



SERVICE MANUAL

FOR ALCOA WHEELS

Service Manual for Alcoa Wheels Edition 2

Europe, Latin America, Asia and Pacific Rim, Edition 2

March 2017 | Supersedes January 2010

1. Manual	4
2. Limited warranty for Alcoa Wheels	4
3. Safety	6
4. Wheel selection.....	7
4.a. Specification Sheet for Alcoa Wheels	7
4.b. Disc brake equipped axles.....	7
4.c. General characteristics.....	8
4.d. Identification of Alcoa Wheels.....	8
4.e. Table: matching tyre to rim	11
4.f. Wheel measurement	13
4.f.i. How to measure minimum dual spacing (for dual mounted wheels)	13
4.f.ii. How to measure offset (for single mounted wheels)	14
4.g. Mixed application of Alcoa Wheels and steel wheels.....	15
4.h. Owner / in-service identification.....	17
5. Putting wheels in service.....	18
5.a. Putting wheels in service / hidden damage	18
5.b. Putting wheels in service / wheel alteration.....	19
5.c. Putting wheels in service / mounting area and support surface diameters.....	19
5.d. Putting wheels in service / before tyre mounting	20
5.e. Valves for Alcoa Wheels	20
5.e.i. Valves with black T-shape grommet with 1-piece nut.....	21
5.e.ii. Valve nuts and torque.....	22
5.e.iii. Valves, general recommendations	22
5.e.iv. Replacing valves	23
5.e.v. TPMS modules.....	24
5.f. Valve extensions.....	24
6. Before mounting tubeless tyres	25
6.a. Safety and compliance.....	25
6.b. Tools and machines.....	25
6.c. Inspection	26
6.d. Matching of tyre, wheel and axle load	26
6.e. Valve	27
6.f. Lubricant.....	27
6.g. Mounting tyres on symmetrical and non-symmetrical drop well wheels	28
6.h. Symmetrical drop well wheels with safety hump.....	28
7. Mounting tubeless tyres on Alcoa Wheels	29
7.a. Mounting tyre to rim	29
7.b. Manual operation mounting and demounting tubeless tyres.....	31
7.c. Inflation and bead seating check	31
8. Deflating and demounting tubeless tyres from Alcoa Wheels	35
8.a. Before deflating and demounting	35
8.b. Machines, tools and lubricants	35
8.b.i. Machines.....	35
8.b.ii. Tools	35
8.b.iii. Lubricants	36
8.c. Deflating and demounting.....	36
9. Balancing Alcoa Wheels with adhesive weights	39
10. Wheel installation.....	41
10.a. Wheel installation preparation	41
10.b. At wheel installation	45
10.c. Hub centering.....	46
10.d. Disc thickness and thread engagement.....	47

11. Mounting hardware	47
11.a. Mounting Alcoa Wheels with standard 2-piece flange nuts and replacing wheel studs	48
11.a.i. How to measure stud stand out (axles with drum brakes)	49
11.a.ii. Confirming proper stud stand out	49
11.a.iii. Availability nuts	50
11.a.iv. Availability studs	50
11.a.v. Extra-long studs	50
11.b. Mounting Alcoa Wheels with standard length studs and sleeved nuts	51
11.b.i. How to check sufficient thread engagement	52
11.b.ii. Wheels studs with unthreaded part / 'bottom out' condition	52
11.b.iii. Wheel studs inspection	53
11.c. 2-piece hex head sleeved nuts for Alcoa Wheels	53
11.d. Mounting hardware for Alcoa Wheels specifically made for Volvo	55
12. Wheel nuts	56
12.a. Tightening nuts	56
12.b. Keep wheel nuts tight	58
12.c. Dualling with steel wheels	59
12.d. Incorrect assemblies	60
13. Wheels in service	61
13.a. Inspect thoroughly and frequently	61
13.b. Hidden damage	61
13.c. Wheel alteration	62
13.d. Heat damage	63
13.e. Dimension checks	65
13.e.i. Dimension checks	65
13.e.ii. Dimension checks	66
13.e.iii. Dimension checks	67
13.f. Tyre wear or ride problems	68
13.g. Rim flange wear	69
13.g.i. Alcoa Wheels rim flange wear gauge instructions	69
13.g.ii. Determining rim flange wear	70
13.g.iii. Rim flange maintenance / edge removal procedures	71
13.g.iv. Dura-Flange®	74
13.h. Cracked or damaged wheel checks	74
13.h.i. Mounting area	75
13.h.ii. Bolt holes	77
13.h.iii. Vent - or hand holes and disc area	77
13.h.iv. Rim area (drop center, valve hole area and bead seats)	78
13.i. Corrosion	80
13.i.i. Corrosion at hub bore and wheel disc or mounting face	81
13.i.ii. Corrosion at drop center	81
13.i.iii. Corrosion at valve hole	82
13.j. Regular inspection and removal of corrosion	83
14. Care and Maintenance	84
14.a. Maintenance against corrosion Brushed, Mirror Polished and LVL ONE® wheels	84
14.b. Maintenance and cleaning Dura-Bright® XBR® and Dura-Bright® EVO surface treated wheels	85
14.b.i. Maintenance and cleaning Dura-Bright® XBR® and Dura-Bright® EVO surface treated Alcoa Wheels in 5 steps	87
14.b.ii. Additional care and tips for Dura-Bright® XBR® and Dura-Bright® EVO surface treated Alcoa Wheels	88
14.c. Maintenance Dura-Flange® wheels	91
15. Glossary of common terms and conversion	92
15.a. Glossary of common terms	92
15.b. Conversion factors	94
15.c. Common terms	94
16. Contact	95

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 at www.arconic.com/alcoawheels.

Free hard copies are also available from Arconic Wheel and Transportation Products and authorized distributors of Alcoa Wheels upon request. Contact your regional Arconic Wheel and Transportation Products location.

2. Limited warranty for Alcoa Wheels

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

Arconic 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.

Arconic 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.

Arconic warrants the 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.

Arconic warrants the Dura-Bright® surface treatment against:

- filiform corrosion (worm or hair like lines, generally milky in appearance, underneath surface protective treatment and emanating from damage to the surface treatment such as nicks, scratches or damage from mounting hardware or wheel weights);
- blistering or peeling due to loss of adhesion of the surface treatment; and
- lift off of the surface treatment due to physical damage (nicks, scratches, gouges).

The foregoing Dura-Bright® surface treatment is warranted for 60 months from the date of manufacture as shown on the Wheel.

If the Dura-Flange® rim flange treatment or Dura-Bright® surface treatment fail in normal use or service (see the qualifications section below) to meet the foregoing warranties on a Wheel, Arconic agrees, without charge, to replace the Wheel.

Qualifications:

Arconic does not warrant, and will not repair or replace or make adjustment, with respect to any Wheel that has been subjected to misuse or abuse 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) Loading the Wheel beyond the applicable maximum Wheel load as specified by Arconic;
- (c) Inflating tyres beyond the applicable maximum pressure as specified by Arconic;
- (d) Changing the original condition of the Wheel by alteration or by subjecting it to any processing such as welding or straightening;
- (e) Accidents, 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;
- (f) Failure to follow maintenance, instructions or warnings set forth in the Service Manual for Alcoa Wheels (“Service Manual”), Technical Bulletins and other literature for Alcoa Wheels. Recommended maintenance includes, without limitation, using proper torque, periodic cleaning, polishing, valve replacement, periodic inspection for damage, loose lug nuts and rim flange wear inspections and procedures;
- (g) Nicks, scratches and other surface blemishes resulting from neglect, road salt, harsh conditions, improper maintenance, cleaning, road debris, curbing, accident or operation;
- (h) Rim flange wear (unless the rim flange has been treated with Dura-Flange®);
- (i) Using a spacer or adaptor of any kind;
- (j) Damaging the surface during tyre mounting and installation due to the use of improper tools or balancing with wheel weights; or
- (k) Damage due to cleaning with abrasives, abrasive brushes, steel wool, scouring pads, or strong chemicals (acids or alkaline).

THERE IS NO WARRANTY THAT THE WHEEL SHALL BE MERCHANTABILITY OR FIT FOR ANY PARTICULAR PURPOSE, NOR IS THERE ANY OTHER WARRANTY, EXPRESS OR IMPLIED, EXCEPT SUCH AS IS EXPRESSLY SET FORTH HEREIN. ARCONIC SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT OR SPECIAL DAMAGES FOR ANY BREACH OF WARRANTY. ARCONIC'S LIABILITY AND THE PURCHASER'S EXCLUSIVE REMEDY IS LIMITED TO REPAIR OR REPLACEMENT OF THE WHEEL AS STATED IN THIS LIMITED WARRANTY.

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

Copies of the Service Manual are available free of charge at www.arconic.com/alcoawheels



www.arconic.com/alcoawheels/europe/en/fleet.asp



or by contacting Arconic Wheel and Transportation Products at +32 11 45 84 60 or at the address below:

Arconic Wheel and Transportation Products Europe
 Industrieweg 135
 3583 Paal, Belgium

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 additional copies of the manual and other useful items listed below, available free of charge, or for the most recent update, contact your Arconic Wheel and Transportation location or go to web page www.arconic.com/alcoawheels



Publications available free from Arconic:

- Service Manual For Alcoa Wheels
- Specification Sheet of Alcoa Wheels
- Cleaning of Alcoa Wheels
- Dura-Bright® service bulletin
- ... and 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.

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.



1 in 1000
TYPICAL INDUSTRY

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 10
THE SERVICE INDUSTRY

Graphic 3-1

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, call Arconic Wheel and Transportation Products or an authorized distributor of Alcoa Wheels. To view the document online or download go to www.arconic.com/alcoawheels

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 the Alcoa Wheel ending with "DB". Dura-Bright® surface treatment is available on most dimensions.

Note: Dura-Flange® is available on Brushed finish only. Dura-Flange® wheels have the part number for Alcoa Wheels ending with "oDF" or "7DF".

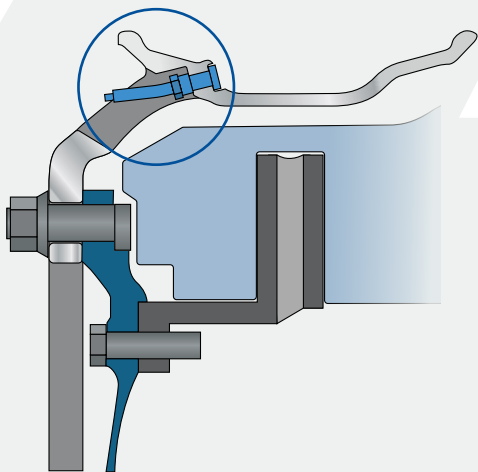
4.b. Disc brake equipped axles

Most Alcoa Wheels come with a protected or outboard valve design that reduce 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.

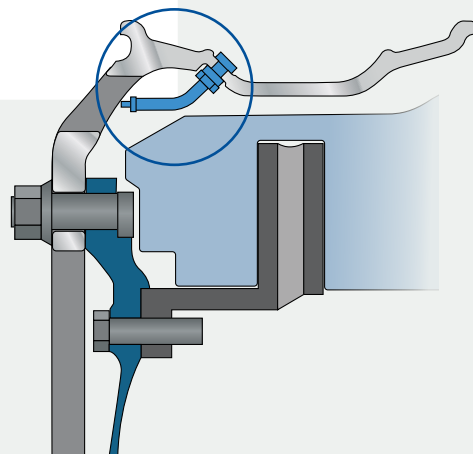
Europe:
All current produced 22.5" and 19.5" Alcoa Wheels have a protected or outboard valve design that can be mounted on axles with disc

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 Pacific Rim:
Consult the regional Arconic 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 alloy
Approved by:	LBF, TÜV, JWL-T and all European MD and HD commercial vehicle manufacturers
ISO certificates:	ISO 14001: 2004 (Environmental Management System) ISO/TS 16949: 2009 (Quality Management System) OHSAS 18001: 2007 (Occupational Health & Safety Management System)
Tyre sizes:	All ETRTO approved sizes
Max. infl. press.:	900 kPa, 130 psi (cold), unless stated otherwise
Nuts:	2-piece nut or 2-piece sleeved nut according to DIN 74361-3 standards
Mounting:	Hub centered according to DIN 74361-3 standards
Valve torque:	12 to 15 Nm (9 to 11 Ft-Lb)
Wheel nut torque:	Recommended by truck or axle manufacturer
Availability wheels:	Through all vehicle manufacturers or authorized distributors for Alcoa Wheels.

4.d. Identification of Alcoa Wheels

Since 1977, all aluminium disc 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 truck 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 truck 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. Wheel identification required by the DOT must be legible. Wheels should be taken out of service and scrapped if this identification is not legible.

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. 892513DB.

All Dura-Flange® wheels have the letters “DF” after the part number e.g. 892510DF.

