no longer serviceable. Conditions such as cracking, corrosion, wallowed bolt holes and worn rim flanges are examples of conditions that may cause a wheel to be removed from service. See Section 13 (Wheels in service) of this manual or Technology and Maintenance Council (TMC) Users Guide to Wheels and Rims RP222 for examples of wheels that should be removed from service.

Proper Disposal and Recycling

Comply with local, state, and national environmental regulations with respect to out-of-service wheels. Howmet strongly encourages you to recycle wheels that are no longer serviceable. Before offering Alcoa® Wheels to an appropriate recycling company:

- Make the wheel permanently unserviceable beyond repair by drilling out the date stamp in the wheel or using a torch to cut a slot into the rim flange on the open side of the wheel
- Remove, deface, or make illegible the serial number, date code, and part number
- Remove valves, tire pressure monitor sensors (TPMS), balancing weights, and other components. Follow local, state, and national environmental regulations for disposing of these components

According to the European Commission all Alcoa® Wheels (part numbers and finishes) are classified as non-hazardous waste and can be disposed of and recycled.

Thank you for contributing to worldwide sustainability efforts by returning Alcoa® Wheels to the recycling chain, which reduces landfill waste and leads to further opportunities for using the aluminium.



Picture 15-1

16. Glossary of common terms and conversion factors

16.a. Glossary of common terms

15° the angle of the tyre's beads and wheel's bead seats as used for tubeless tyres and wheels for medium- and heavy-duty vehicles.

1 PIECE FLANGE NUT - A 1-piece washer and nut combination. Not recommended for use on any Alcoa® Wheels application.

2 PIECE FLANGE NUT - A 2-piece washer and nut combination used to secure hub piloted wheels.

AIR CHAMBER - The space enclosed by a tyre and rim of the wheel.

BEAD SEAT - The tyre seating surface (2x) of the rim (See graphic 16-1).

BOLT CIRCLE - The circle defined by connecting the centres of the bolt holes (mounting holes) of a wheel, dimension of diameter stated in millimetres or inches (See graphic 16-1).

BOLT HOLES or mounting holes - Holes in the disc of the wheel through which the bolts (studs) pass.

CENTRE BORE - See "HUB BORE" (See graphic 16-1).

CLOSED SIDE - The disc face, top side or beauty face of a wheel that can be mounted in a dual application. See also OPEN SIDE.

DC - Abbreviation for drop centre. See "DROP CENTRE" (See graphic 16-1).

DISC AREA - The vertical part of the wheel which supports the rim and is connected / faced to the hub, or the other wheel's disc in case of a dual mounting (See graphic 16-1).

DISCMATE - A nylon protection gasket that goes between the hub or brake drum and wheel and/or between two wheels to help reducing corrosion.

DISC WHEEL - A 1-piece (forged) or 2-piece (welded) assembly of a disc and a rim.

DOT - abbreviation for Department of Transportation, federal cabinet department of the U.S. government concerned with transportation.

DROP CENTRE - The well or centre portion of the wheel rim that enables the fitment of a tubeless tyre (See graphic 16-1).

DUAL WHEEL - Any wheel that can be mated disc side to disc side with a similar wheel resulting in an inner and outer dual wheel assembly. See also SINGLE WHEEL.

ET - stands for Einpresstiefe. Commonly found on steel wheels. German for Offset (or Inset). See INSET.

fl oz - fluid ounces, liquid volume measurement

FMVSS - Federal Motor Vehicle Safety Standards (U.S.A.)

FOOT-POUNDS / NEWTON METRES - The measure of the amount of torque applied to a nut or other part. May be measured with a torque wrench.

ft-lbs. - abbreviation for Foot-pounds, torque measurement.

HDS or 1/2 DUAL SPACING - Measurement for use of wheels in dual application. Half the distance between the two centrelines of a dualled tyre/wheel assembly. The dimension is the same as the OUTSET dimension (See graphic 16-1).

HMA - abbreviation of 'Halber Mittenabstand'. German for Half Dual Spacing see "HDS" (See graphic 16-1).

HUB BORE - The centre hole of a disc wheel, dimension of diameter stated in millimetres or inches (See graphic 16-1).

HUB PILOTED MOUNTING - A wheel mounting system which uses the hub to centre the wheel (in single application) or both wheels (in dual application) and 2-piece flange nuts to secure wheel(s).

in. - Abbreviation for inches (distance measurement). 1 inch equals 25.4 mm.

INNER CAP NUT - Nut used to mount the inner wheel in a dualled stud located wheel system. Not applicable for hub piloted wheels.

INSET or OFFSET - The distance from the wheel mounting surface to the rim centreline when the centreline is placed inboard of the mounting surface. Measurement used for single wheel application. Dimension stated in millimetres or inches (See graphic 16-1).

kg - Abbreviation for kilogram, equal to 1000 grams, weight measurement.

kPa - Abbreviation for Kilopascal, 100 kPa equals 1 bar, pressure measurement.

lb. - symbol for pound, weight measurement.

