

USER GUIDE



Gallock – Wedge Lock Washer

Complete Safety Under Heavy Vibrations



Gallock Wedge Lock Washer

Welcome to the user guide of Gallock Washers.

Gala Precision Engineering has successfully developed Gallock Wedge Lock Washers, which is useful to safely secure bolted joints especially exposed to heavy vibrations and dynamic loads.

These Wedge Lock Washers have started replacing conventional washers rapidly due to its proven advantages. Hence it is becoming an ideal choice for replacement, retrofit during maintenance, repair and overhaul procedures.

We have in-house Junker testing facility to test these washers according to DIN-65151 standard in conformity with the requirements of the Standard DIN 25201-4.

Wedge Lock Washers are widely used in industries such as Energy, Transportation, Off-highway & Construction Equipments, Mining & Quarrying, Infrastructure, Manufacturing, Ship building, Farming & Forestry, Heavy vehicles & Military etc.

A method for the manufacturing of circular washers for locking from blanks, a washer having a central hole, a first side contains a pattern of radially extending teeth and a second side comprising a pattern of radially extending cams.

In a locking system of this kind two washers are arranged in a pair, substantially as shown in Fig. 1, the cam pattern sides Fig. 2 facing and engaging each other, the main cam surface inclination being larger than the pitch of the threads, which causes a positive and efficient locking of the fastening element.



