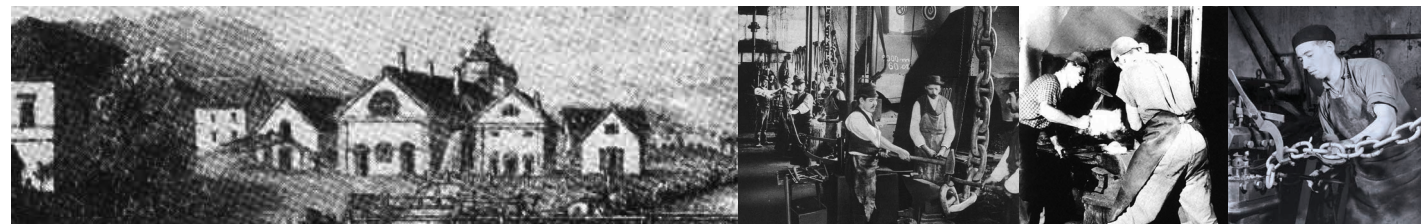


pewag
tire protection chains

Protection and traction



pewag History



At the core of chain innovation since 1479

pewag is one of the oldest chain manufacturers in the world and the company's history goes back over 535 years when the first production facility was established in the town of Brückl, Austria in 1479. With over 535 years of engineering and manufacturing know-how, pewag has continued its research and development to provide the highest-quality innovative chain products to the market.

The pewag brand is well known for premium-quality chain products around the world and is well established as a global market leader. Today, pewag is the technological innovator in the high quality chain business. Stringent demands are placed on all employees to ensure high standards of quality.

pewag products

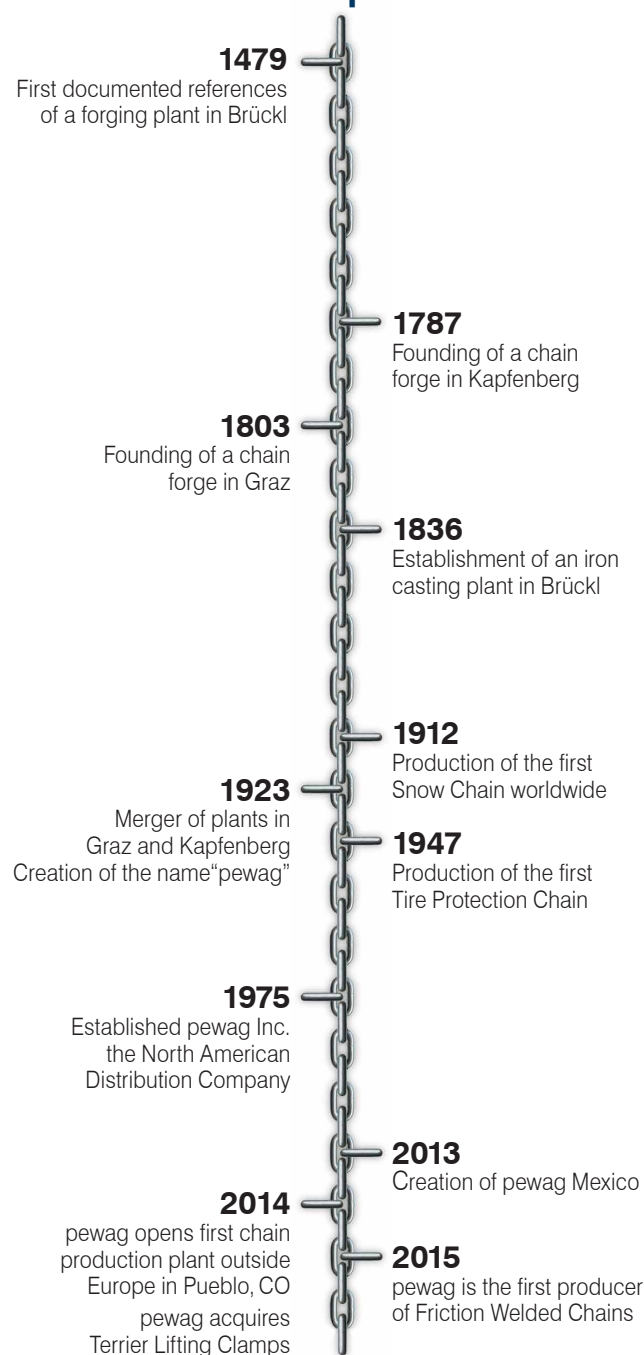
The pewag group has a substantial and diverse spectrum of products and services.

