Former issues of this standard: initial release, no former issue available

1. Scope and field of application

This EUWA Guideline specifies safety and service instructions concerning the use of wheels. EUWA intends to inform consumers about the risks related to the product and its use.

Additional information for resellers and tyre workshop operators can be found in the “EUWA Safety and Service Recommendations”.

Additional information for use, general maintenance and safety requirements and out-of-service conditions are given in ISO 14400.

The following guideline is valid for commercial vehicle (CV) wheels, which are produced or commercialized by EUWA members. It concerns the activities of handling, mounting, and dismounting these / following wheels.

For Truck, Bus and Trailer applications, for use in on-highway, medium- and heavy-duty original equipment applications

Tubeless wheels:

- 17.5”, 19.5”, 22.5”, 24” and 24.5”

Tube Type and Tubeless multipiece wheels:

- 15”, 20” and 24”

As applied and used for vehicles UN ECE categories:

- M3, N2, N3, O3 and O4

2. General Instructions

2.1 The wheel is a highly stressed component of the vehicle that in service may be subjected to extreme forces. Improper or unsafe wheel servicing practices can lead to risks during utilisation by the consumers. Therefore, it is highly recommended that all service operations should be performed only by qualified and appropriately trained personnel.

2.2 Follow the vehicle or wheel manufacturer’s current manuals for utilisation instructions, recommendations and any other additional information concerning the use and maintenance of wheels. It is essential to use only wheels and components which are

approved by the vehicle manufacturer or in case of aftermarket wheels these parts are certified for the vehicle by an authorised institution.

2.3 Avoid damages or deformations of the wheel due to the application of high forces or due to impacts during all operations like handling and mounting to the vehicle.

➔ Risk of reduced fatigue life performance of the wheel in service
➔ Risk of uniformity problems and vibrations

2.4 In all those operations, avoid dents or scratches which may damage the surface protection of the wheel.

➔ Risk of corrosion which may reduce fatigue performance of the wheel in service

Prior to inflation of tyres on multipiece rims, the correct positioning of the lock rings or of the loose flange rings must be confirmed, always avoiding any correction by means of a hammer.

In the case of incorrect positioning, all air must be let out and the whole procedure must be repeated.

When inflating tyres, an approved restraining device (i.e. safety cage or safety chains) must be used. The operator must insure to stay out of the trajectory of potential exploding parts or air blasts.

3. Mounting of the Tyre/ Wheel Assembly to the Vehicle

3.1. The tyre/wheel assembly must be correctly positioned relative to the hub when mounting on the vehicle. Make sure that all matching (mating) contact surfaces of hub and wheel are dry, clean, flat and smooth and that no foreign object is between wheel and hub, except for an approved or recommended protective gasket between the hub and wheel or wheels in a dual mounting.

➔ Risk of uniformity problems and vibrations

➔ Risk of damages to the wheel in a highly stressed area which may cause fatigue problems

➔ Risk of reduced torque or reduced clamping force and subsequent wheel loss

3.2. To assure the right application, the following characteristics of the wheel must be checked regarding correspondence with the axle, hub, and the vehicle:

Wheel-tyre and wheel-vehicle combination according to OEM a/o local regulations

Following:

LOAD

Load index sum of the individual wheels matches or supersedes the equivalent maximum axle load of the vehicle as specified by OEM or documentation.

TYRE(S)

Rim size, i.e. diameter and width match the tyre dimension according to tyre OEM recommendations or international standards e.g. ETRTO

Used with tyres inflated with / up to the maximum inflation pressures established by the wheel manufacturer

AXLE (topics)

Type of centring i.e. hub - or stud piloted

Wheel inset and half dual space in case of dual mounting

Piloting tab length in case of hub piloted wheels

Brake calliper contour (+ interference other components steering & suspension)

Valve position (inboard, outboard) (disc brake system compatible)

HARDWARE (fixation related topics)

Number of bolt holes

Diameter of centre hole or hub bore

Diameter of the bolt hole circle

Diameter and shape of the bolt holes

Type and kind of hardware i.e. studs, washers and nuts

All mounting hardware such as spherical, conical, or sleeved nuts, special parts for steel and light alloy wheels, must match the wheel(s) being mounted. Any incorrect combination of parts (different dimensions, different type, different shape different threading, different radius, or angle) may cause nuts loosening or wheel failure. The use of the wrong ring components on multipiece rims can result in catastrophic wheel failure.