Fig. 1 Washer Locking Assembly

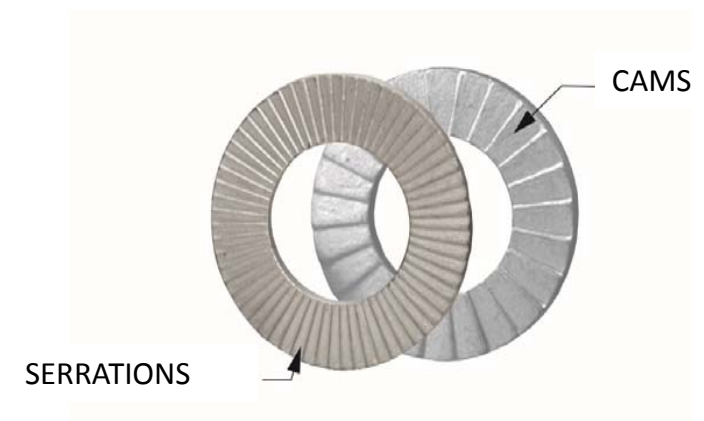


Fig. 2 Cam Pattern Sides

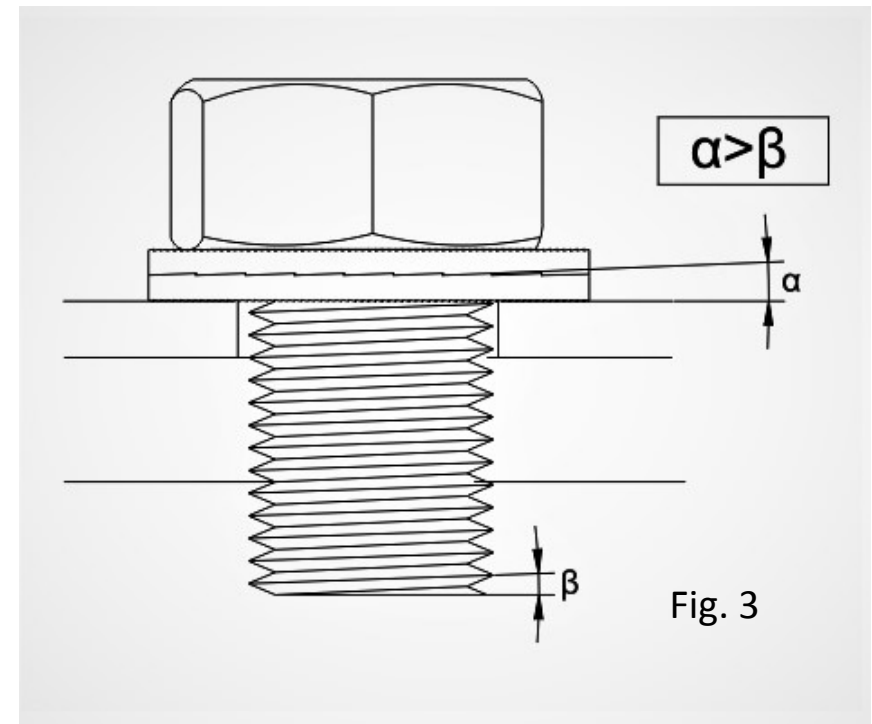
About Gallock

Gallock - Wedge Lock Washers ensure the integrity of fastener thread systems by using tension rather than friction, which is the basis of most traditional fastening methods. This provides security to the threaded systems.

Gallock - Wedge Lock Washers consists of two identical flat washers which have a set of cams on one side and a radial knurling on the other. These two washers are supplied glued together, in order to avoid any orientation mistake during assembly.

Working Principle

As shown in the diagram, the angle of the cam of the washer α is larger than the angle of the thread β . When the fastener is tightened, the knurled surfaces grip both the bearing surface of the fastener and the material into which the screw is being fastened. The larger angle of the cam, compared to the smaller angle of the screw thread β , will not allow the screw to loosen because of the tension caused by the cam lifting.



Raw Material :
Steel, Spring Steel,
Alloy Steel

Coatings:
Zn Flake Coatings

Functional Principle

Wedge shaped surface on the inside of the lock washers,
radial teeth on the outside

Interlocking embedding of the radial teeth with the
respective mating surface (When the bolt is tightened)

System movement only possible between the inside washer
surfaces, allowing the securing system to readjust itself
automatically

Increase in clamping force



Advantages

This unique cam system uses tension to create high force in a fastened joint
that is subjected to vibrations

Particularly suitable for dynamic loads

Very easy to install & remove

Also suitable for high-tensile bolts of 8.8, 10.9 and 12.9 and their respective
nuts

These can be re-used with no reduction in function or quality

Locking function is not affected by any kind of lubrication.

Secures fastening joint at comparatively low pre load with respect to other
securing options



Installation Guidelines

Gallock washers are easy and effective to use while ensuring structural security for applications bare to vibration and dynamic loads.

Installing the washers:

The pre-assembled washers are installed in pairs, cam face to cam face. Gallock recommends lubrication when possible.

Tightening:

Tighten Gallock washers with standard tools according to the guidelines provided on page number 05 - 07. Tightening guidelines for other bolt grades are available through your Gallock representative.

Untightening:

Untightening Gallock washers is much simpler than tightening. Note that since the locking function is not based on increased friction, the untightening torque is generally lower than the tightening torque. Therefore it is not possible to measure off-torque as verification of locking function.

Reusing Gallock:

Gallock washers can normally be reused. As with all fasteners, they should be inspected for wear before reassembly. Make sure that the washers are reinstalled correctly with cam face to cam face. Gallock recommends lubrication of fasteners before reuse in order to minimize changes in friction conditions`

Installation Examples

Refer Fig. 4 images for installation and bolt joint guide reference.

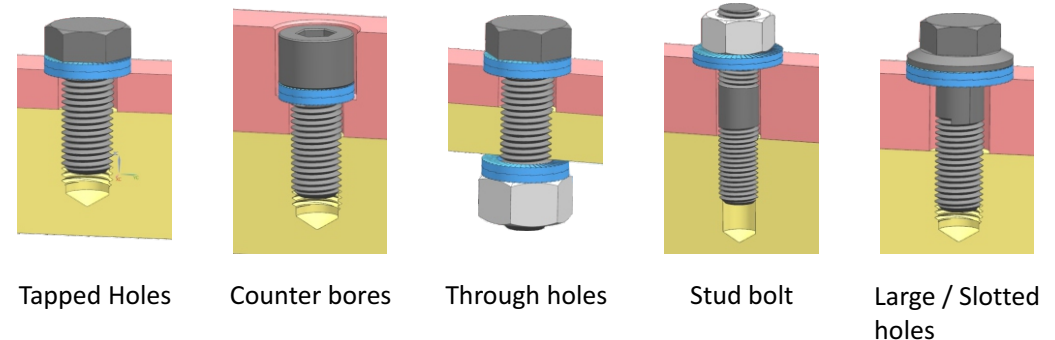


Fig. 4

Torque Guidelines - Strength Class 8.8 (ISO 898)