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

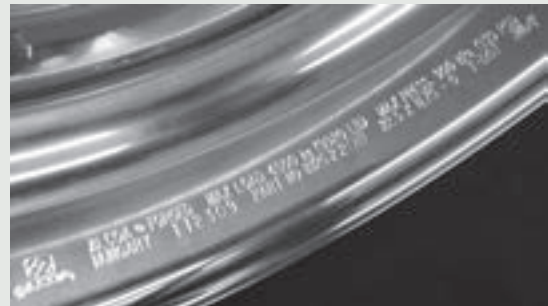
- ALCOA® FORGED
- MAX LOAD 3550 Kg (wheel load rating)
- MAX KPa 952 T-DOT (maximum inflation pressure)
- T-DOT (FMVSS 120 designation)
- JWLT (symbol Japanese impact test)
- MADE IN HUNGARY (can also be: JAPAN / MEXICO / U.S.A.)
- 021703 (date of manufacture month/day/year, in this case February 17, 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

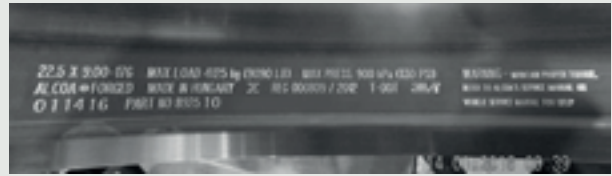
- ALCOA® FORGED
- MAX LOAD 4500 kg (9920 LB) (wheel load rating)
- MAX PRESS. 900 kPa (130 PSI) (maximum inflation pressure)
- HUNGARY (made in...) (can also be: JAPAN / MEXICO / U.S.A.)
- 112309 (date of manufacture month/day/year, in this case November 23, 2009)
- PART NO 812522DB (part number)
- 22,5 x 11,75 - o (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: JAPAN / MEXICO / U.S.A.)
- REG 000809/2012 (Inmetro registration number) (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: JAPAN / MEXICO / U.S.A.)
- REG 000809/2012 (Inmetro registration number) (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 4-8

4.e. Table: matching tyre to rim

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 Arconic Wheel and Transportation Products 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

Rim width to tyre matching chart (most common sizes) for medium and heavy trucks according to ETRTO - Standards Manual - 2017

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
265/70	6.75	7.50	
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	11.75		
375	9.75	11.75	
445	13.00	14.00	
605	18.00		

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 4-10

4.f. Wheel measurement

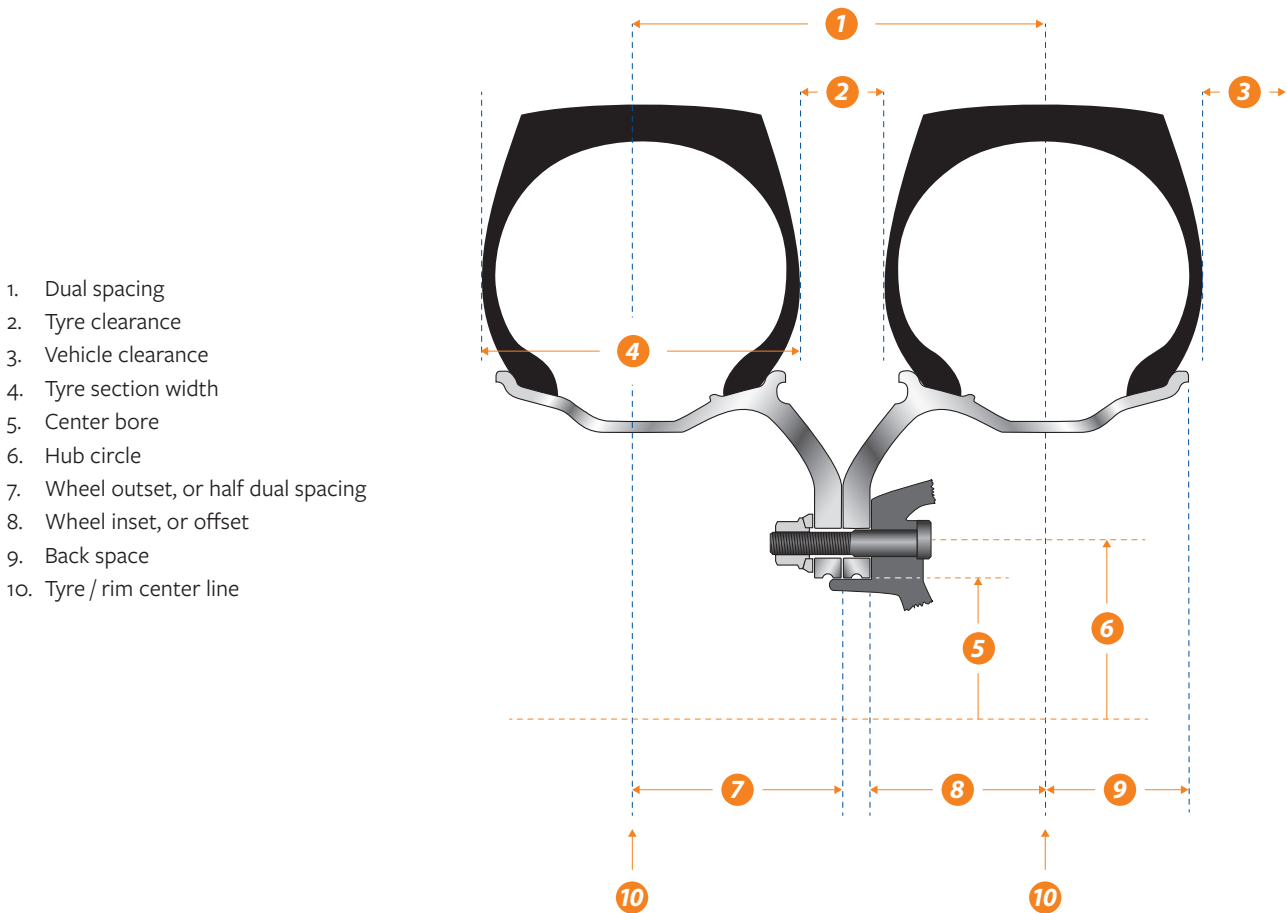
4.f.i. How to measure minimum dual spacing (for dual mounted wheels)

Minimum dual spacing measurement is determined by tyre manufacturers and may be obtained from the tyre manufacturers' handbooks. To determine if aluminium dual Alcoa Wheels assembly 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 sufficient 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 center line of the rim. Maintaining proper tyre inflation and load ratings are essential to maintaining proper minimum dual spacing.



Graphic 4-11

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 millimeters.

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 truck 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)

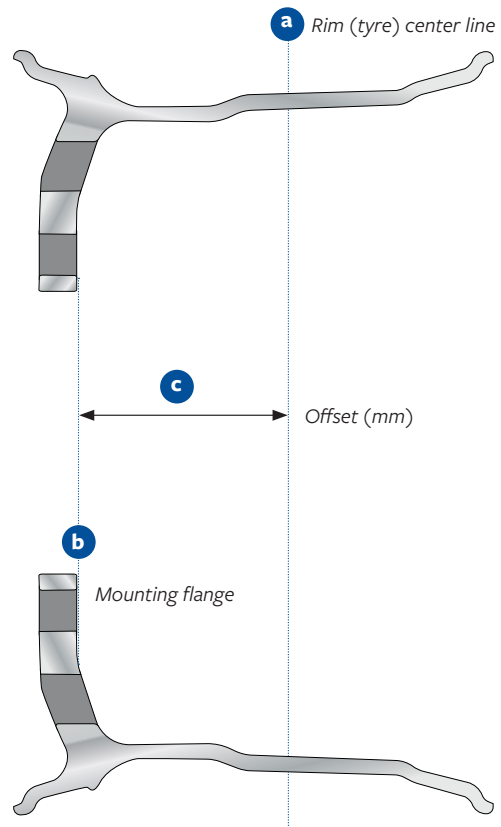
The offset (or inset) measurement is determined by the truck or (trailer) axle manufacturer and may be obtained from the truck or axle manufacturers' handbooks. To determine if the wheel matches the recommended offset (or inset) of a truck or trailer axle, consult the Specification Sheet for Alcoa Wheels.

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 OS is 120 measured in millimeters.

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

- a) Rim (tyre) center line
- b) Mounting flange, wheel disc
- c) Offset or inset
distance rim center line to mounting flange
measured in millimeters



Graphic 4-12

SINGLE MOUNTING

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

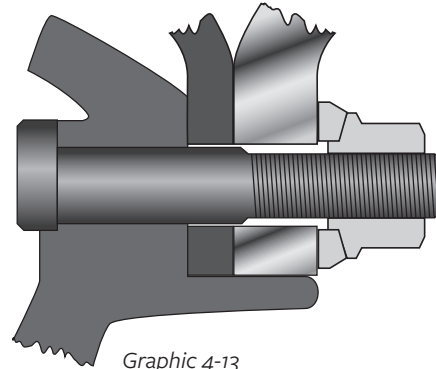
4.g. Mixed application of Alcoa Wheels and steel wheels

Aluminium truck 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 center 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.



Graphic 4-13

Warning



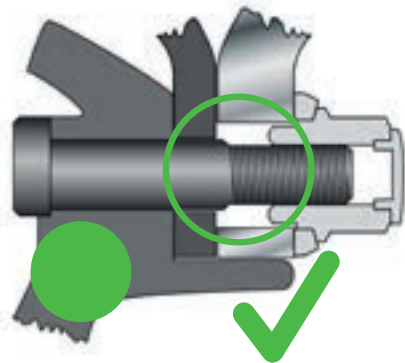
When mounting painted steel wheels with Alcoa Wheels, in dual application, be cautious of excessive paint build-up on the steel wheel.

Excessive paint can reduce the clamping force and allow the wheels to become loose, which can lead to serious injury or death.

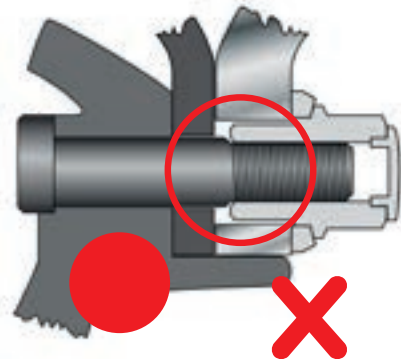
Follow the proper wheel installation and maintenance practices as described in this Section.

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 4-14



Graphic 4-15

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.

HUB ENGAGEMENT

1. Stud standout and thread engagement (hardware)

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 wheel from 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: the disc thickness of 1x steel wheel and 1x wheel from Alcoa Wheels added with a regular 2-piece flange nut M22 x 1.5 result in a stud standout of $14 + 22 + 27 + 3 = 66$ mm.

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:

- 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 to make sure the hub has a minimum pilot length that allows no less than 5 mm for the outer wheel to be centered, excluding the bevelled edges.

For example:

The horizontal part of the pilot 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 4-16

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 aluminium truck Alcoa Wheels are dualled with steel truck wheels, it is recommended that DiscMates for Alcoa Wheels or nylon protection gaskets are used to help prevent corrosion.

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.

Arconic Wheel and Transportation Products 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.

4.h. Owner / in-service identification

Some fleets wish to identify wheels as to OWNERSHIP and IN-SERVICE dates. Arconic Wheel and Transportation Products recommends that fleets and owner-operators adopt the practice of permanently stamping wheels with the date they are first 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 centers and a minimum of 2,5 cm or 1.0" 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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp



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 proper 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/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 enlargement and elongation which can occur if the nuts are not kept tight. See Section 12.a. Dirt streaks radiating from stud and/or vent holes may indicate loose nuts. See picture 5-1.



Picture 5-1

5.b. Putting wheels in service / wheel alteration

Arconic Wheel and Transportation Products 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 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 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.

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	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 5-2

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 have to be checked for cracks on the inner and outer attachment face each 50.000 km.
- In case cracks are detected wheels have to be removed from service immediately and permanently.

5.d. Putting wheels in service / before tyre mounting

- 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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp



- 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 sufficient 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 foreign products 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 valve stems be 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 removed. See the recommendations in Section 7 and Section 8.

5.e. Valves for Alcoa Wheels

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

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

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

40MS-00N, 54MS-00N, 60MS-00N (not pictured), 70MS-07N2, 83MS-00N original equipment valves (Picture 5-3)

70MS-27N, 70MS-45N (not pictured), 70MS-60N (not pictured) replacement valves (Picture 5-3).

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



Picture 5-3

It also significantly reduces the chance of damaging this area when applying too much torque.

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.



Picture 5-4

Picture 5-5:

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

www.arconic.com/alcoawheels/europe/en/distributors.asp



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

See the Specification Sheet for Alcoa Wheels:

www.arconic.com/alcoawheels/europe/pdf/en/downloads_spec_en.pdf



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.e.iii. Valves, general recommendations

DO's

- It is recommended that valve stems be replaced at every tyre change.
- Before mounting the new valve, check if the valve corresponds with the wheel. Use the Specification Sheet for Alcoa Wheels for reference.
- 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.
- When replacing O-rings or grommets, use silicone, Viton® or EPDM O-rings or grommets.
- When replacing valve stems, it is recommended that the threads and O-ring or grommet be lubricated with VALVEgrease for Alcoa Wheels or with a non-water non-metal based lubricant.
- When inflating the tyre use dry air.
- Valve dust caps with an air seal are recommended.

DON'Ts

- Do not fit valves for steel wheels. Valves for steel wheels may have different diameters, different bends (angle) and/or insufficient thread length.
- Do not use unplated brass valves. Aluminium and brass cause accelerated galvanic corrosion. This corrosion may result in leakage.
- Do not bend the standard valve to another shape.
- Do not use rubber O-rings or grommets.
- Do not inflate the tyre with air coming from an air system, using automatic lubrication for power tools.
- Do not use balancing liquids or liquid sealants. Products may cause oxidation of the wheel's bead seat and drop center. Cracks may be initiated with air loss as a result.
- Balancing with powder or granulates are not recommended. These products may cause malfunctioning of the valve core with air loss as a result.
- 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 can occur in the valve base and/or the wheel's valve hole area, causing air loss.
- 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 edges or burrs.

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 area without harming the surface.

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 1" inch or 2,5 centimeters in diameter around the valve hole.

Before installing the valve, apply a thin coat of VALVEgrease for Alcoa Wheels or non-water non-metal based lubricant on the shaft and base where the O-ring or T-shape grommet is located. 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 host 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

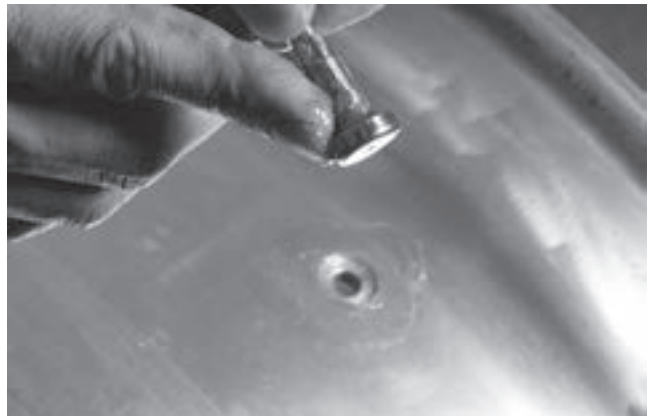
Refer to truck or trailer OEM for installment or replacement of valves with TPMS modules.



Picture 5-6



Picture 5-7



Picture 5-8

5.e.v. TPMS modules

Vehicle OEM may offer a Tyre Pressure Monitoring System on vehicles, replacing the Alcoa Wheels valve. A Tyre Pressure Monitoring System 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 valves are available through the vehicle manufacturer organization only.

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

Unless truck / 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 1" inch or 2,5 centimeters in diameter around the valve hole.

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

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 inner tyre of a regular 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 (Polyoxymethylene) valve stem extensions are recommended and can be obtained from an authorized distributor of Alcoa Wheels.