➔ Risk of wheel loss or wheel failure

3.3. The user must be extremely careful with any lubricant or rust protector. To prevent rusting small amounts of oil may be applied to the centring area of the centre hole. Nuts and stud threads shall be carefully cleaned and should not be lubricated, unless other specifications are given in the manual of vehicle, axle, or wheel manufacturer.

➔ Excessive lubrication may cause wheel loss

3.4. The nuts of all disc wheels must be fastened with the recommended torque given in the vehicle or axle manufacturer's instructions. For correct tightening of the nuts to the recommended torque a calibrated torque wrench is needed.

➔ Excessive tightening of the nuts may cause deformation of wheel disc or failure of studs and nuts, which may cause wheel loss
➔ Insufficient tightening may cause wheel loss

3.5. The correct tightening sequence is crosswise over the wheel disc. This means to tighten one nut, then the opposite one or the one farthest away. Continue to follow this sequence until all nuts are tightened. Tighten progressively to the final torque, not in one go.

➔ Risk of deformation of the wheel centre and resulting vibrations if the tightening sequence is progressed clockwise or counterclockwise

3.6. On a new vehicle and always after a wheel de- & mounting e.g. tyre replacement, it is imperative to verify the mounting torque after approximately 50-100 km of operation, unless vehicle - or axle OEM determine otherwise. Where necessary, retighten the wheel nuts to the correct value with a calibrated torque wrench per sections 3.5 and 3.6.

4. Mounting of a Wheel Cover or Hub Cover

4.1. Verify with vehicle, axle, or wheel OEM if and how wheel - or hub covers can be applied safely on the specific wheel type. Wheel - or hub covers may result in insufficient cooling of brakes, bearings, tyres, and other parts.

➔ Risk of loose or loss of cover
➔ Risk of premature failure of vehicle components

4.2. Mounting hardware or brackets for wheel cover and hub cover may not interfere with the wheels' mounting hardware or jeopardize a correct fixation of wheel tyre assemblies

➔ Risk of premature failure of wheel, or wheel loss

4.3. The mounting of a wheel cover or a hub cover must not require excessive forces. Mounting hardware or brackets may damage the surface protection.

➔ Risk of resulting corrosion

4.4. The wheel cover must be mounted in the correct angular position versus the valve to avoid damages or bending of the valve.

4.5. Verify the proper seating and position of the wheel cover or hub cover to prevent its loss or overheating of brakes, bearings, or axle components.

5. Dismounting of the Wheel and Inspection

5.1. Follow attentively the instructions of the vehicle manufacturer concerning the dismounting of the tyre/wheel assembly. For safety reasons it is imperative that, where multipiece rims and divided (bolted) type wheels are involved, the tyres must be fully deflated before any removal procedures are started and that only correct tools are used. Check closely all components after removal, to ensure that they are in good condition and look for any possible nonconformity.

5.2. The wheel as a safety part must not show fractures, deformations, distortions, severe corrosion, or other similar defects. Such pieces must be replaced and scrapped. Also, in the event of a suspected damage, due to severe pot-hole shocks for example, the involved part must be replaced and scrapped. See wheel supplier service manual / instructions for out of service conditions.