LONG SLEEVE NUT - A (retrofit) nut with a long extension sleeve used to secure dualled wheels (see also SHORT SLEEVE NUT).

MAXIMUM INFLATION - The highest amount of air pressure allowed, measured at ambient (cold) temperatures, approx. 20°C (Celsius) or 68°F (Fahrenheit).

millilitre - ml, 1000 millilitres equals 1 litre, liquid volume measurement.

mm - Abbreviation for millimetres. 1000 mm equals 1 meter.

MOUNTING FACE - Disc area, mounting area, support surface diameter, that portion of the wheel face which contacts the hub or brake drum, or the adjacent wheel in case of a dual mounting (See graphic 16-1).

NEWTON METERS / FOOT-POUNDS - The measure of the amount of torque applied to a nut or other part. May be measured with a torque wrench.

Nm - Abbreviation for Newton meters, torque measurement.

OFFSET – also referred to as **INSET**, see both **INSET** and **OUTSET** (See graphic 16-1).

OPEN SIDE - The side of the wheel opposite the disc face. The deep side of a wheel that can be mounted in a dual application. See also **CLOSED SIDE**.

OUTER CAP NUT - A nut used to secure the outer stud located wheel in a dual wheel pair and threaded onto the inner nut. Not applicable for hub piloted wheels.

OUTSET - The distance from the mounting surface of the wheel to the rim centreline when the rim centreline is mounted outboard of the hub face. This dimension is the same as the **HALF DUAL SPACING** dimension. See "HDS" and "HMA". Dimension stated in millimetres or inches (See graphic 16-1).

PCD - Pitch Circle Diameter, is the measurement of the diameter of the imaginary circle drawn through the centre of all the bolt holes of the wheel. See **BOLT CIRCLE**.

PILOT TAB or PAD / SPIGOT - The raised surfaces/parts on a hub used to centre a hub piloted wheel.

POUND – symbol lb., weight measurement.

PSI - Abbreviation for pounds per square inch, pressure measurement.

REVERSIBLE - Term applied to a disc wheel which can be reversed on the hub without changing the position of the rim - and tyre centreline.

RIM CENTRELINE - A line to the radial axis of the wheel running through the midpoint between the rim flanges.

RIM FLANGE - That portion of the rim which extends above the bead seat which helps to retain the tyre bead.

RIM - That portion of the wheel which supports the tyre.

SAFETY HUMP - Small and integral raised part of the wheel situated on lower end of one bead seat near the drop well. Prevents the tyre bead from slipping into the drop well when tyres are operated at low or deflating tyre pressure (See graphic 16-1).

SHORT SLEEVE NUT - A retrofit nut with a short extension sleeve used to secure a single wheel. See also **LONG SLEEVE NUT**.

SINGLE WHEEL – A single mounted wheel, or any wheel that cannot be mated disc side to disc side with another wheel. See also **DUAL WHEEL**.

STUDS - Threaded bolts extending from the hub surface to which the wheels are secured by the nuts (See graphic 16-1).

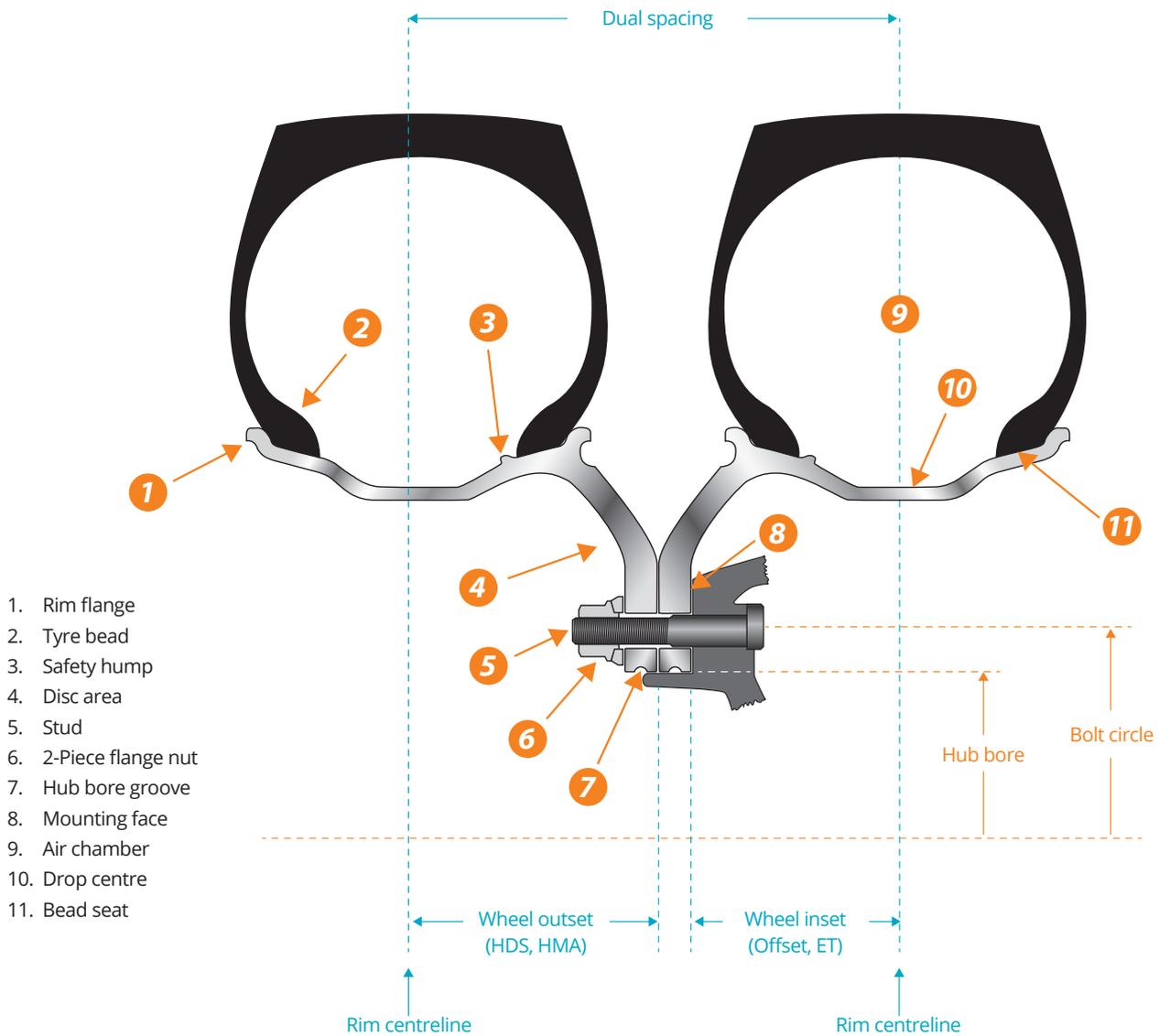
STUD LOCATED, BALL SEAT MOUNTING - A wheel mounting system which uses the studs and spherical ball seat nuts to centre and secure the wheel. Not applicable for hub centred wheels.