Picture 5-9

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. Arconic Wheel and Transportation Products offers all listed valves for Alcoa Wheels through its distributor networks. For more info please contact an authorized distributor of Alcoa Wheels or Arconic Wheel and Transportation Products.

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 may result in serious injury or death.

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

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

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

Warning



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

Failure to follow proper tyre fitment or maintenance practices may result in injury or death.

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.

6

6.b. Tools and machines

Warning



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

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

Tyre servicing must only be performed by trained personnel.

Typical tyre service tools:

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

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

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.

6.c. Inspection

1. Do not gouge or nick the wheel.
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.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. Table: matching tyre to rim.
2. Alcoa Wheels for commercial vehicle tubeless tyres have a 15° bead seat angle and accommodate tubeless tyres with a 15° bead only. Never use tube type tyres or tyres with different angled beads on Alcoa Wheels with a 15° bead seat angle.
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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp



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 is 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 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 correct 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 valve stem adjacent to low point mark on the tyre.
3. For additional information see Specification Sheet for Alcoa Wheels, column 'Valves'.

6.f. Lubricant

1. Always lubricate tyre/wheel beads to make tyre demounting and mounting easier and seat the beads properly.
2. Apply a non-water based lubricant for tyre mounting that does not contain metals and is pH neutral.
3. Alternatively use a non-flammable vegetable or soap-based rubber lubricant, always pH neutral, on the beads and rim surfaces.

Lubricating bead seats and drop well center:

- 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 seat and drop well surface.
- Corroded bead seats may not be air tight. Corrosion in the bead seats may initiate cracks with air loss as a result.
- Corrosion at the drop well or drop center 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 loosing 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/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

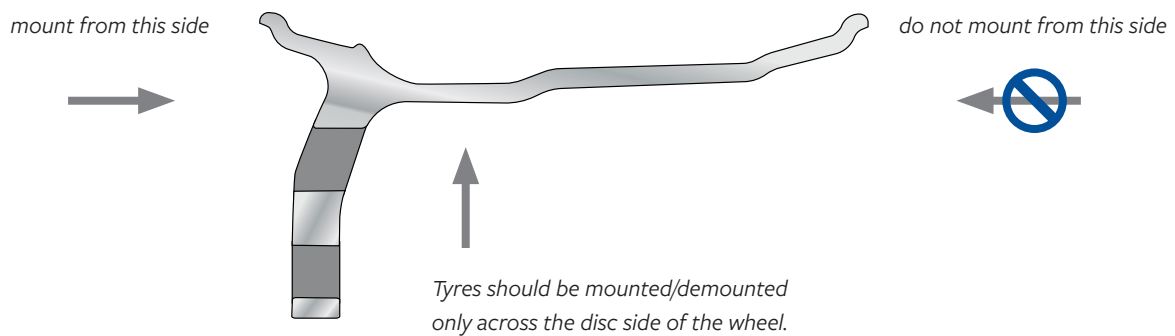
Alcoa Wheels may contain a symmetrical drop well with a narrow ledge on both sides of the rim. This feature allows mounting of the tyre from either side of the wheel.

However, some Alcoa Wheels are non-symmetrical and contain a narrow ledge on only one side of the wheel (see graphic below). 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, all mounting and dismounting 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 dismounting of the tyre may be performed from the side of the wheel without the safety hump by preference.

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 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.

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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp



1. Do not gouge or nick the wheel.
Note: Additional care should be used when mounting Alcoa 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 center well. Single-piece tubeless rims and wheels must be mounted from the short side of the drop center well. I.e. tyre beads should be mounted over the rim flange closest to the wheel well.
Note: Aluminium wheels typically have symmetrical drop centers so tyres can be mounted from either side. However, on certain aluminium wheels, the short side of the drop center 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 for tyre fitting, as well as neglecting to clean the surface of the bead seat, can lead to loss of air caused by corrosion, oxidization 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.
5. After cleaning the bead seats, insert a wire down the valve stem to ensure it is not blocked.
6. Position the wheel on the machine. Lubricate wheel (entire air chamber surface) and tyre bead 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.

7. Attach the “gripper” i.e. mounting aid to the front rim flange.

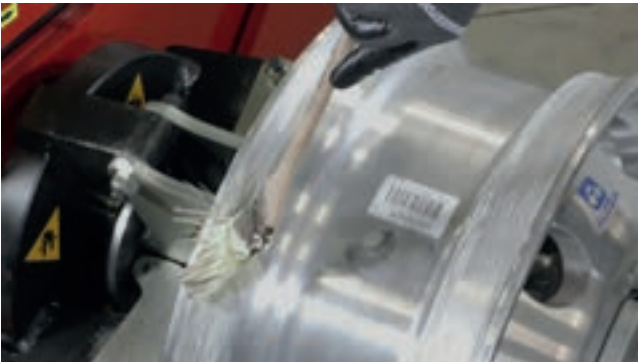


Picture 7-1



Picture 7-2

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



Picture 7-3



Picture 7-4

9. Lubricate both tyre beads and inside of the second bead just before mounting the tyre.



Picture 7-5



Picture 7-6



Picture 7-7

10. Position the tyre on the wheel with the rear bead positioned on the “gripper”. Position the “tool arm” 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 “gripper”.



Picture 7-8



Picture 7-9



Picture 7-10

11. 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 “gripper” a little above the “tool arm”, below the valve location. Turn the wheel clockwise until the second bead is properly mounted. Detach the “gripper” and disengage the “tool arm”.

IMPORTANT

Do not cut or damage the bead of the tyre.



Picture 7-11

7.b. Manual operation mounting and demounting tubeless tyres

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

Note:

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

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

7

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 7.12 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 sidewall. Pay attention to any popping or snapping sounds. If ANY of these conditions are present: STOP! DO NOT approach tyre. 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.

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 restraining device or safety cage.

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



Picture 7-12

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, 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.

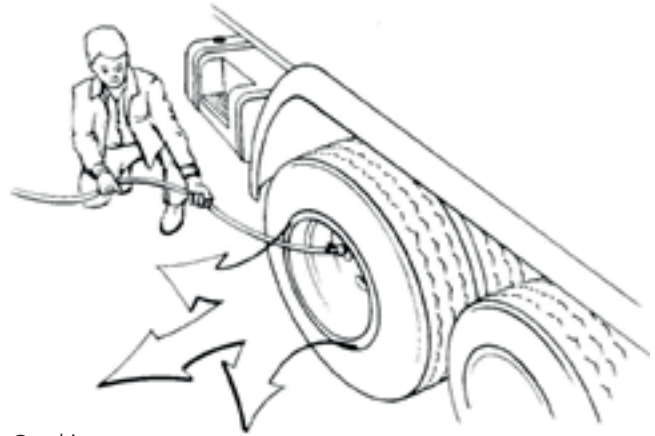
6. Place tyre/wheel assembly inside an approved restraining device or tyre cage. See picture 7.12. After the tyre beads are seated.
7. Continue to inflate the tyre to its recommended inflation pressure. Refer to tyre manufacturers' recommendations for proper tyre pressures. Using a clip-on air chuck or a self-locking straight chuck with remote valve and pressure gauge, inflate the tyre/wheel assembly to proper pressure.

IMPORTANT

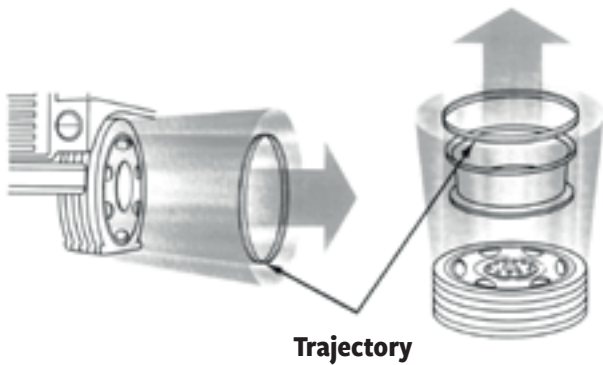
When inflating a tyre, stay out of the trajectory. See graphics 7-13, 7-14 and 7-15. DO NOT stand or lean any part of your body against, or reach over, the approved restraining device or tyre cage during inflation.

IMPORTANT

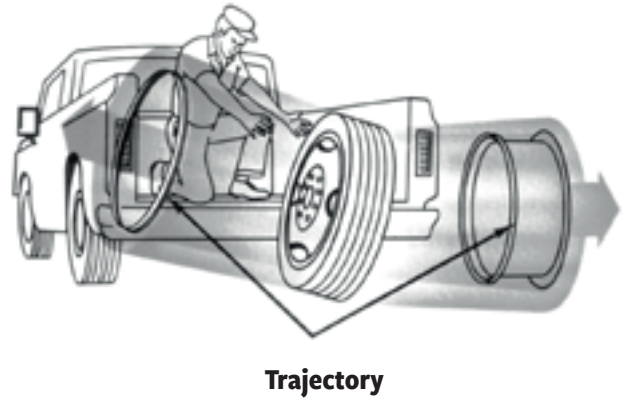
Look for distortions, undulations, or other irregularities in the tyre sidewall. Pay attention to any popping or snapping sounds. If ANY of these conditions are present: STOP! DO NOT approach tyre. Before removing the assembly from the approved restraining device or tyre cage (picture 7.12), completely 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 7-13



Graphic 7-14



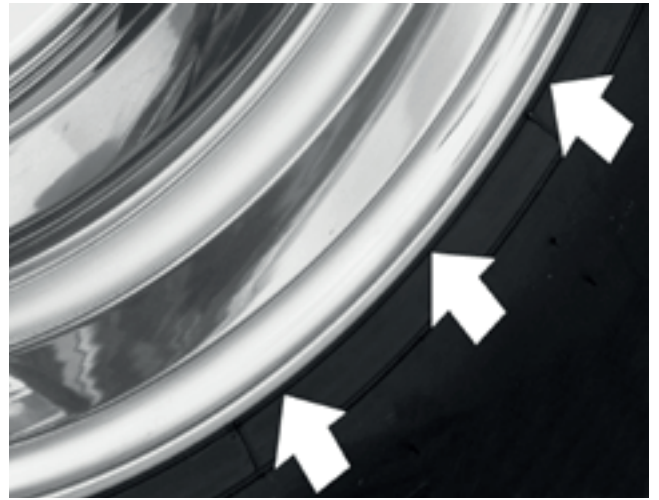
Graphic 7-15

- 8. Do not over-inflate. Use the tyre 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 truck tyres have a “guide rib” or “mounting ring” molded into the sidewall next to the tyre bead. See picture 7-16. When the tyre is inflated, this molded ring should be evenly spaced from the rim flange all the way around the wheel. See picture 7-17. Check the position of the mounting ring before removing the assembly from the approved restraint device or tyre cage.

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



Picture 7-16



Picture 7-17

11. Check the tyre/wheel assembly for air leaks. Install a suitable valve cap.

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.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 rims. Refer to "Typical Tyre Service Tools". See Section 6.b. Never strike the tyre and/or the wheel assembly with a hammer to unseat the beads. DO NOT use slide impact bead unseating tools with the risk of damaging bead seat, 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 rubber lubricant, pH neutral (chemical inert) on bead seats and other rim surfaces. 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 centers so tyres can be demounted from either side. However, on certain aluminium wheels, the short side of the drop center well is located on the disc side. See Section 6.g.

1. Identify the short side of the drop center well. Single-piece tubeless rims and wheels must be demounted from the short side of the drop center well. I.e. tyre beads should be demounted over the rim flange closest to the wheel well.
2. Remove valve core/air from tyre wheel assembly prior to removal from vehicle and insert a wire down the valve stem to ensure complete deflation.
3. Position the wheel on the machine. Lift the wheel 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 front 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



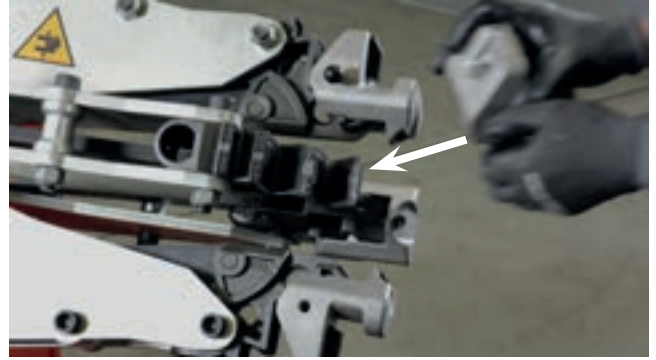
Picture 8-8

Fixture for clamping aluminium wheels



Picture 8-9

Fixtures attachment to machine's chucks



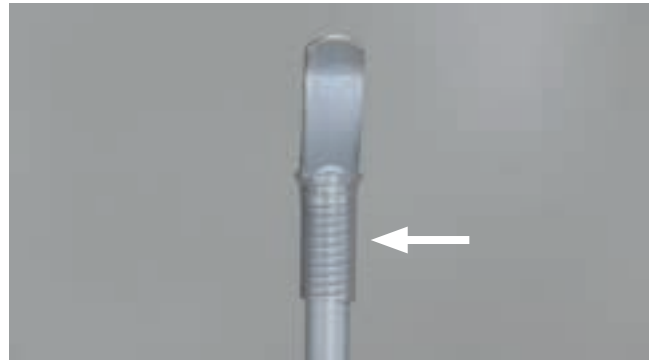
Picture 8-10

Plastic gripper 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 with air loss as a result.

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

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 (liquid or powder) 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 of the weight clamp 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 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, granulates or liquid balancers as well as liquid sealants may harm the inner liner of tubeless tyres. For information consult the tyre manufacturers' recommendations.
- The policy of Arconic Wheel and Transportation Products 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 Sections 2), unless inspection of the wheel shows anomalies related to its use.

Caution



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

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

Arconic Wheel and Transportation Products recommends adhesive style balancing weights for this application.

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 with dry air.