5.3. The replacement must be carried out with new pieces having completely identical characteristics. Typical defects that require the part's replacement are, for example:

Any cracks in the wheel's rim or disc area

Deformations of bolt holes or abnormal imprints in the seats of the bolt hole area

Bent rim flanges (generally due to impacts against obstacles or potholes)

Excessive wear on the attachment face(s) to the hub or to the adjacent wheel in case of a dual mounting

Excessive wear at the rim flanges beyond the specifications as provided for commercial vehicle wheels in EUWA Standard 3.06, or

Excessive corrosion (see 6.4 for light corrosion): on rim attachment faces, and at hole edges in disc area, at bolt holes, hub bore and/or bead seats

5.4. Any wheel that shows signs of being exposed to a fire, e.g. blisters, discoloration of paint, shrunk or discoloured labels or stickers must be removed from service immediately and permanently

➔ Risk of separation of tyre from rim

6. Repair, modification, reconditioning, marking, maintenance, and cleaning of wheels for commercial vehicles (CV)

6.1. Repair or modification of wheels for commercial vehicles, CV wheels, **is not permitted:**

Any repair or modification of an existing or damaged CV wheel, rim, disc or its components e.g. rings, lock rings, etc., by any processing, including and not limited to changing the structural and mechanical properties and/or by addition or removal of material **is strictly forbidden**.

Any repair or modification alters the requirements for conformity to the wheel's original specification, invalidating OEM or vehicle manufacturer type approval and aftermarket type approval. See table 1.

➔ Risk of wheel loss or wheel failure

Any repair or modification voids the warranty of the original wheel equipment manufacturer. Repair or modification of CV wheels may cause uncontrolled explosions, separation of tyres from rims, wheel failures or wheel loss with injuries or fatalities as a result

NOTE

➔ Removing metal that coincides with maintenance of rim flange wear is subject to limitations as per EUWA Standard 3.06 or instructions of steel or aluminium wheel manufacturer: consult the wheel manufacturer for specific instructions. See 6.4

➔ Repair or Modification, is not permitted **including and not limited to:**

- Welding, brazing, tempering, adding or replacing metal
- Plastic deformation/ straightening
- Drilling/ milling/ grinding/ deburring

6.2. Repair or Modification – further details:

- **WELDING, BRAZING, TEMPERING, ADDING** or **REPLACING METAL** may excessively heat or melt metal and may override thermal treatments that are applied to the wheel. Thermal treatments are a crucial part of the manufacturing process. These repairs can compromise the structural integrity and reduce wheel strength.
- The reduced strength of parts and areas that are welded, brazed, tempered, or have added or replaced metal may initiate cracks, leading to separation of parts of the wheel or disintegration of the wheel
- **PLASTIC DEFORMATION / STRAIGHTENING** manually or by means of any tools or equipment, with or without use of heat, may cause stress, and reduce the structural integrity and strength of the wheel.
- The reduced integrity of parts and areas that are deformed or straightened may initiate cracks, leading to separation of parts of the wheel or disintegration of the wheel
- **DRILLING / MILLING / GRINDING / DEBURRING**, i.e. removing metal, including removing coatings or surface treatments.

Removing metal, modification of bolt holes, hub bore, valve hole or vent holes to a larger diameter or different shape, including addition of holes:

- To adapt the wheel for fitment on an axle, vehicle (bolt hole and hub bore modifications)
- For use with different mounting hardware (bolt hole mods)
- For fitment of a valve or tyre pressure monitoring devices of any different kind or dimension (valve hole mods)

- For cosmetics (vent hole mods)
- Removal of metal may initiate cracks, leading to separation of parts of the wheel or disintegration of the wheel
- Removal of coatings or surface treatments may cause accelerated corrosion. Corrosion may cause premature failures, initiate cracks, or wheel loss

6.3. Reconditioning

In case of reconditioning by an external company, the full liability is transferred from the wheel manufacturer to this external company or to the person or company that ordered the reconditioning.

