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Skirt Nut 

Product Bulletin

Bulletin: 00SNP-042003-A

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Subject: General Product Description & Properties

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1. Skirt Nut® and The Hub-piloted Disc Wheel

A key design objective of the hub-piloted disc wheel system is to position the wheel on the hub so closely that vertical and horizontal runout is virtually eliminated. In effect, wheel studs and flange nuts are intended to serve only as the means by which the wheel is clamped to the hub.

This design feature has been cited as a major cause of loose wheels, “wheel off” incidents and excessive maintenance and operating costs. Fleets have been required to ramp up wheel maintenance procedures, especially re-torques, to ensure that flange nuts do not work loose. Millions of dollars of fleet profits have been spent unnecessarily in reduced tire mileage, lower fuel economy, replacement of damaged wheel hardware, damaged wheels and damaged hubs.

And still, “wheel off” incidents continue to make the front page or become the lead issue on the 6:00 PM news, and fleets are still held solely responsible.

The problem with the current system is that the wheel studs or bolts have a diameter of 22mm while the bolt holes have a diameter of 26mm. That 4mm space is intended to reduce corrosion that could cause seizing of the components, and also to allow easier installation. Unfortunately, in the real world conditions of truck operations, that space also allows the wheel to react to load stress by vibrating back and forth on the bolt circle even when flange nuts are torqued correctly.

This vibration is called “clocking”. It’s a dangerous and unnecessary condition that leads directly to torque loss. Its effect can be identified early as scratches and/or gouges between and on the hub’s mounting pads and the pilot hole in the wheel, damaged threads, and peening wear on the stud holes (elongation). These conditions are also sometimes signaled by excessive rust around the pilot hole and/or the flange nut. Scratching or gouging on the hub-to-wheel mating surface is a sure indication that clocking is taking place.



At this point, unreparable damage to the wheels and possibly the hub may already have occurred. If the damaged components are not promptly replaced wheel loss may result. The industry’s “fix” - narrowing the torque setting window in an effort to keep torque values higher, at the 500 ft/lbs level - has done very little to improve the situation. Most damage reduction is a result of fleets substantially increasing their maintenance costs to check and re-check torque.

Skirt Nut® completely eliminates the clocking motion that is unavoidable using conventional flange nuts, even when those nuts are correctly torqued.

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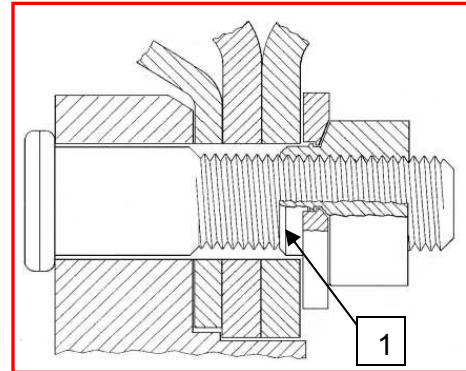
The Skirt Nut[®] also provides more thread engagement (almost double that of a conventional flange nut), provides greater torque retention and will greatly extend the life of hub-piloted wheels while ensuring that users get the true benefits the assembly was originally designed to deliver. These include improved tire wear, reduced vibration and reduced wear on wheel-end components, with no reduction in load capacity.

For information on the benefits of the Skirt Nut[®] refer to Skirt Nut[®] FAQs.

2. Design Characteristics of Skirt Nut[®]

The key feature of the Skirt Nut[®] is the inside-threaded, lower extended portion referred to as the “skirt”. The skirt extends approximately 3/16” (5mm) into the stud hole. This provides more thread engagement and much improved torque retention.