Picture 9-1



Picture 9-2



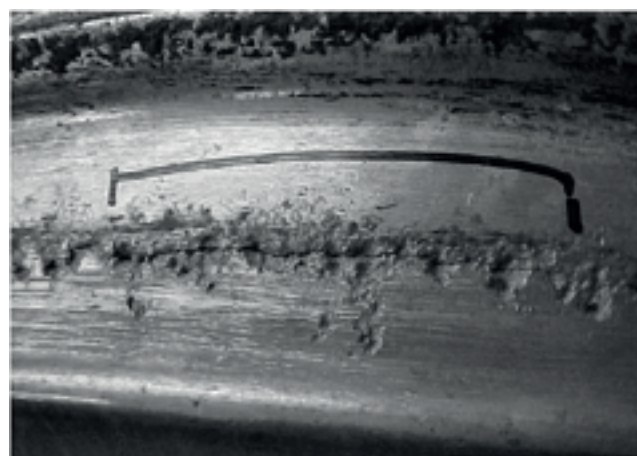
Picture 9-3

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

The valve or valve hole also may not function properly due to corrosion and 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 Arconic limited warranty. See Sections 2, 13.i.ii. 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 training on proper installation and maintenance, available free of charge from Arconic Wheel and Transportation Products, or for the most recent updates, contact Arconic Wheel and Transportation Products via web page www.arconic.com/alcoawheels

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

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.

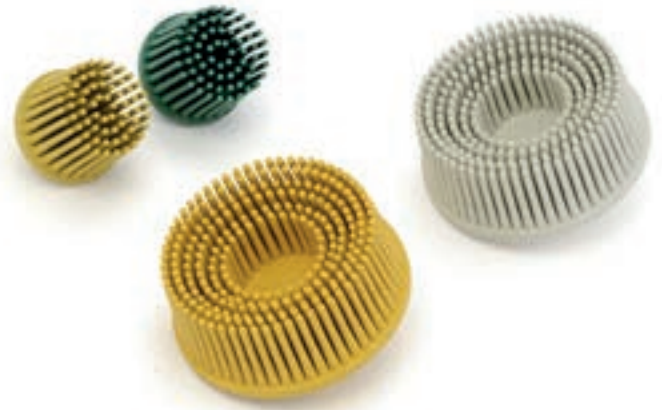


Picture 10-3

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 Arconic Wheel and Transportation Products at +32 11 458 460, or go to web page: www.arconic.com/alcoawheels



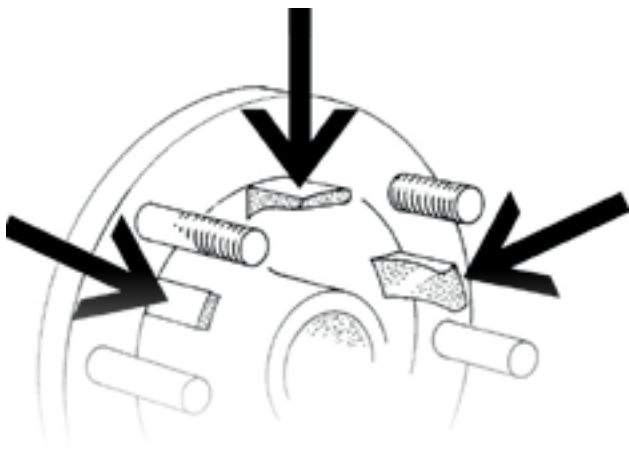
Picture 10-4

STEP 4

Apply a layer of HUBgrease for Alcoa Wheels 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 centering edge of the hub / axle. See Graphic 10-6.



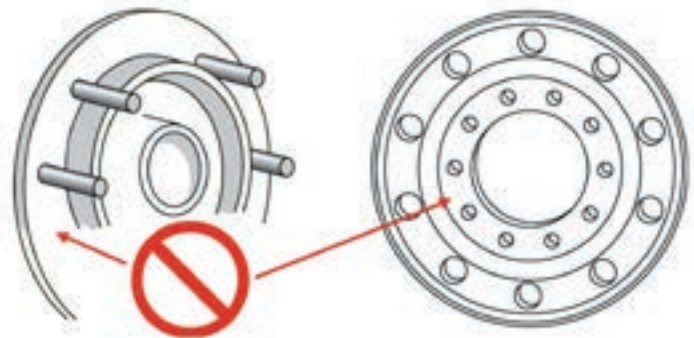
Picture 10-5



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 it 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.

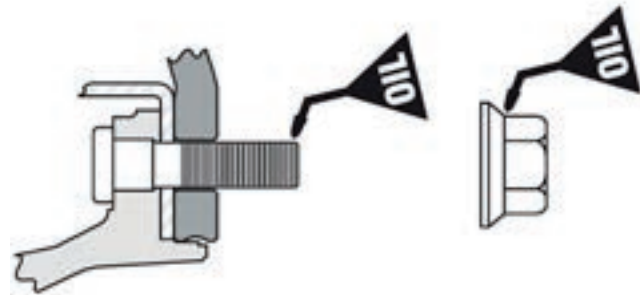


Picture 10-8

STEP 5

For nuts used on hub piloted wheels apply two drops to the point between the nut and the integrated washer (see graphic 10-10) and two drops of motor oil to the first two threads of the tip of each stud (see graphic 10-9). This will minimize corrosion between the mating threading. 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

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.

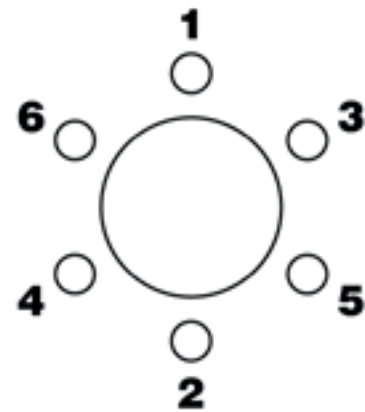
For information contact Arconic Wheel and Transportation Products via web page www.arconic.com/alcoawheels



Picture 10-11

STEP 6

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



Graphic 10-12

IMPORTANT

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

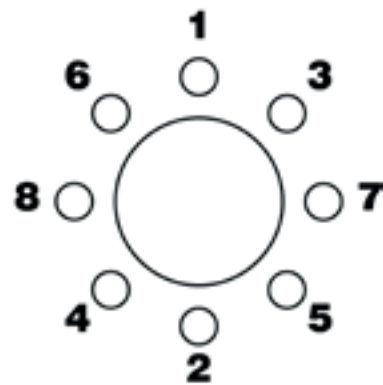
Check torque frequently from then on.

NOTICE

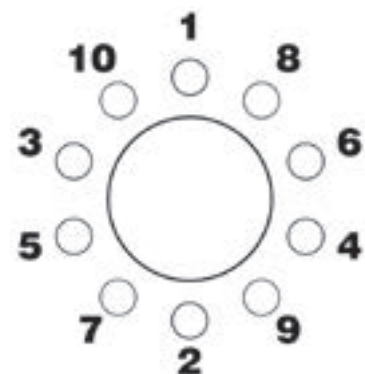
If nuts require frequent tightening, studs break frequently, wheel nut washers break or bolt holes are pounding out, hardware and mounting practices should be reviewed.

For training on proper installation and maintenance, available free of charge from Arconic Wheel and Transportation Products, or for the most recent updates, contact Arconic Wheel and Transportation Products via web page: www.arconic.com/alcoawheels

For additional information see Section 12.a.



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.

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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp
- 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.



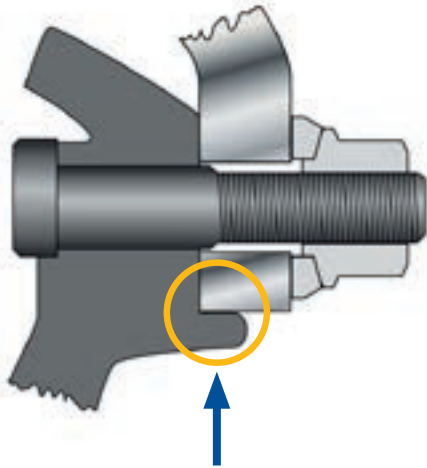
1. Make sure all wheel nuts are properly torqued. Check them often. See Section 12.a. If the wheel is loose, the holes will pound out (deform). If some nuts are tight and others are loose, the wheel may develop cracks or studs may break. This condition may cause wheels to loosen and disengage from the 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 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 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 Arconic Wheel and Transportation Products. Do not paint 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 also between the dual mounted wheels contact surfaces. See Sections 4.g. and 10.a. DiscMates for Alcoa Wheels or a nylon protection gaskets are recommended to be replaced when the tyre/wheel assemblies are removed and reinstalled.

10.c. Hub centering

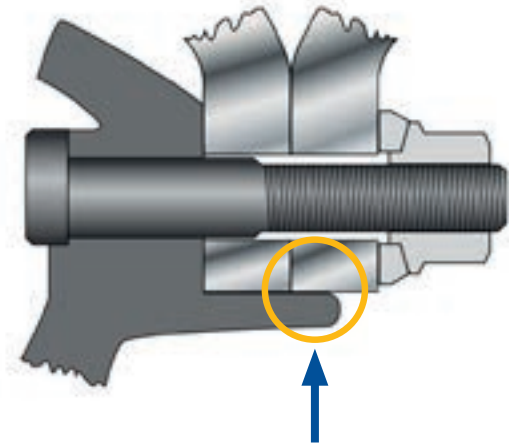
All European type Alcoa Wheels for medium and heavy duty commercial vehicles are hub centered wheels. European type Alcoa Wheels have cylindrical bolt holes and are not suitable for bolt centering with conical or spherical nuts: never use any kind of this type of hardware on wheels with cylindrical bolt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

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 centers the wheels. The pilot tab length for sufficient centering must be 5 mm or more for single mounting (Graphic 10-15) and 1x disc thickness + 5mm 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

11

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 for service.



Picture 10-17

10.d. Disc thickness and thread engagement

The mounting flange or disc of medium and heavy duty truck Alcoa Wheels is thicker (19.0 to 28.5 mm) than the mounting flange of steel wheels (10 to 14 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 hereafter, or
- Sleeved nuts (available from Arconic Wheel and Transportation Products) with standard length studs, as described in Section 11.b. hereafter

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 a wheel from Alcoa Wheels 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.

IMPORTANT

1-piece flange nuts are not approved for use on any Alcoa Wheels application.

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.

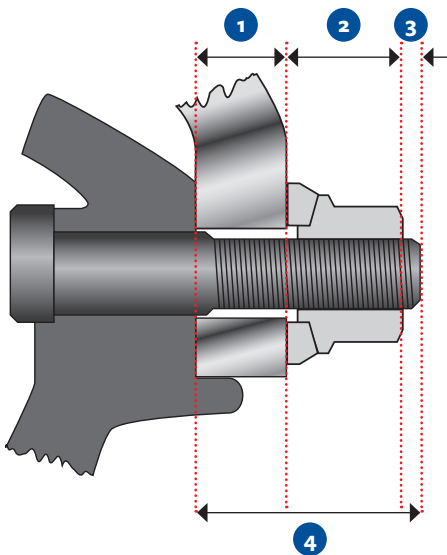
The stud standout is measured from the flat mounting surface of the hub, or drum brake, which is in contact with the disc of the wheel, to the outer end of the stud.

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

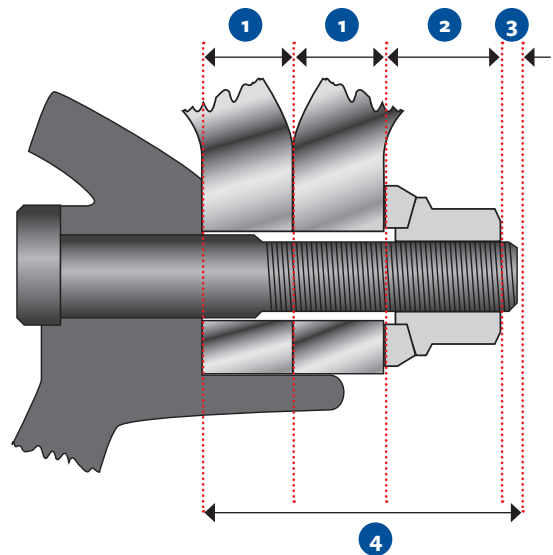
Alcoa Wheels with this type of mounting system require longer studs than for steel wheels. The stud standout must be long enough to cover the disc thickness of one or both aluminium wheels, the height of the wheel nut and an additional two threads protruding from the nut.

For single mounting the minimum stud standout required = 1x disc thickness wheel of Alcoa Wheels + height of standard nut + 2 full threads, 3 mm** @ M22, M20 or M18 x 1.5

For dual mounting the minimum stud standout required = 2x disc thickness wheel of Alcoa Wheels + height of standard nut + 2 full threads, 3 mm** @ M22, M20 or M18 x 1.5



Graphic 11-4



Graphic 11-5

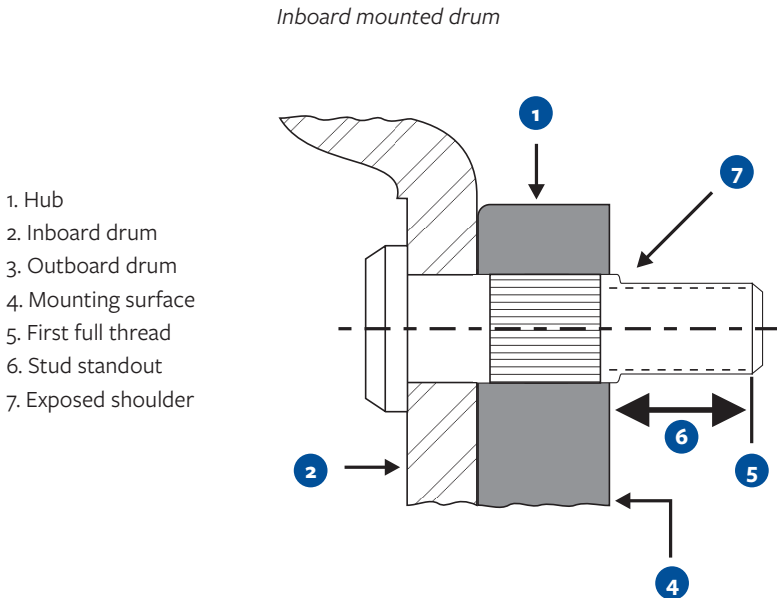
1. Disc thickness wheel of Alcoa Wheels
2. Height of standard nut
3. 2 full threads
4. Total stud standout

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

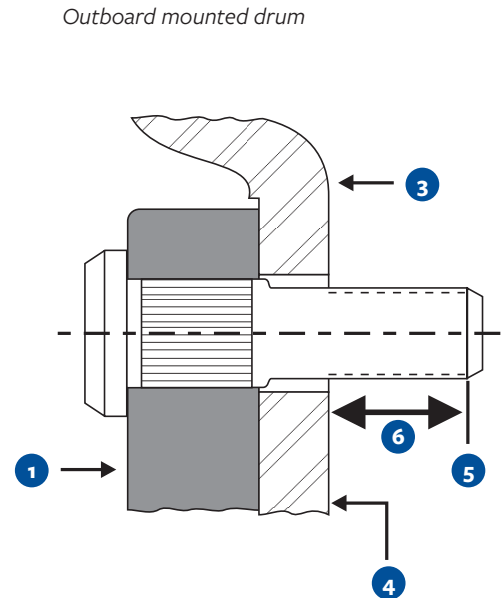
11.a.i. How to measure stud standout (axles with drum brakes)

Stud standout is measured from the axle end mounting surface:

- I.e. 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
- I.e. the drum for outboard mounted drums of drum brake operated axles to the first complete thread at the outside end of the stud



Graphic 11-6



Graphic 11-7

IMPORTANT

Check for “Bottom Out” when using sleeved nuts at exposed shoulder (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 (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 face

11.a.ii. Confirming proper stud standout

For safe mounting the stud standout 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 2-piece flange nuts and replacing studs the minimal stud standout must be:

Single mounting:

- 1x disc thickness wheel of 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 1x 22.5 x 14.00 wheel of Alcoa Wheels with 28.5 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud standout of $28.5 + 27 + 3 = 58.5$ mm

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 9.00 Alcoa Wheels with 22 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud standout of $2 \times 22 + 27 + 3 = 74$ mm

Mixed mounting:

For use with 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 wheel of Alcoa Wheels with 22 mm disc thickness and 1x 22.5 x 9.00 steel wheel with 14 mm disc thickness and a regular 2-piece flange nut M22 x 1.5 result in a stud standout of $1x 22 + 1x 14 + 27 + 3 = 66$ mm

11.a.iii. Availability nuts

If hex nuts with greater overall height are used, more stud length is required.