| μ_t Oil (WD 40) : Thread Coefficient of friction : (0.13) μ_b Oil (WD 40): Bearing surface Coefficient of friction : (0.15) | | | | μ_t Cu/G Paste : Thread Coefficient of friction : (0.12) μ_b Cu/G Paste: Bearing surface Coefficient of friction : (0.14) | | Bolt Clamping Condition: 75 % of Yield Point | |
|--|-------------|-----------|------------|---|-----------------|---|-----------------|
| Bolt Specifications: Metric; Zink Plated Strength Class 8.8 (ISO 898) | | | | Lubrication : Oil (WD 40) | | Lubrication : Cu/G Paste | |
| Sr. No. | Washer Size | Bolt Size | Pitch (mm) | Clamping Torque (Nm) | Clamp Load (KN) | Clamping Torque (Nm) | Clamp Load (KN) |
| 1 | GL 8 | M 8 | 1.25 | 23 | 16 | 22 | 16 |
| 2 | GL10 | M10 | 1.50 | 45 | 25 | 43 | 25 |
| 3 | GL12 | M12 | 1.75 | 78 | 36 | 74 | 36 |
| 4 | GL14 | M14 | 2.00 | 125 | 50 | 119 | 50 |
| 5 | GL16 | M16 | 2.00 | 192 | 68 | 182 | 68 |
| 6 | GL18 | M18 | 2.50 | 267 | 86 | 254 | 86 |
| 7 | GL20 | M20 | 2.50 | 377 | 110 | 357 | 110 |
| 8 | GL22 | M22 | 2.50 | 517 | 136 | 490 | 136 |
| 9 | GL24 | M24 | 3.00 | 649 | 159 | 616 | 159 |
| 10 | GL27 | M27 | 3.00 | 954 | 206 | 904 | 206 |
| 11 | GL30 | M30 | 3.50 | 1297 | 252 | 1230 | 252 |
| 12 | GL33 | M33 | 3.50 | 1756 | 312 | 1663 | 312 |
| 13 | GL36 | M36 | 4.00 | 2260 | 367 | 2142 | 367 |
| 14 | GL39 | M39 | 4.00 | 2928 | 439 | 2772 | 439 |
| 15 | GL42 | M42 | 4.50 | 3615 | 481 | 3424 | 481 |

Notes :

Too Low clamp load may lead to sliding of two halves of Gallock Washer. Too high clamp load may lead to deformation of bolts. Severity of vibrations, Design of joints, Functional need of application, Surrounding condition to be taken into account while deciding tightening ratio (Yield point %).

Depending on application requirement clamp load is being decided in the range of 60 to 90 % of Proof Load of respective fastening bolt. However above table figures are corresponding to 75 % of Proof Load and indicative figures.

Unclamping Torque may vary, depending on the severity of stresses applied during function, environment condition.

Torque Guidelines - Strength Class 10.9 (ISO 898)