TORQUE - The amount of force used to tighten nuts. Usually stated in Newton-meters or Foot-pounds and measured with a torque wrench. Torque measurement.

TPMS - abbreviation for Tyre Pressure Monitoring System, an electronic system designed to monitor the air pressure inside the tyres of vehicles.

TYRE BEADS - The parts of the tyre that sit on the bead seats of the wheel's rim.

16.b. Common terms



Graphic 16-1

16.c. Conversion factors

Inches to Millimetres
 $\text{Inches} \times 25.4 = \text{Millimetres}$

Millimetres to Inches
 $\text{Millimetres} \times 0.03937 = \text{Inches}$

Millilitres to fluid ounces (UK)
 $\text{ml} \times 0.035195065 = \text{fl oz (UK)}$

Fluid ounces (UK) to millilitres
 $\text{Fl oz (UK)} \times 2.841.307 = \text{millilitres}$

Millilitres to fluid ounces (US)
 $\text{ml} \times 0.03381402 = \text{fl oz (US)}$

Fluid ounces (US) to millilitres
 $\text{Fl oz (US)} \times 2.957.353 = \text{millilitres}$

Bar to kPa
 $\text{Bar} \times 100 = \text{kPa}$

kPa to Bar
 $\text{kPa} \times 0.01 = \text{Bar}$

psi to kPa
 $\text{psi} \times 68.948 = \text{kPa}$

kPa to psi
 $\text{kPa} \times 0.145 = \text{psi}$

Pounds to Kilograms
 $\text{Pounds} \times 0.4536 = \text{kg}$

Kilograms to Pounds
 $\text{kg} \times 22.046 = \text{Pounds}$

Foot-pounds to Newton Meters
 $\text{Ft-lbs.} \times 135.582 = \text{Nm}$

Newton Meters to Foot-pounds
 $\text{Nm} \times 0.737562 = \text{Ft-lbs.}$

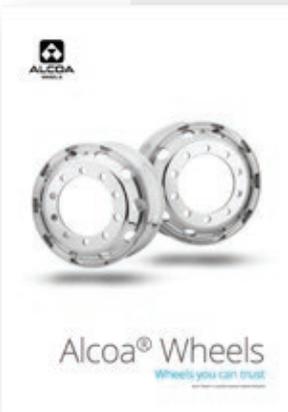
17. Links and references



> Service manual



> Limited warranty



> General brochure



> Where to buy



> Cleaning instructions



> Accessory & maintenance products



> Specification sheet



> YouTube



18. Contact

Fleet Service Center Europe

Howmet-Kőfém Ltd.
Howmet Wheel Systems
1-15 Verseci út
H-8000 Székesfehérvár, Hungary

Email: fleet@howmet.com
Web: www.alcoafleet.eu
Tel: +36 22 531 841

Marketing and Sales Europe

Howmet-Kőfém Ltd.
Howmet Wheel Systems
1-15 Verseci út
H-8000 Székesfehérvár, Hungary

Email: info.wheels@howmet.com
Web: www.alcoawheelseurope.com

Global contact
www.alcoawheels.com



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HOWMET WHEEL SYSTEMS

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