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

Arconic Wheel and Transportation Products (Europe) do not offer OEM nuts. Consult the manufacturers of vehicles or axles for availability of nuts.



Picture 11-8

11.a.iv. Availability studs

Consult your truck or trailer OEM for availability of longer replacement studs M22 (7/8"), M20 or M18 in case of 26, 24 or 21 mm (bolt hole diameter) mounting system, i.e. longer studs and standard nuts.

11.a.v. Extra-long studs



Picture 11-9

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 procedure as described in this Section.

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.

IMPORTANT

1-piece flange nuts 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 Arconic Wheel and Transportation Products.

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 thread engagement between 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 11-10



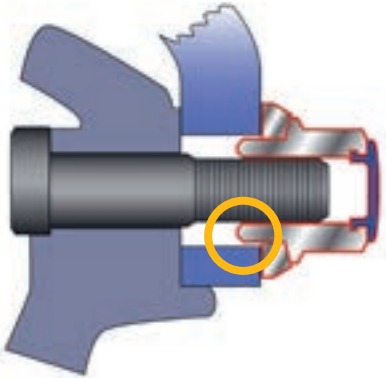
Picture 11-11

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.

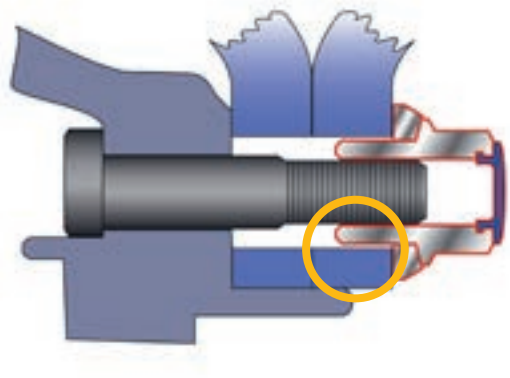
Do not center hub piloted type wheels with sleeved nuts

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



Graphic 11-12

Single mounted wheels require sleeved nuts with a short sleeve



Graphic 11-13

Dual mounted wheels require sleeved nuts with a long sleeve

Short and long sleeved nuts are available from Arconic Wheel and Transportation Products in thread sizes for most European MD and HD commercial vehicles. The torque to obtain the correct clamping force is recommended by truck / trailer or axle manufacturers.

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

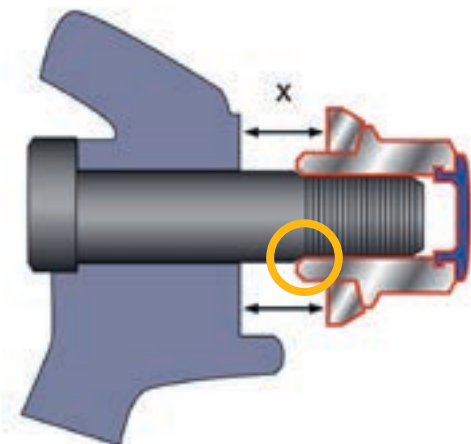
Studs that have an unthreaded part or exposed shoulder can cause insufficient or no clamping of the wheel(s) at all. Sleeved nuts may 'bottom out' on the stud's unthreaded part or exposed shoulder even before the wheels are clamped correctly.

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 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.

When mounting a steel wheel at the inside position and a wheel of Alcoa Wheels 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 11-14

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.

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 centering 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 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.
- Following 2-piece hex head sleeved nut types are available from Arconic Wheel and Transportation Products:
 - 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 have left-hand threads. If a "R" "L" is stamped on the studs and nuts, it indicates right and left-hand threads respectively.

Sleeved nuts P/N ^{*1}	Thread size	For	Sleeve	Application
GAX578032	M22 x 1,5	Metric, Volvo 2005 >	Short	Single
GAX57803201 ^{*2}	M22 x 1,5	Metric, LH thread	Short	Single
GAX578132	M22 x 1,5	Metric, Volvo 2005 >	Long	Dual
GAX57813201 ^{*2}	M22 x 1,5	Metric, LH thread	Long	Dual
GAX614230	M20 x 1,5	Metric	Short	Single
GAX614330	M20 x 1,5	Metric	Long	Dual
GAX542026	M18 x 1,5	Metric	Short	Single
GAX542126	M18 x 1,5	Metric	Long	Dual
GAX578432	7/8 ^{''} -11 BSF	Scania	Short	Single
GAX578532	7/8 ^{''} -11 BSF	Scania	Long	Dual
GAX578232	7/8 ^{''} -14 UNF	Volvo > 2004	Short	Single
GAX578332	7/8 ^{''} -14 UNF	Volvo > 2004	Long	Dual

Table 11-15

*1 At the moment of editing this manual the current portfolio of sleeved nuts was subject to change. Consult Arconic Wheel and Transportation Products or authorized distributors of Alcoa Wheels for update and specification.

*2 The extension 01 on sleeved nut part numbers indicate left-hand thread versions.

NOTICE

Though sleeved nuts are designed to compensate stud length sufficiently, a minimal stud stand-out 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 Section 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 vehicles changed stud thread specification from 7/8"-14 UNF to M22x 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 Arconic Wheel and Transportation Products.

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.
2. Alcoa Wheels specifically made for Volvo have the Volvo logo / name in the roll stamp of the wheel and have a different part number.
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.
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 Arconic Wheel and Transportation Products.
5. Alcoa Wheels specifically made for Volvo and Volvo hardware, studs and nuts, are available from the Volvo organization only.



Picture 11-17

From left to right:

- Volvo OE sleeved nut for single and dual mounting: only suitable for Volvo 'dual hole' wheels
- Sleeved nut from Arconic Wheel and Transportation Products for single mounting
- Sleeved nut from Arconic Wheel and Transportation Products 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 Volvo Trucks organization or contact Arconic Wheel and Transportation Products.

12. Wheel nuts

12.a. Tightening nuts

2-piece flange nuts M22 x1.5, M20 x 1.5, M18 x 1.5, or 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.

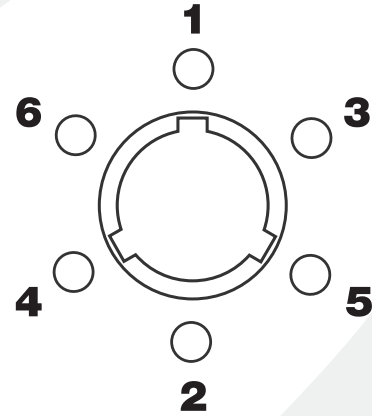
Follow the proper wheel installation and maintenance practices as described in this Section.

IMPORTANT

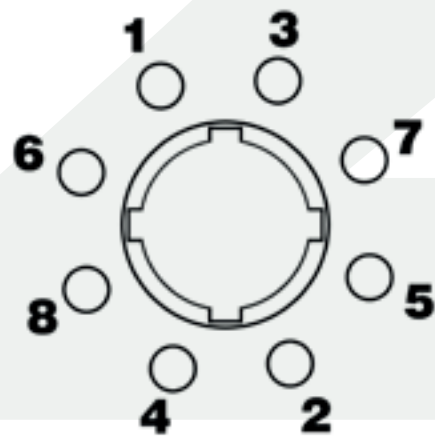
Lubricants must be completely removed from the nut's washer i.e. nut-to-wheel contact surface if applied accidentally.

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

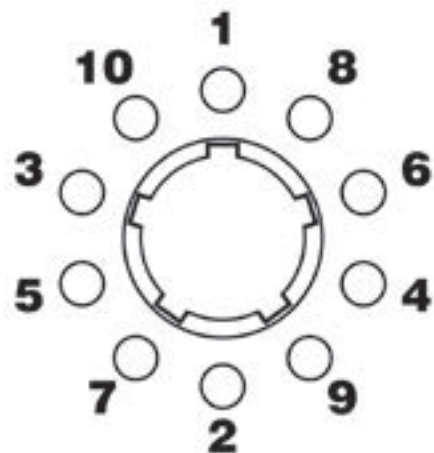
Position one of the hub's pilot tabs at the twelve o'clock position. After positioning wheels on the pilot tabs, hand tighten all 2-piece flange nuts, then tighten to the recommended torque, following the proper sequence shown below for your type wheel.



Graphic 12-1 - Six Stud



Graphic 12-2 - Eight Stud



Graphic 12-3 - Ten Stud



Picture 12-4
Torque wrench

After 5-50 miles / 8-80 kilometer of operation, torque should be rechecked, unless 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 the limits recommended. 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 and stripped or damaged threads are found, remove these nuts from service. Check wheel studs accordingly.

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.

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 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.

12.b. Keep wheel nuts tight

2-piece flange 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 may indicate looseness. See picture 12-5.

For proper installation of 2-piece flange nuts, two drops of motor oil should be applied to the point 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 the chart following: Chart 12-6.



Picture 12-5

Hub piloted wheels using 2-piece flange nuts

(nuts with integrated washer):

Mount type	Nut Thread	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 12-6

*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 also may result in loose wheels.
2. All torque wrenches, air wrenches and any other tools should be calibrated periodically to ensure the proper torque is applied.
3. Refer to OEM for torque range for any hardware that is noted above.

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 aluminium truck Alcoa Wheels are dualled with a steel inner wheel. When this application occurs, it is recommended that a DiscMate 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.

Arconic Wheel and Transportation Products 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 is required as 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



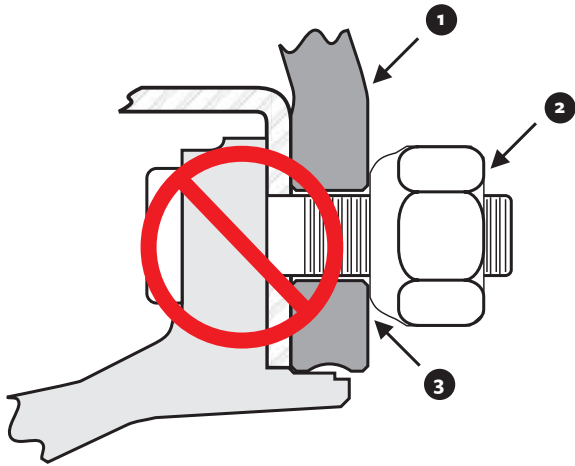
When mounting painted steel inner dual wheels with outer aluminium wheels, be cautious of excessive paint build-up on the inner steel wheel.

Excessive paint 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 this Section.

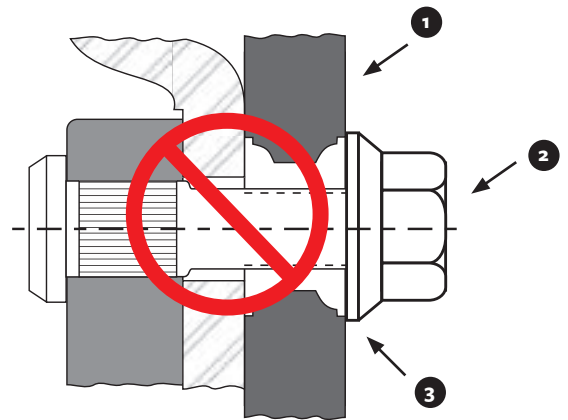
12.d. Incorrect assemblies

The following are examples of incorrect wheel assemblies.



Graphic 12-7

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



Graphic 12-8

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

- Do not use ball seat or conical seat nuts with hub piloted wheels.
- Do not use standard 2-piece flange nuts with stud located ball / conical seat wheels.
- Do not use sleeved nuts on wheels designed for use with extended studs.
- 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.

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.

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/wheel manufacturers' recommended pressure, but under no circumstances exceed cold inflation pressure listed by the tyre/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: www.arconic.com/alcoawheels/north_america/en/info_page/wheel_fitment.asp



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 the enlargement and elongation which can occur if the nuts are not kept tight. Dirt streaks radiating from bolt 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. Explosive separation can result in serious injury or death.

Inspect tyres and wheels for damage before removing from vehicle.

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

13.c. Wheel alteration

Arconic Wheel and Transportation Products 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.

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 or otherwise coated 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 does not meet requirements.

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 could cause serious injuries or death.

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

See also Section 13.d. Heat Damage.

Warning



Excessive heat from fire, brake malfunction, wheel bearing failure, tyre failure or other sources 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 for exposure to excessive heat before being returned to service. A wheel that has been subjected 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 bead, brake components 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 grayish 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.