| μ_t Oil (WD 40) : Thread Coefficient of friction : (0.13) μ_b Oil (WD 40): Bearing surface Coefficient of friction : (0.15) | | | | μ_t Cu/G Paste : Thread Coefficient of friction : (0.12) μ_b Cu/G Paste: Bearing surface Coefficient of friction : (0.14) | | Bolt Clamping Condition: 75 % of Yield Point | |
|---|-------------|-----------|------------|---|-----------------|---|-----------------|
| Bolt Specifications: Metric; Zinc Plated Strength Class 10.9 (ISO 898) | | | | Lubrication : Oil (WD 40) | | Lubrication : Cu/G Paste | |
| Sr. No. | Washer Size | Bolt Size | Pitch (mm) | Clamping Torque (Nm) | Clamp Load (KN) | Clamping Torque (Nm) | Clamp Load (KN) |
| 1 | GL 8 | M 8 | 1.25 | 32 | 22 | 31 | 22 |
| 2 | GL10 | M10 | 1.50 | 64 | 35 | 61 | 35 |
| 3 | GL12 | M12 | 1.75 | 110 | 51 | 105 | 51 |
| 4 | GL14 | M14 | 2.00 | 176 | 69 | 167 | 69 |
| 5 | GL16 | M16 | 2.00 | 270 | 97 | 260 | 97 |
| 6 | GL18 | M18 | 2.50 | 376 | 116 | 357 | 116 |
| 7 | GL20 | M20 | 2.50 | 529 | 150 | 503 | 150 |
| 8 | GL22 | M22 | 2.50 | 726 | 185 | 688 | 185 |
| 9 | GL24 | M24 | 3.00 | 913 | 214 | 866 | 214 |
| 10 | GL27 | M27 | 3.00 | 1341 | 280 | 1271 | 280 |
| 11 | GL30 | M30 | 3.50 | 1825 | 341 | 1730 | 341 |
| 12 | GL33 | M33 | 3.50 | 2470 | 424 | 2339 | 424 |
| 13 | GL36 | M36 | 4.00 | 3179 | 498 | 3012 | 498 |
| 14 | GL39 | M39 | 4.00 | 4117 | 597 | 3898 | 597 |
| 15 | GL42 | M42 | 4.50 | 5084 | 685 | 4815 | 685 |

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Unclamping Torque may vary, depending on the severity of stresses applied during function, environment condition.

Torque Guidelines - Strength Class 12.9 (ISO 898)



| μ_t Oil (WD 40) : Thread Coefficient of friction : (0.13) μ_b Oil (WD 40): Bearing surface Coefficient of friction : (0.15) | | | | μ_t Cu/G Paste : Thread Coefficient of friction : (0.12) μ_b Cu/G Paste: Bearing surface Coefficient of friction : (0.14) | | Bolt Clamping Condition: 75 % of Yield Point | |
|---|-------------|-----------|------------|---|-----------------|---|-----------------|
| Bolt Specifications: Metric; Zink Plated Strength Class 12.9 (ISO 898) | | | | Lubrication : Oil (WD 40) | | Lubrication : Cu/G Paste | |
| Sr. No. | Washer Size | Bolt Size | Pitch (mm) | Clamping Torque (Nm) | Clamp Load (KN) | Clamping Torque (Nm) | Clamp Load (KN) |
| 1 | GL 8 | M 8 | 1.25 | 39 | 26 | 37 | 26 |
| 2 | GL10 | M10 | 1.50 | 77 | 42 | 73 | 42 |
| 3 | GL12 | M12 | 1.75 | 132 | 61 | 125 | 61 |
| 4 | GL14 | M14 | 2.00 | 211 | 84 | 200 | 84 |
| 5 | GL16 | M16 | 2.00 | 324 | 114 | 308 | 114 |
| 6 | GL18 | M18 | 2.50 | 451 | 139 | 429 | 139 |
| 7 | GL20 | M20 | 2.50 | 636 | 178 | 603 | 178 |
| 8 | GL22 | M22 | 2.50 | 872 | 220 | 826 | 220 |
| 9 | GL24 | M24 | 3.00 | 1095 | 256 | 1039 | 256 |
| 10 | GL27 | M27 | 3.00 | 1609 | 334 | 1525 | 334 |
| 11 | GL30 | M30 | 3.50 | 2189 | 408 | 2076 | 408 |
| 12 | GL33 | M33 | 3.50 | 2964 | 505 | 2807 | 505 |
| 13 | GL36 | M36 | 4.00 | 3815 | 594 | 3614 | 594 |
| 14 | GL39 | M39 | 4.00 | 4941 | 710 | 4678 | 710 |
| 15 | GL42 | M42 | 4.50 | 6101 | 821 | 5779 | 821 |

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Inspection and Quality Control

Stringent tests like material test, micro structure, hardness test post heat treatment, dimensional accuracy, parallelism, flatness and junker test are a few test parameters checked at every stage. Data from raw material testing, online testing during production processes and sample testing is compiled and analysed. Any deviations are corrected using cause-effect methods so that each outgoing product is of optimum quality.