The outside diameter of this skirt fits neatly into the stud hole. While the skirt permits minimal clearance within the stud hole it actually improves clamping force without affecting the load capacity of the assembly in any way. This unique design allows Skirt Nut[®] to provide these added features:



- .1 The nose end of the skirt (1) is beveled to provide resistance-free penetration through the stud hole. This eliminates the need to manually align the stud to the stud hole to ensure concentricity – this is the “true stud spacing” feature.
- .2 Each nut provides up to twice the thread engagement on the stud compared to a standard flange nut.
- .3 Skirt Nut[®] eliminates clocking and relieves excessive stress wear on the piloted areas. The clocking movement (vibration) is where loss of torque begins.
- .4 Skirt Nut[®] supports and effectively maintains the correct horizontal and vertical mounting position of the assembly and prevents disc “squirming” that will damage hubs and wheels, and will cause unnecessary tire wear (river wear and cupping).
- .5 Skirt Nut[®] eliminates the clocking movement of the disc under the flange nuts which ensures that the full clamping force provided by the nut is retained.
- .6 In a dual assembly, Skirt Nut[®] partially penetrates only the stud holes in the outer wheel. The inner wheel is bossed by the outer wheel provided it is within the specified overall circumference requirement for dual assemblies (see diagram in 3.8 below). Once the correct clamping force is applied both wheels in the assembly are aligned and benefit from the features of Skirt Nut[®].
- .7 Skirt Nut[®] is specially treated with a rust retardant lubricant during the manufacturing process to reduce or offset the effects of oxidation. It is fully compatible with aluminum wheels.
- .8 Skirt Nut[®] provides an industry-high flange washer-to-wheel disc total mating surface area of 17.9 square inches, approximately 24% more than conventional flange nuts.

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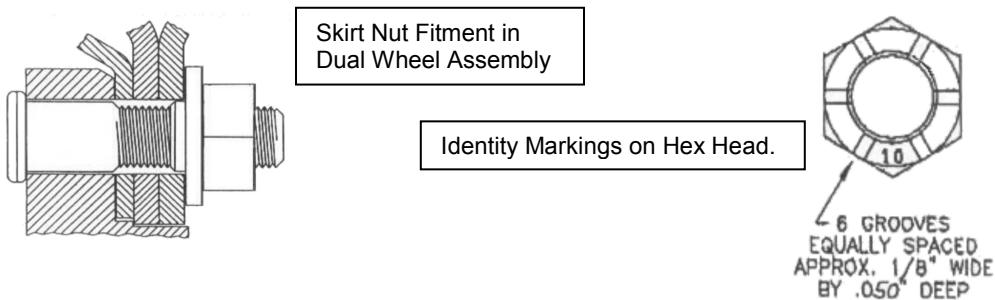
3. Design Properties of Skirt Nut®

- .1 The Skirt Nut® is designed for use with M22 x 1.5 threaded studs or bolts used in standard hub-piloted wheel systems having either eight bolts or ten bolts, for use with either STEEL or ALUMINUM wheels.
- .2 Installation and removal procedures for hub-piloted disc wheels are defined in any industry Users Guide to wheels and rims. Refer to your vehicle’s owner’s manual for basic information. For more detailed assistance, contact your local professional tire service center. You may also contact Safety Trigo. Inc. for clarification of any installation or removal procedure.

.3 Dimensional Data:

Part Number	Thread Size (RH)	Hex Size	Hex Hgt	Washer Thickness	Hex/Washer Ass’y Hgt	Skirt O.D.	Washer O.D.	Overall Length
SN100	22mm	33mm	21mm	8mm	29mm	25mm	46mm	35mm
			.83"	.314"	1.14"	1.03"	1.806"	1.38"

- .4 Industry recommended torque settings for these applications are 450 – 500 ft/lbs. Skirt Nut® meets and exceeds torque specifications of SAE J1965, i.e. 370 – 500 ft/lbs.
- .5 Standard industry-recommended installation procedures should be followed at all times, including correct tightening sequences and prescribed re-torque intervals after initial installation.
- .6 Skirt Nut® is manufactured to mechanical testing standard SAE J1965, micro examination standard SAE J121 and salt spray test standard ASTM B117.
- .7 Skirt Nut® should only be used in full sets of 8 for 8-bolt wheels, and full sets of 10 for 10-bolt wheels. Industry recommended procedures should be followed when replacing wheel hardware.
- .8 The top of the Skirt Nut® hex is crowned per standard for identification purposes only.