Wheels manufactured from January 2009 and onwards will have a 1 inch or 2.5 cm clear round 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 as shown in pictures 13-2 and 13-3:

Picture 13-2 Heat Indicator at wheel flange



Picture 13-3 Heat indicator at wheel drop well



Picture 13-4 Heat indicator version 2



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



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 sticker prior to 2009

Picture 13-7 Discolouration of rim with charred rubber

Picture 13-8 Charred DiscMate for Alcoa Wheels or other nylon protection gaskets

Picture 13-6



Picture 13-7



Picture 13-8



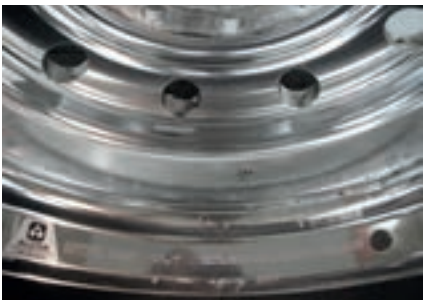
If either of these round labels show signs of blistering, charred, blackened, or cracked look, this may indicate that the wheel has been exposed to excessive heat.

Picture 13-9 Charred heat indicator next to roll stamp 2009 and after

Picture 13-10 Charred heat indicator next to roll stamp 2009 and after (close up)

Picture 13-11 Charred heat indicator in drop well inside the wheel 2009 and after

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, discoloration 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.

13.e. Dimension checks

Open side circumference check

Warning



Wheels that have been subjected to high pressure tyre and rim separation or excessive heat damage may no longer have sufficient dimension and contour to retain the tyre bead while under pressure.

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

Immediately and permanently remove from service any wheel that has been exposed to high pressure, tyre and rim separation or excessive heat.

Warning



Wheels that have run flat or have other physical damage may no longer have sufficient dimension and contour to retain the tyre bead 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. 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 shows an example of a wheel rim ball tape.

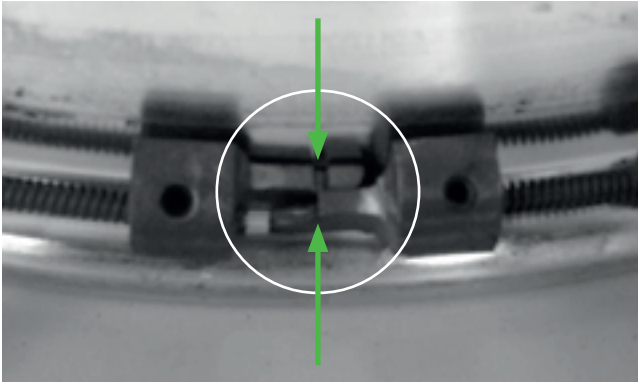
Measure the circumference of the bead seat on the open side with a ball tape.

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 center flange wide base wheels, or wheels with offsets (or insets) less than 76 mm or 3 inches, both rim flanges should be checked. All wheels should be inspected prior to mounting.

Picture 13-13

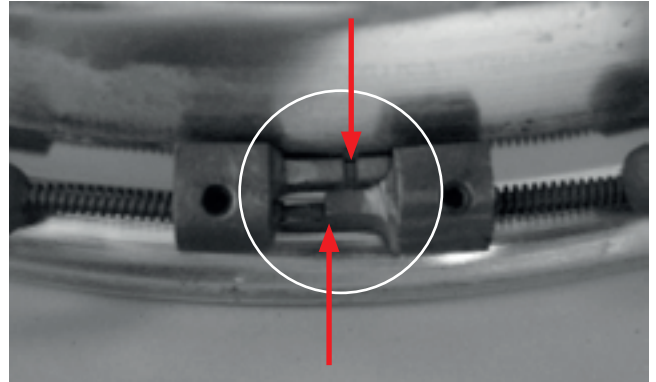


Picture 13-14
Correct dimension



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



Ball tapes used for measuring wheel circumference can be purchased from:

Tire and Rim Association Inc.
175 Montrose West Avenue
Copley, Ohio 44321
T +1 330 666 821
E tra@us-tra.org
W www.us-tra.org

13.e.ii. Dimension checks

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

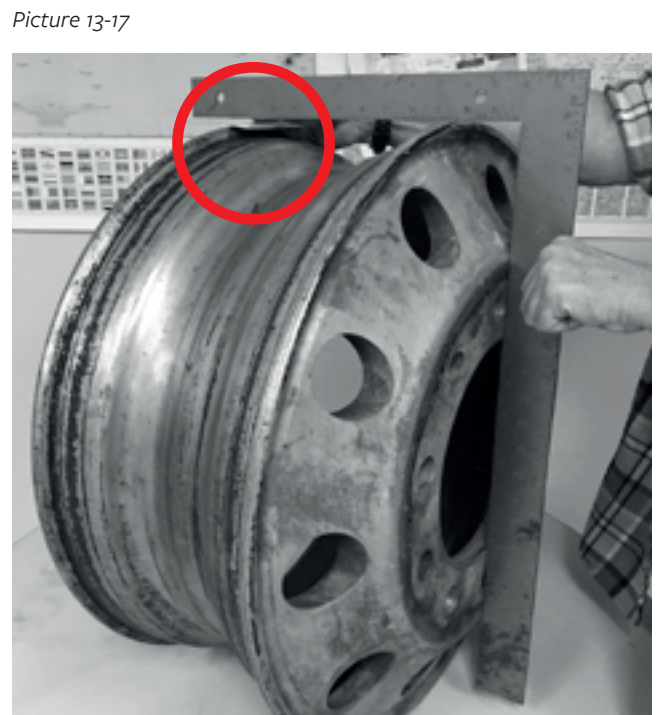
ACCEPTABLE

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



UNACCEPTABLE

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



Picture 13-16

Picture 13-17

THIS INSPECTION TECHNIQUE 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. Place the long leg of a carpenter square across the center of the disc side of the wheel. Extend the short leg across both rim flanges of the wheel as shown in pictures. 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 10 feet or 3 meters 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. Remove the wheel from service until it can be properly checked with a ball tape.

If you do not fully understand any of these inspection methods as described in this Section contact Arconic Wheel and Transportation Products.

13.f. Tyre wear or ride problems

If you experience tyre wear or ride problems 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.

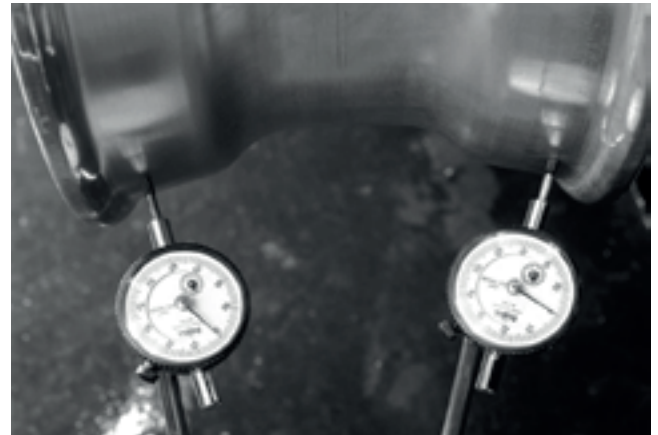
Remount the wheel on the vehicle without the tyre. Be sure to follow proper mounting procedures to assure the wheel is well centered on the hub. Place a dial indicator as illustrated in picture 13-23 to trace the bead seats of the wheel. Rotate the wheel noting the amount of variation shown on the dial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

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 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.

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.

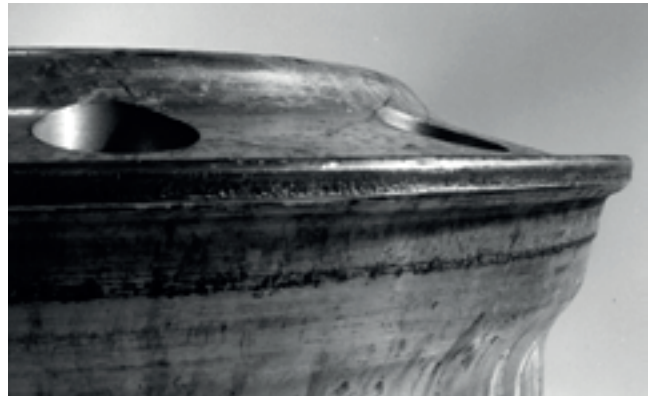
Irregular wear on the surface of the rim flange is caused by abrasion from the tyre. Rim flange wear happens most often in applications with heavy or shifting loads.

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 www.arconic.com/alcoawheels/europe/en/info_page/duraflange.asp



Picture 13-24



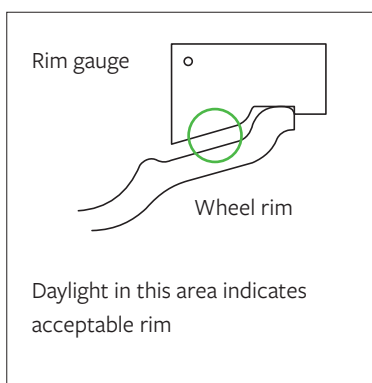
Remove wheels from service when rim flange wear is excessive. Excessive wear can be determined using an Arconic Wheel and Transportation Products approved wear gauge and procedures detailed under Section 13.g.ii.

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.

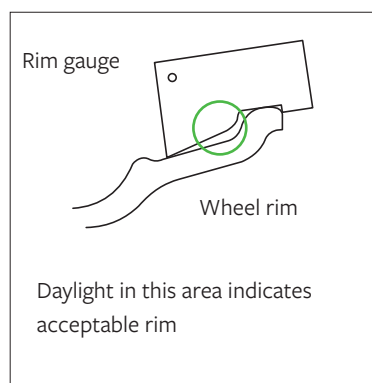
13.g.i. Alcoa Wheels rim flange wear gauge instructions

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.

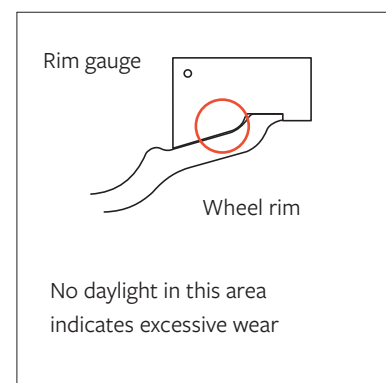
Graphic 13-25
Rim acceptable



Graphic 13-26
Rim acceptable



Graphic 13-27
Rim **NOT** acceptable



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

Check the wheel flange with the Alcoa Wheels Rim Flange Wear Gauge to determine if the wheels must be removed from service for excessive rim flange wear. See pictures 13-28 and 13-29.

See Alcoa Wheels rim flange wear gauge instructions, Section 13.g.i, and illustrations above to make this determination.

Rim Flange Wear Gauges are available from Arconic Wheel and Transportation Products: contact Arconic Wheel and Transportation Products.

STEP 3

If the rim flange 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 13-30: A rubber sharpness gauge or a suitable piece of rubber attached to a block of wood.



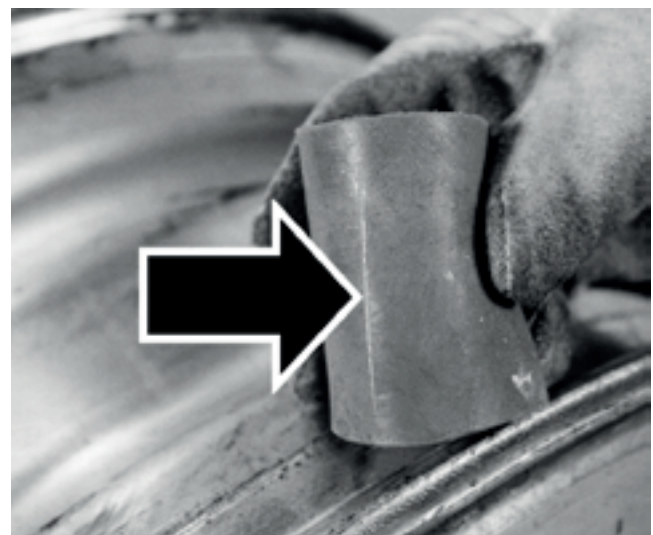
Picture 13-28 SERVICEABLE



Picture 13-29 NOT SERVICEABLE



Picture 13-31: Run the sharpness indicator gauge along the wheel in the area of the wear to determine if the 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 the 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 area and side wall. 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. If you follow this practice, you will significantly reduce the possibility of a rim flange cutting into the tyre.

If the 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. Cuts can lead to infection.

Always wear gloves when handling used wheels or when testing for edge sharpness.

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

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

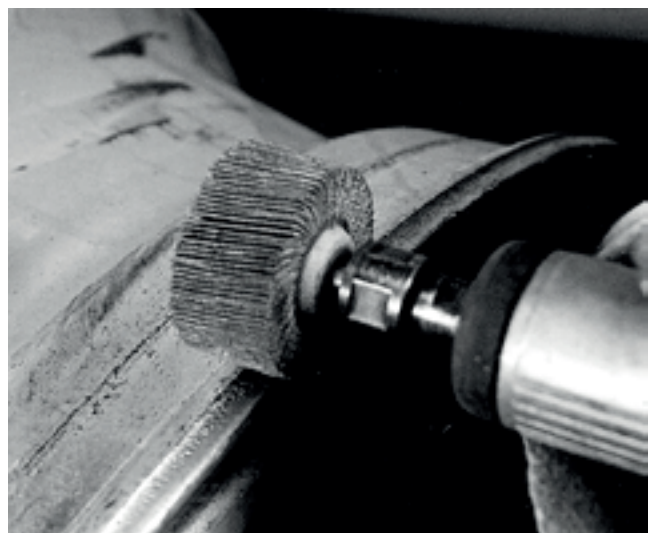
Picture 13-32 File

A file can be used very effectively to remove the sharp edge.



Picture 13-33 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 edge when using these tools.



Picture 13-34 Air or electric 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 13-35 Die grinder

Used 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.