Reconditioning of wheels may not be permitted or permitted with limitations:

- Consult the manufacturer's guidelines or documentation
- Consequently, reconditioning is to be carried out according to guidelines provided by the wheel manufacturer, as specific surface finishes or treatments:
- May require different procedures, tools, and products, or
- Cannot be reconditioned or restored
- Wheels should be taken from service immediately and permanently if any of the original regulatory identification after the reconditioning is not legible, consult EUWA standard ES 3.08 (section 3.1)

Reconditioning wheels i.e. occasional painting, powder coating or anodising, including sanding, sand blasting, thermal or chemical paint stripping and polishing of wheels is:

Reconditioning	Steel multipiece Tube type	Steel Tubeless	Aluminum Untreated	Aluminum Surface treated
Painting	Subject to recommendations OE	Subject to recommendations OE	Subject to recommendations OE	Not permitted
Powder coating	Not permitted	Not permitted	Not permitted	Not permitted
Anodizing	Not permitted	Not permitted	Not permitted	Not permitted
Sand blasting / thermal or chemical paint stripping	Not permitted	Not permitted	Not permitted	Not permitted
Sanding	Subject to recommendations OE	Subject to recommendations OE	Not permitted	Not permitted
Abrasive polishing	Does not apply	Does not apply	Subject to recommendations OE	Subject to recommendations OE

Important:
Reconditioning may be subject to the warranty terms of the wheel manufacturer. Consult the warranty terms and documentation of the wheel manufacturer.

Painting:
Adding paint or coating to contact areas of wheels, hardware, and hubs, (1) may cause incorrect / reduced clamping force, (2) may make wheel identification illegible:

1. Reduced clamping force may cause fractures to wheels or broken studs with wheel loss as a result
2. Wheels should be taken from service immediately and permanently if this identification is not legible, consult EUWA standard ES 3.08 (section 3.1) and local / national legislation

Powder Coating:
Processes of painting or coating using heat e.g. powder coating, may override the thermal treatment(s) applied by the wheel manufacturer and weaken the structural integrity / strength of the wheel

- Wheels that have undergone thermal treatments, by third parties, may deform
- When mounting a tyre, inflating a tyre or under normal service conditions at any unpredicted moment, an uncontrolled separation of the tyre from the rim may occur

Sand Blasting, Thermal or Chemical Paint Stripping:
The treatment of wheels with sand or similar particle blasting devices and their blasting media as well as thermal and chemical paint striping are not permitted:

- Removal of paint, coating or surface treatments with blasting devices and their media may remove metal and reduce the strength and /or service life of the wheel
- Thermal paint striping may override the thermal treatments applied by the wheel manufacturer and shorten the wheel's service life
- Chemical paint striping may remove metal and reduce the strength and /or service life of the wheel

Sanding, Abrasive Polishing
As part of regular maintenance, sanding or polishing of wheels is allowed, when limited to removal of rust (steel wheels) or corrosion (alu wheels) without removing metal.
The wheel regulatory identification stamps and markings must remain legible.
Wheels that demonstrate excessive amounts of rust or corrosion should be removed from service immediately and permanently.

Consult the guidelines and documentation of the wheel manufacturer.

Repair, Modification and Reconditioning of Wheel Parts
Do not repair or recondition wheel parts e.g. valves, wheel nuts, wheel studs and hub or axle mating faces. Replace parts that have been subject to any kind of reconditioning:

- Wheel parts that have been subject to reconditioning may not be safe after processing
- A premature and unpredicted failure of the wheel, tyre or assembly may occur
- Reconditioning of wheel parts may lose warranty of the parts manufacturer. Consult the manufacturer's documentation and guidelines for cleaning, maintenance, and warranty

6.4. Marking

Marking of wheels may be permitted with limitations:

- Consult the wheel manufacturer which, or if, other methods for marking may apply

External companies providing reconditioning services shall mark CV wheels:

- Each wheel must have a marking that clearly identifies the external company name and location as well as a number
- A traceable number must lead to information, records, data on the reconditioning activities and controls applied for the wheel marked
- Both marking and traceability number must remain legible during the service life of the wheel

Marking with stamps may compromise painting, coating, and surface treatments with corrosion as a result. Consult the manufacturer of wheel for the area of marking and way of marking.