- ☐ Micro Hardness Tester
- ☐ Online Dimension Inspection
- ☐ Profile Projector
- ☐ Junker Test Machine



Junker Test Machine



Counter Measuring Machine



Micro Hardness Tester

Gallock Applications in Wind Turbine



Yaw Motor



Rotor Brake



**Ladders, Platforms &
Tower Connections**



Tower Section



Turbine Foundation

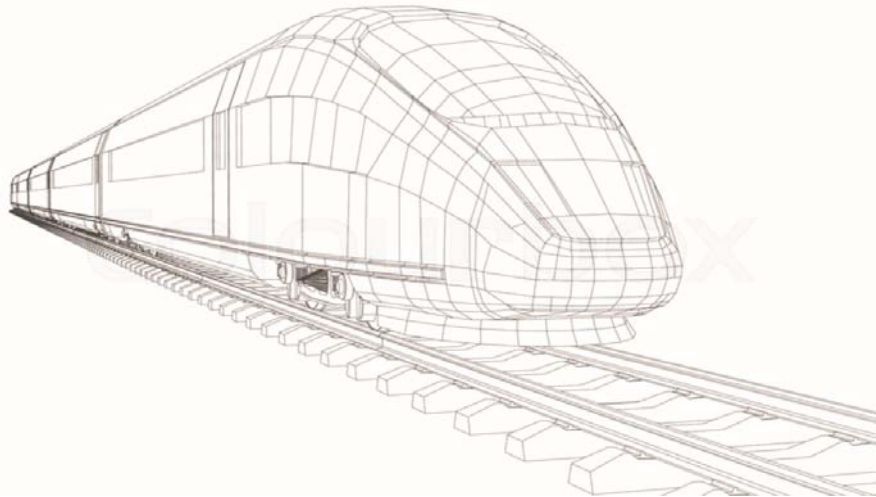
Gallock Applications in Railways



Traction Motors



Control Arm of Coaches

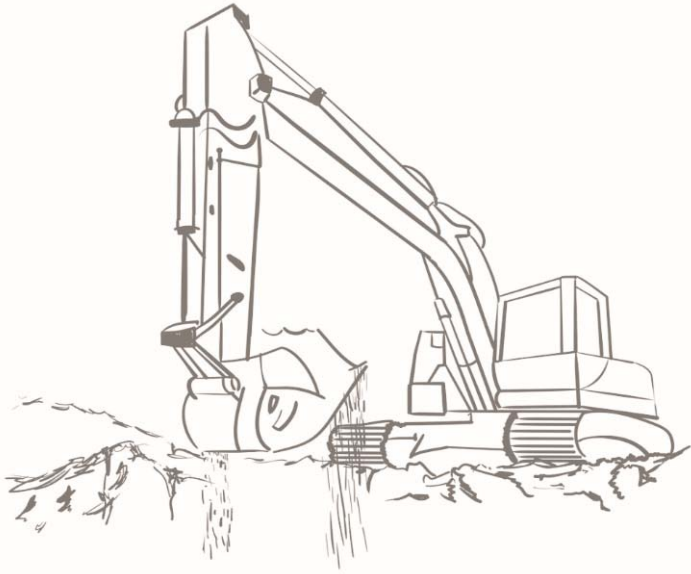


Push Pull Rod
(Electrical Locomotive)



Compressor
(Electrical Locomotive)

Gallock Applications in Off-Highway Equipment



Construction
Agricultural
Mining



CONTACT US



IATF:16949 Certified Manufacturing Facilities



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