Caution

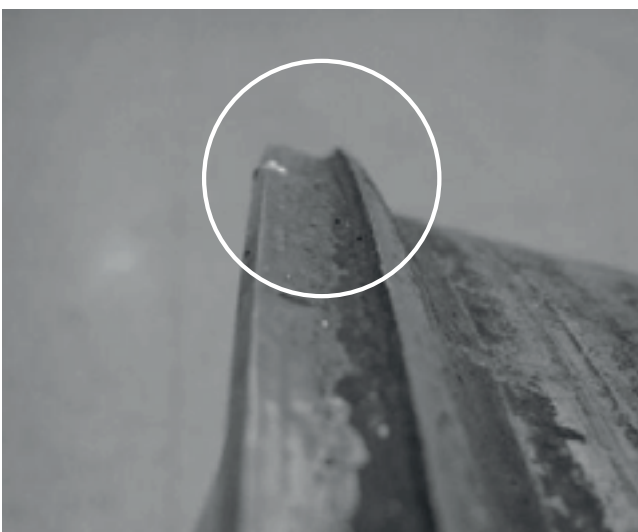


Removing sharp edges with hand or power tools produces metal filings and sparks. Many power tools have edges that are sharp. Some power tools produce excessive noise and may heat up during use.

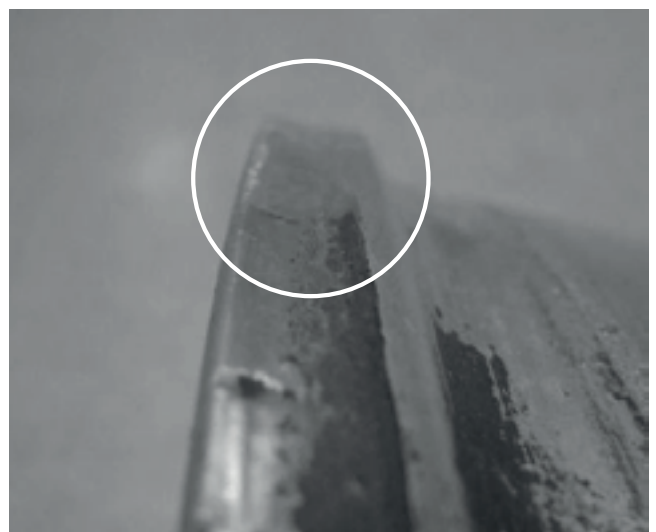
Metal filings can be sharp and, when projected by the action of power tools, can cause serious skin or eye damage. Excessive noise from power tools can harm hearing. Sharp edges can produce cuts and hot surfaces can cause burns. Cuts and burns can lead to infection.

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

Picture 13-36 Sharp edge before removal



Picture 13-37 Sharp edge removed



STEP 4

These pictures 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 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 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 Alcoa 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 (13).

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.

NOTICE

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

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 on the vehicle 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 may weaken the metal and cause the tyre/wheel assembly 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 Section 13.g.iii. Rim flange maintenance / edge removal procedures.

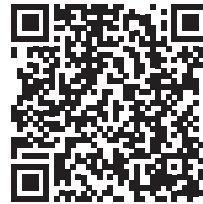
NOTICE

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 the rim flange maintenance Section 13.g.iii. Rim flange maintenance / edge removal procedures.

The Alcoa Wheels Dura-Flange® leaflet is available on:
www.arconic.com/alcoawheels/europe/en/info_page/downloads.asp

Picture 13-38 Acceptable 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

Bolt hole cracks 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 wheel from service.

Pictures below show cracks starting from the bolt hole. Causes are:

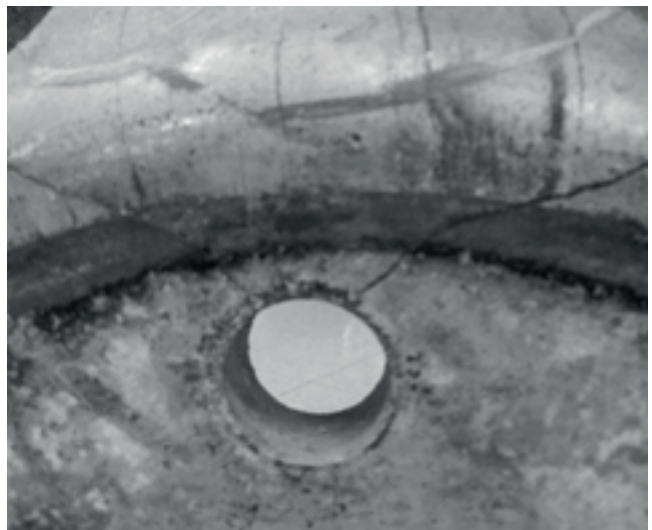
- Presence of paint, dirt and corrosion at mating faces of wheel and hub, when installing
- Undersized diameter of wheel support surface
- Support surface not flat
- Incorrect attachment parts or mounting hardware, see Section 11
- Insufficient torque, see Sections 10 and 12

Remove wheel from service and scrap.

Picture 13-39



Picture 13-40



Picture 13-41



Picture 13-42



Inspect the hub / drum contact area thoroughly for cracks or other damage.

Hub / drum surface should be flat within the entire wheel support diameter recommended below to properly support the wheel disc.

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	Arconic 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

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 have to 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 ball seats on stud located wheels.

- On hub piloted wheels look for elongated bolt holes and damage at the disc face
- On stud located wheels over torquing can lead to damaged ball seats

Remove damaged wheels from service and scrap.

UNACCEPTABLE

For hub piloted wheels - normally if thread marks are present on the inside diameter of the bolt holes, this would indicate the wheel ran loose.

Picture 13-44



Picture 13-45



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

Inspect both sides of disc area for vent or - hand hole cracks. If cracks are found, remove the wheel from service and scrap.

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

Picture 13-46



Picture 13-47



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

Check the entire rim area for nicks, gouges and cracks.

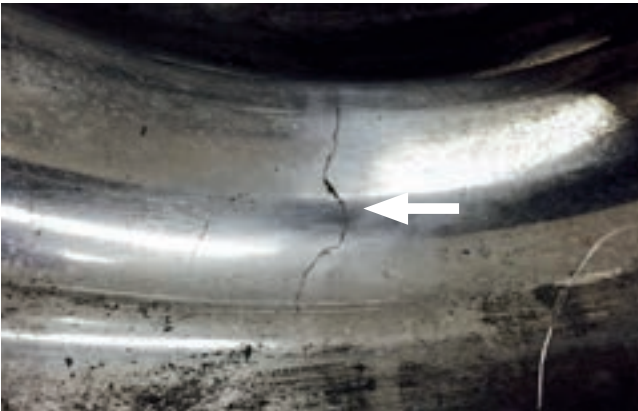
Loss of air may be caused by cracks in areas throughout the drop center, around the valve hole, and in the bead seat areas. Remove the wheel from service.

Drop center crack

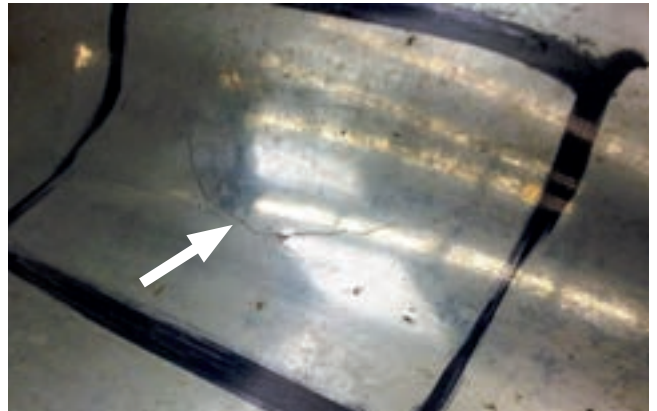
Possible causes of drop center cracks:

- Exceeding load or inflation capacity
- Corrosion damaged the rim
- Tyre tool damage
- Damage from foreign parts stuck between static brake caliper and rotating wheel
- Rim is too narrow for the tyre used

Picture 13-48



Picture 13-49



Valve hole crack

Possible causes for valve hole cracks:

- Exceeding load or inflation capacity
- Rough finish on the valve hole surface
- Over-tightening the valve nut
- Corrosion, see picture 13-54 and 13-55

Picture 13-50



Picture 13-51



Picture 13-52



Picture 13-53



Picture 13-54



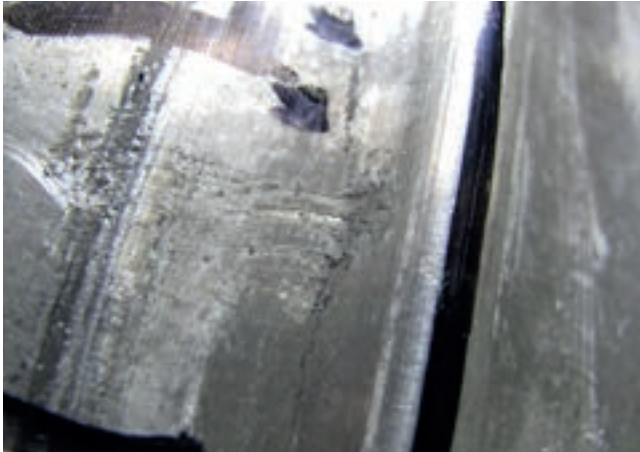
Picture 13-55



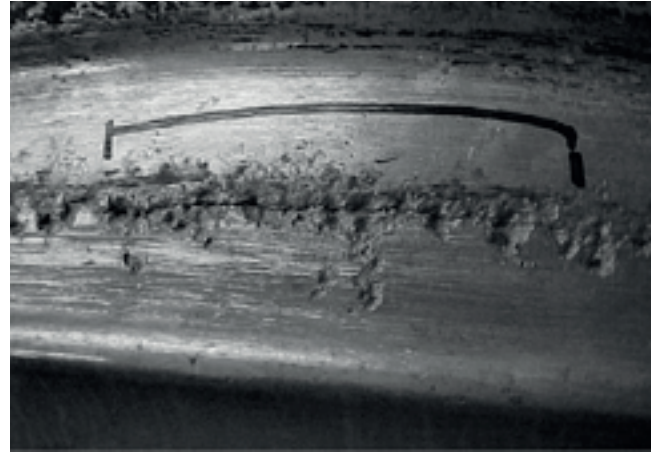
Bead seat crack

Bead seat cracks may result from exceeding load or inflation capacity, corrosion or tyre tool damage.

Picture 13-56



Picture 13-57



Note:

Cracks in the rim area are normally caused by overloading of the wheels. If this type of wheel damage is observed, Arconic Wheel and Transportation Products recommends to use WorkHorse® Alcoa Wheels.

See Alcoa Wheels Specification Data Sheet for part numbers.

For more information see page 13:

www.arconic.com/alcoawheels/europe/pdf/en/Alcoa_Wheels_General_Brochure_en.pdf



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 fill tubeless tyres, or the tyre itself is not dry, the areas of the wheel covered by the tyre can corrode severely.

Drop center, bead seat (see Section 13.h.iv.), valve hole and hub bore corrosion often are caused by entrapped moisture. Mild corrosion should be removed thoroughly by wire brush and the rim protected with non-water non-metal based tyre lubricant. Remove any severely corroded wheel from service.

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

Picture 13-58



Picture 13-59



After removal of corrosion:

The hub bore diameter may not exceed 0.5 mm more than the value the hub bore diameter as listed in the Specification Sheet for Alcoa Wheels.

From both sides of the wheel disc i.e. the mating areas with either hub and dualled wheel the disc thickness may not be less than 0.5 mm than the disc thickness as listed in the Alcoa Wheel Specification Sheet.

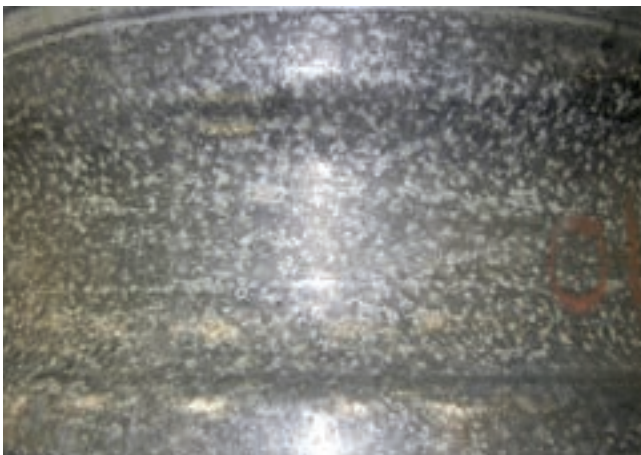
Remove wheels from service with severe hub bore corrosion.

Specification Sheet for Alcoa Wheels:



13.i.ii. Corrosion at drop center

Picture 13-60



Picture 13-61



Picture 13-62



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 by the use of liquid tyre balancers or sealants will not be replaced under the Arconic limited warranty.

13.i.iii. Corrosion at valve hole

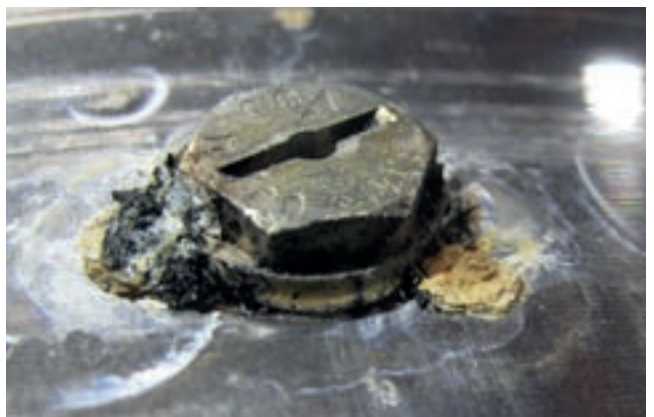
Picture 13-63



Picture 13-65



Picture 13-64



Picture 13-66



Caution

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

Severely corroded valve hole areas are unsuitable for service.

Alcoa Wheels corroded by the use of liquid tyre balancers or sealants will not be replaced under the Arconic 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 and removing corrosion of aluminium wheels 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 highly corrosion resistant alloy that is used for forged aluminium 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. The inside of non-reversible Dura-Bright® wheels have no surface treatment. 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 hair line cracks or by accelerating hair line cracks.

Any excessive corrosion build up must be removed at vehicle inspection intervals, before taking 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.