- **Industrial Lifting Chains & Components**
- **Traction Chains**
(cars, trucks, special purpose vehicles)
- **Tire Protection Chains**
(mining vehicles)
- **Conveyor and Hoist Chains & Components**
- **Security Chains**

Contact

pewag, Inc
600 W. Crossroads Parkway
Bolingbrook, IL 60440
P: 630.226.6020
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tpcsales@pewagchain.com
pewag.us

Timetable of important events



pewag Tire protection chains Contents

	Benefits and Service	4-5
	Application Areas	
	Open pit mining	6-7
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Benefits and Service

pewag tire protection chains

Benefits

Earth Mover Tires are the highest single cost factor for the operation of a wheeled unit and sensitive to cuts, punctures and other damages.

Their high value means that pewag tire protection chains solve many of these problems by providing the following advantages:

Lower direct hourly operating costs:

- Multiplied tire life – significant reduction of tire costs
- Predictable service life of chains and tires – accurate budgeting at lower costs, low financial costs
- Minimized down-time due to tire failure – maximum equipment availability
- Improved stability, increased traction and better penetration for digging and break-out – increased productivity in output per hour

Additional benefits:

- Optimum tire protection – reduced tire maintenance
- Protection plus traction with chain use – safe operation even in worst conditions



4



Services

After Sales Service, an elementary key point of pewag's long-term partnership with our customers, is offered by the pewag worldwide network:

- Technical assistance and repair by chain experts
- Training in chain handling (mounting, correct tensioning, repair, adjustment, dismantling, etc.)
- Inspection calls including performance reporting
- Availability of spare parts
- Special tools and accessories facilitating chain handling and maintenance
- Manuals and relevant risk assessments



5

Application areas

Open pit mining

Strong chains for great performance

pewag is always in the forefront when it comes to chaining the world's largest machines and tires. Large-scale mining operations owned by renowned international companies are choosing pewag as their reliable and innovative partner for the protection of their tires.