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4. Warnings, Precautionary Detail

While Skirt Nut[®] is superior to standard flange nuts in its ability to achieve and retain torque and clamping force, under no circumstances should the vehicle's operator, tire service or maintenance personnel fail to follow recommended usage and maintenance procedures. These may include but are not limited to:

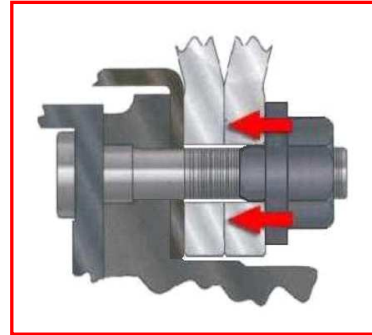
- .1 All wheel-to-hub and wheel-to-wheel contact surfaces should be brushed free of dirt and debris before the wheel is reinstalled. Safety Trigo. Inc. recommends that particular attention be paid to the areas around the stud holes in the brake drum – rust and debris trapped inside the drum may be knocked loose during wheel installation and interfere with the mounting.
- .2 Any signs of cracking on the disc between hand holes or radial cracking at stud holes require that the wheel be removed from service immediately. Neither of these conditions is repairable.
- .3 Any signs of peening (hammering damage) on the interior edges of the stud holes on any two adjacent holes require that the wheel be removed from service.
- .4 Stripped or damaged threads on studs or flange nuts require those parts to be replaced immediately. When replacing a damaged stud, it is recommended that the stud on either side of the damaged stud be replaced at the same time.
- .5 Paint spalling or starring around stud holes must be carefully investigated to ensure there are no cracks in the disc.
- .6 Caution must be used when applying lubricant to threads on studs and flange nuts. Use only top quality lubricant that is not water soluble, does not attract or retain grit and grime, and has high heat resistance.
- .7 Do not use protective plates (plastic or any other material) between dual wheels except those that may be offered by the specific wheel manufacturer. These plates do not prevent torque loss, may in fact contribute to it, and serve only to protect wheel finish.
- .8 Safety Trigo. Inc. recommends that used wheels never be purchased from unknown sources, and that used wheels should never be put into service without a complete and thorough inspection by qualified personnel, including chemical dye inspection for cracks.
- .9 Used hardware must never be installed or reinstalled if there is any sign of nicks in the threads, crossed or stretched threads or if service personnel noted extreme difficulty removing or installing the nuts. Any mechanical condition out of the ordinary should be carefully investigated before the service is completed – lives may be at stake!

5. Testing, Performance Standards.

Skirt Nut[®] may be the most-tested and performance-proven hardware component ever offered to the trucking industry. Testing procedures were not simply confined to lab tests or repeatable, situational test rigs, although these were, and are, a part of the process. Real world testing was conducted continuously from the earliest stages of design and is ongoing today.

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Testing included such processes as excessive axle loads supported by wheels attached with only five nuts, with the vehicle driven at speed on a tight oval test track for long intervals. All axle positions were tested individually and repeatedly, using different loads, different speeds, and even under-torqued and over-torqued nuts. Testing included comparative results for standard flange nuts on the same rigs, using the same wheel positions, speeds and loads. The result of all of the testing is that we can say without fear of contradiction that the Skirt Nut[®] has no equal, and easily outperforms any "similar purpose" hardware. Our tough testing standards and procedures, many steps beyond the testing that most hardware is subjected to, proves conclusively that:



- .1 Even if under-torqued, Skirt Nut[®] will not back off in operation. There have been cases where wheels with nuts only hand-tightened traveled thousands of miles with no loss or damage.
- .2 Correct torque is achieved more quickly and retained much longer than with conventional flange nuts. Although correct torque is important, even critical, to the safe operation of any truck, no damage has ever been found on wheels or studs on which the torque setting on the Skirt Nut[®] was less than half the recommended minimum.
- .3 Not a single wheel has been lost or come loose on a Skirt Nut[®]-equipped vehicle over millions of hard driving miles on many different road surfaces and conditions, in many different types of service.

Skirt Nut[®] is not yet widely available as an original equipment option. Contact Safety Trigo. Inc. for distribution contacts.

Try Skirt Nut[®] - **the ultimate heavy duty disc wheel fastener!**

Recommended reference material (available via listed contacts):

Sales Brochure	09SFea3.pdf
Features & Benefits of Skirt Nuts	07SNP012007A
Textron Engineering Report	SN100-TFS0901

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Skirt Nut[®] is protected by the following US, Canadian and World-wide Patents: 6,070,946 / 2,236,720 / 010664