Picture 13-67



Picture 13-68



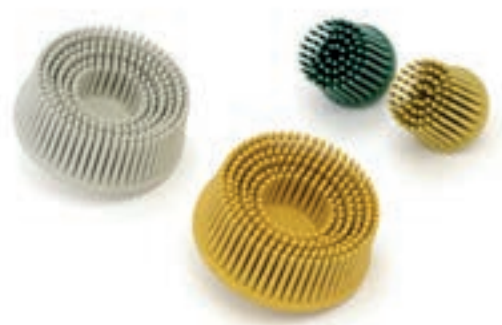
Picture 13-69



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

For documentation contact Arconic Wheel and Transportation Products at +32 11 458 460, or go to web page: www.arconic.com/alcoawheels

Picture 13-70



CLEANING NON MATING FACE(S):

For Brushed, Mirror Polished and LvL ONE® finished wheels, see: www.arconic.com/alcoawheels/europe/pdf/en/cleaning_EN.pdf



Dura-Bright® surface treated wheels, see: www.arconic.com/alcoawheels/europe/pdf/en/Alcoa_Dura-Bright_cleaning_leaflet_en.pdf



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 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

Use ALclean and ALpolish from Arconic Wheel and Transportation Products

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 luster 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 Wheel Care section on: www.arconic.com/alcoawheels/europe/en/info_page/wheelcare.asp



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

See: www.arconic.com/alcoawheels/europe/en/distributors.asp



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 fiber brush to wash exposed wheel surfaces with a mild detergent and warm water solution.
 - b) Flush thoroughly with clean water.
 - c) Wipe dry to avoid water spots.
 - 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.



Picture 14-3



Picture 14-4

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 or a (near 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 detergent straight without diluting with water.



Picture 14-5

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

See: www.arconic.com/alcoawheels/europe/en/distributors.asp



IMPORTANT

Dura-Bright® Alcoa Wheels should NOT be polished with standard polishes such as ALpolish.

IMPORTANT

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

Hydrofluoric acid, HF, should never be used on Dura-Bright® treated wheels.

The pH value can be found in chemical MSDS (Material Safety Data Sheet). If the cleaner is in concentrated form, contact your cleaning chemical supplier to determine pH levels.

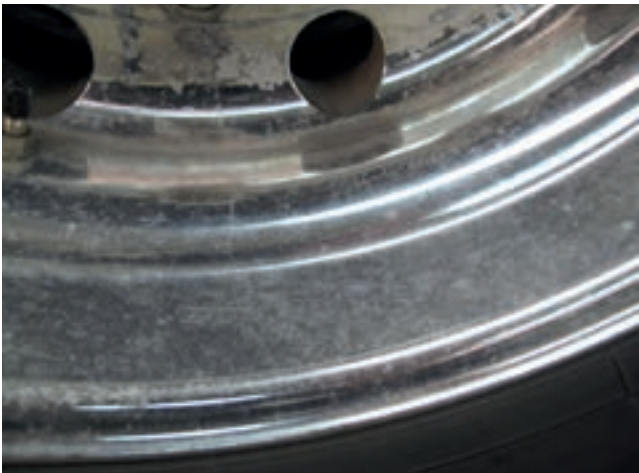
Pictured an example of how to test pH value with pH indicator sticks (Picture right).

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



Picture 14-6

Examples of Alcoa Wheels with Dura-Bright® surface treatment exposed to aggressive cleaner and or cleaned at too high temperature:



Picture 14-7



Picture 14-8

See next page 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 14-9

STEP 2

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



Picture 14-10

STEP 3

Use undiluted Wheel Wash for Dura-Bright® Alcoa Wheels, a standard car wash or a (near 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.



Picture 14-11

STEP 4

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



Picture 14-12

STEP 5

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



Picture 14-13

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 above.

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, erosion and discolouring of the Dura-Bright® surface treatment, refer to the Wheel Care tab of www.arconic.com/alcoawheels or contact Arconic Wheel and Transportation Products.



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.

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 like scratches, nicks, dents or gouges, build up disc brake dust on those parts of the surfaces where the treatment is missing. These surfaces will look as if they have not been treated with Dura-Bright®.



Picture 14-14



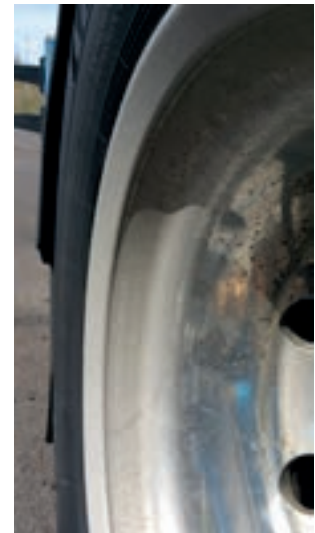
Picture 14-15

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, disc brake dust will gradually build up at the rim flange area.



Picture 14-16



Picture 14-17

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 discolouring is due to sediment of residue elements from disc brake pads.

The above mentioned conditions may appear sooner after a winter period or at longer intervals between cleaning. More frequent cleaning with soap and water is recommended.



Picture 14-18

Notice

These conditions, i.e. handling marks, erosion and/or discolouring, are not warrantable. Only blistering, peeling, lift off of the Dura-Bright® treatment, as well as filiform corrosion, is warrantable for a period of 60 months from date of manufacturing.

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® treatment will not be affected by the use of 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.

Safety Data Sheets are available upon request.



Picture 14-19
ALclean 1 litre bottle



Picture 14-20
ALbrush soft fiber brush

ALclean and ALbrush are available from distributors and dealers of Alcoa Wheels (Europe). For the actual list of contacts see: www.arconic.com/alcoawheels/europe/en/distributors.asp



How to proceed:

1. Make sure the wheel is not hot. The recommended temperature of the wheel 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 power washer. Do not dry the wheel.
4. Use a limited quantity (10 cc or 0.6 cubic inch) of undiluted ALclean with ALbrush 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 Alcoa Dura-Bright® Wheel Wash 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” after the 6-digit P/N. Dura-Flange® wheels have blue logo Alcoa stickers and two extra 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. Edge re-conditioning cannot be performed on Dura-Flange® wheels 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. or Section 14.b. as appropriate.



Picture 14-21



Picture 14-22

15. Glossary of common terms and conversion

15.a. Glossary of common terms

15° the angle of the tyre bead's surface 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 wheel rim.

BEAD SEAT - The tyre seating surface of the rim.

BOLT CIRCLE - The circle defined by the centers of the bolt holes (mounting holes) of a wheel, dimension of diameter stated in inches or millimeters.

BOLT HOLES or mounting holes - Holes in the disc of the wheel through which the bolt (stud) passes.

BORE - See "HUB BORE."

CC - Cubic Centimeter.

CENTER BORE - See "HUB BORE".

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

DC - Abbreviation for drop center. See "DROP CENTER".

DISC AREA - The vertical wheel face which supports the rim.

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 CENTER - The well or center portion of the wheel rim that enables the fitment of a tubeless tyre.

DUAL WHEEL - Any wheel that can be mated disc side to disc side with another wheel resulting in an inner and outer dual wheel assembly.

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

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

FOOT-POUNDS / NEWTON METERS - 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. One half the distance between the two center lines of dualled tyre/wheel assembly. The dimension is the same as the OUTSET dimension.

HMA - abbreviation of 'Halber Mittenabstand'. German for Half Dual Spacing see "HDS".

HUB BORE - The center hole of a disc wheel, dimension of diameter stated in inches or millimeters.

HUB PILOTED MOUNTING - A wheel mounting system which uses the hub to center 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 centerline when the centerline is placed inboard of the mounting surface. Measurement used for single wheel application. Dimension stated in inches or millimeters.

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

kPa - Abbreviation for kiloPascal. 100 kPa equals 1 bar (pressure 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(elsius) or 68°F(ahrenheit).

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

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**.

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.

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 centerline when the rim centerline 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 inches or millimeters.

PCD - Pitch Circle Diameter, is the measurement of the diameter of the imaginary circle drawn through the center of all of the wheel bolt holes of the wheel (see **BOLT CIRCLE**).

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

PSI - Abbreviation for pounds per square inch (pressure measurement). 100 psi equals 690 kPa.

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

RIM CENTERLINE - 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.

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

STUD - A threaded bolt extending from the hub surface to which the wheels are secured by the nuts.

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

TORQUE - The amount of force used to tighten nuts. Usually stated in Foot-pounds or Newton-meters 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 BEAD - That surface of the tyre which contacts the bead seats of the wheel rim.

WHEEL MOUNTING FACE - Mounting area, support surface diameter, that portion of the wheel face which contacts the hub or brake drum.

15.b. Conversion factors

Inches to Millimeters
 Inches x 25,4 = Millimeters

Millimeters to Inches
 Millimeters x 0,03937 = Inches

CC to Cubic Inch
 CC x 0,06102374 = Cubic Inch

Cubic Inch to CC
 Cubic Inch x 16,38708 = CC

Bar to kPa
 Bar x 100 = kPa

kPa to Bar
 kPa x 0,01 = Bar

psi to kPa
 psi x 6,8948 = kPa

kPa to psi
 kPa x 0,145 = psi

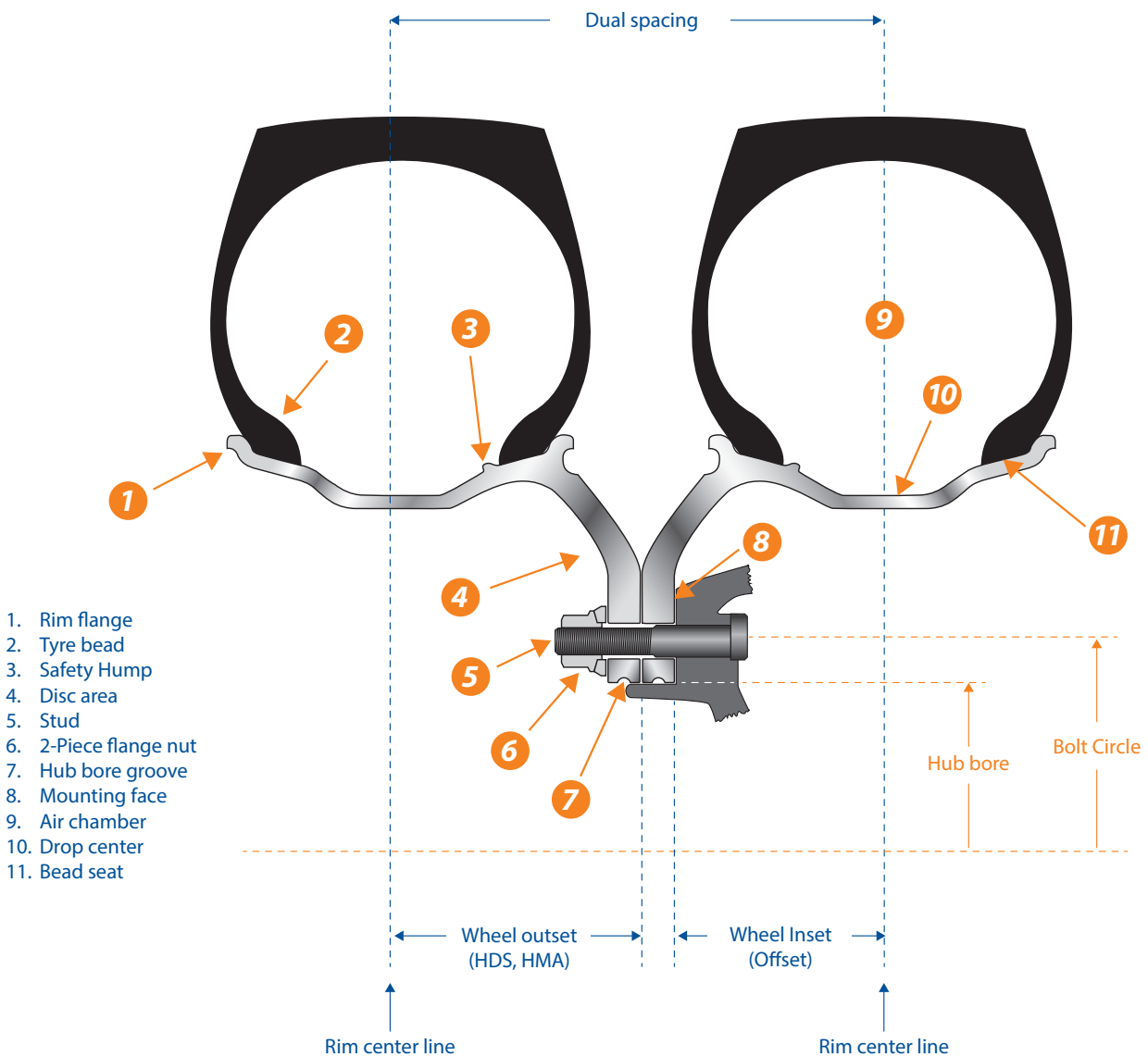
Pounds to Kilograms
 Pounds x 0,4536 = kg

Kilograms to Pounds
 kg x 2,2046 = Pounds

Foot-pounds to Newton Meters
 Ft-lbs. x 1,35582 = Nm

Newton Meters to Foot-pounds
 Nm x 0,737562 = Ft-lbs.

15.c. Common terms



Graphic 15-1

16. Contact

Arconic Wheel and Transportation Products
Arconic Köfem Ltd.
Fleet Service Center for Alcoa Wheels
Verseci Street 1-15
H-8000 Székesfehérvár
Hungary

Tel +36 22 531 867
Fax +36 22 311 450
E-mail fleet@arconic.com
Web <http://www.alcoafleet.eu>

For specific territory contact, consult:
www.arconic.com/alcoawheels



Arconic Wheel and Transportation Products
Arconic Finance & Services bvba
Industrieweg 135
Industrial Zone Ravenshout 7046
B-3583 Beringen-Paal
Belgium

Tel +32 11 458 460
Fax +32 11 455 630
E-mail info.wheels@arconic.com

Web www.arconic.com/alcoawheels/europe

Disclaimer:

This brochure has been compiled with great care. Nevertheless, no guarantees can be made as to the completeness, correctness or currentness of the information contained in this brochure.

Arconic Wheel and Transportation Products cannot be held liable for the content of this brochure or for the consequences of the use thereof.

Therefore no rights can be derived from the information as presented in this brochure.

Arconic Wheel and Transportation Products reserves the right to change the information in this brochure at any time without prior notice or without stating the reasons for doing so.

Copyright © 2017
Arconic Wheel and Transportation Products
All rights reserved

Printed in EU
2017



ARCONIC

ARCONIC WHEEL AND TRANSPORTATION PRODUCTS

Industrieweg 135

B-3583 Paal, Belgium

info.wheels@arconic.com

Tel: +32 11 45 84 60

Fax: +32 11 45 56 30

www.alcoawheelseurope.com



The Alcoa trademarks are owned by Alcoa Corporation and used by Arconic Inc. under license from Alcoa Corporation.