6.5. Maintenance and Cleaning

Maintenance **(a)** and cleaning **(b)** is permitted and recommended

- Maintenance of rim flange wear is subject to limitations as per EUWA Standard 3.06 or instructions of wheel OEM: consult the manufacturer for specific instructions
- Cleaning is considered to be part of a regular maintenance program and should be carried out frequently during the service life of a wheel

a) Maintenance

Rim Flange Dressing (Permitted) - Wear of the rim flanges is caused by abrasion from tyres:

- Rim flange wear is subject to limitations, consult EUWA standard ES 3.06 or wheel OEM guidelines (see picture 5)
- Rim flange wear may create sharp edges that can be removed or dressed according to manufacturer's guidelines (see picture 6)

Important

- Wheels with rim flange wear beyond the limitations and / or excessive rust or corroded contact areas must be removed from service immediately and permanently (see section 5.3)

Removal of Rust / Corrosion (permitted)
Steel and aluminium wheels may show rust and corrosion:

- Removal of rust or corrosion from the attachment faces i.e. hub to wheel, wheel to wheel (dual mounting) and wheel to hardware is permitted and recommended

b) Cleaning

Non-Abrasive Polishing (permitted) - According to guidelines of the wheel manufacturer non-abrasive polishing is permitted:

- Limited to restoring the shine or gloss of paint or coating of steel wheels
- Limited to restoring the shine or gloss of blank aluminium wheels
- With a polishing compound, tooling and methods that do not remove paint, coating, surface treatments nor metal

Detergent & Water, Tar Remover (permitted) - According to guidelines of the wheel manufacturer. With cleaning products, tooling, and methods that:

- Are limited to remove dirt, regular contamination, traffic film, brake dust and tar spots
- Do not damage the integrity of paint, coating, or specific surface treatments
- Do not corrode or remove metal, or change the structural and mechanical properties of the wheel
- Do not jeopardize the integrity of other wheel components such as valves, tpms devices, mounting hardware, hubs and tyres

Examples of repair and modification of wheels for commercial vehicles are shown in table 1

Table 1

Repair or modification		Safety effects		Comfort & cosmetic effects	
Type	Example	Fatigue cracks a/o air loss	Risk for collapse a/o wheel loss	Vibration	Corrosion
Welding	1, 2, 4	X	X	X	X
Brazing	3	X	X	X	X
Thermal processes		X	X	X	X
Adding a/o replacing metal	4	X	X	X	X
Plastic deformation	3	X	X	X	X
Straightening	3	X	X	X	X
Drilling		X	X	X	X
Milling		X	X	X	X
Grinding	3	X	X	X	X
Deburring		X	X	X	X

Examples of reconditioning and marking of wheels for commercial vehicles are shown in table 2

Table 2

Reconditioning and marking		Safety effects		Comfort & cosmetic effects	
Type	Example	Fatigue cracks a/o air loss	Risk for collapse a/o wheel loss	Vibration	Corrosion
Painting	7 & 8		X		
Powder coating		X	X	X	
Sanding	9	X	X		X
Sandblasting	9	X	X		X
Thermal paint stripping		X	X	X	X
Chemical paint stripping		X			X
Abrasive polishing		X	X		X

Sample Images:

Image 1

Image 2

Image 3

Image 4

Image 5

Image 6

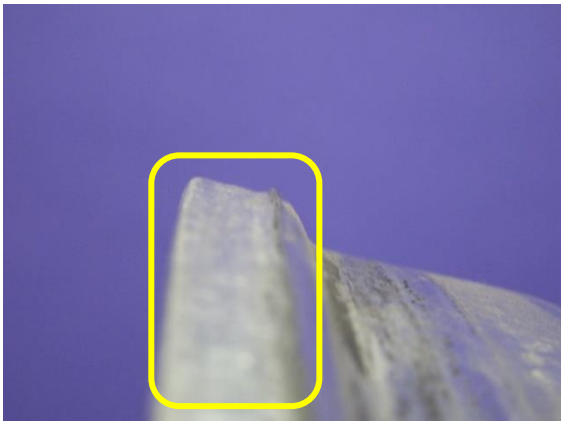

Image 7

Image 8

Image 9

Source for images :

Howmet 1-5, 7-9

Ronal 6

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