Characteristics

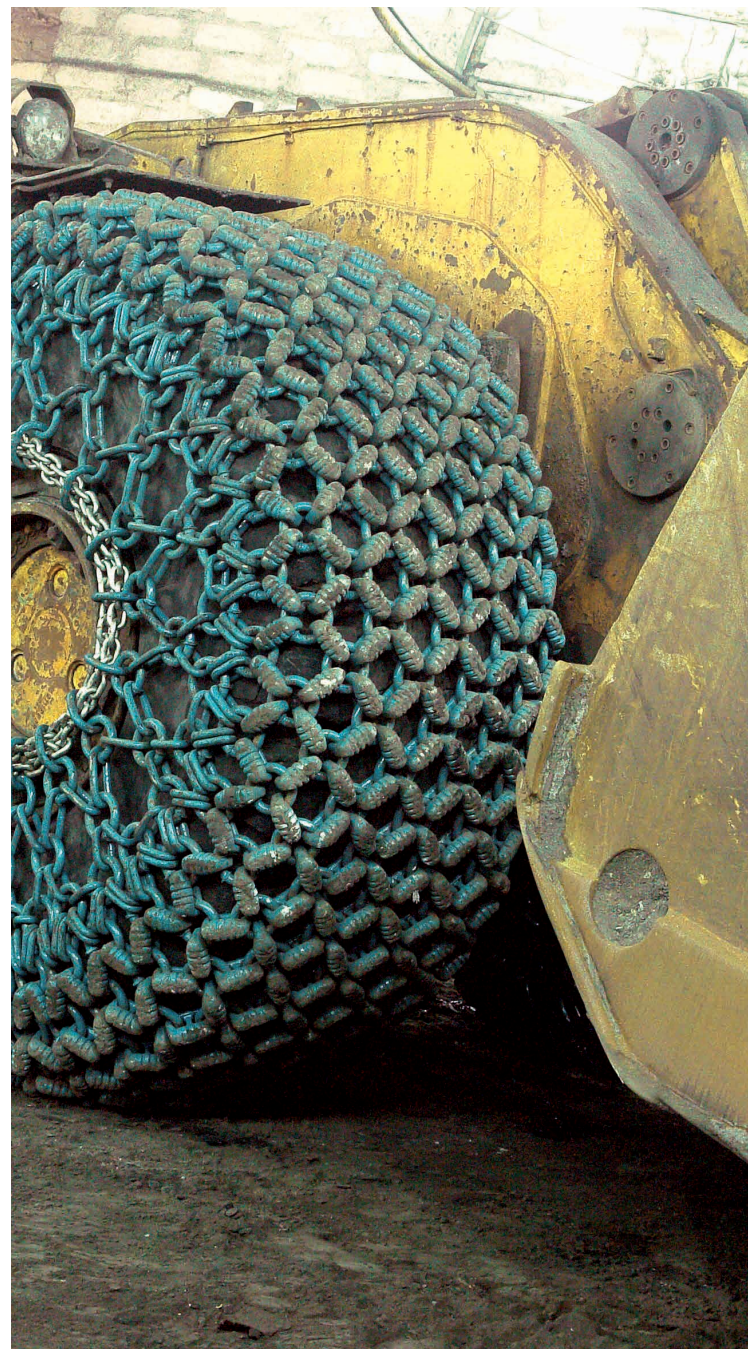
- Large fleet of earthmovers
- Expensive and vulnerable tires
- Huge mining areas
- Millions of tons to be moved
- 24/7 operation



Underground mining and tunneling

High quality in deepest grounds

From low surface tunneling to deepest level mining at 4,785 m pewag tire protection chains keep underground operations going. pewag chains are used with a wide range of highly specialized equipment like loaders, shuttle cars, scoops and other wheeled vehicles, for both protection and traction.



Characteristics

- Limited space for chain installation
- Narrow operating space and long driving distances
- Extreme stress and load for the machine, tires and chains
- Difficult equipment and tire maintenance
- Frequent tire failures
- 24/7 operation



Quarrying

The right choice for every need

The largest group of users exploiting all kind of materials, from aggregates to ornamental rock. Their very specific and numerous requirements are fully covered by pewag's wide range of chain solutions.



Characteristics

- High diversity of rock, from soft limestone to hard granite, in all sizes
- Load and carry operation
- Seasonal operation
- Premature tire wear and failure
- 1 to 2, maximum 3 shift operation



Slag and scrap handling

Tire protection in extreme applications

Very high temperatures, liquid steel slag, large and solid scrap pieces, concrete driveways, etc. mean toughest working conditions. pewag's successful answer: reinforced, highly wear resistant and customized chain designs.



Characteristics

- Temperatures up to 2,190 °F (1,200 °C)
- Punctures and tire burning
- Abrasive ground conditions
- Exceptional stress and load
- Limited time for maintenance
- Operation with time limitation



Traction

Safety with pewag traction chains

pewag chains ensure that mining operations keep on rolling! A great diversity of machines can be chained such as loaders, dozers, graders, dump and service trucks. For seasonal use on ice and snow as well as for continuous use on slippery and muddy ground.



Characteristics

- Ice and snow
- Slippery or muddy surfaces
- Steep inclines
- Spinning wheels
- Safety requirements for operator and machine
- Seasonal or continuous use throughout the year



Products

Traction

Mesh design

hexa

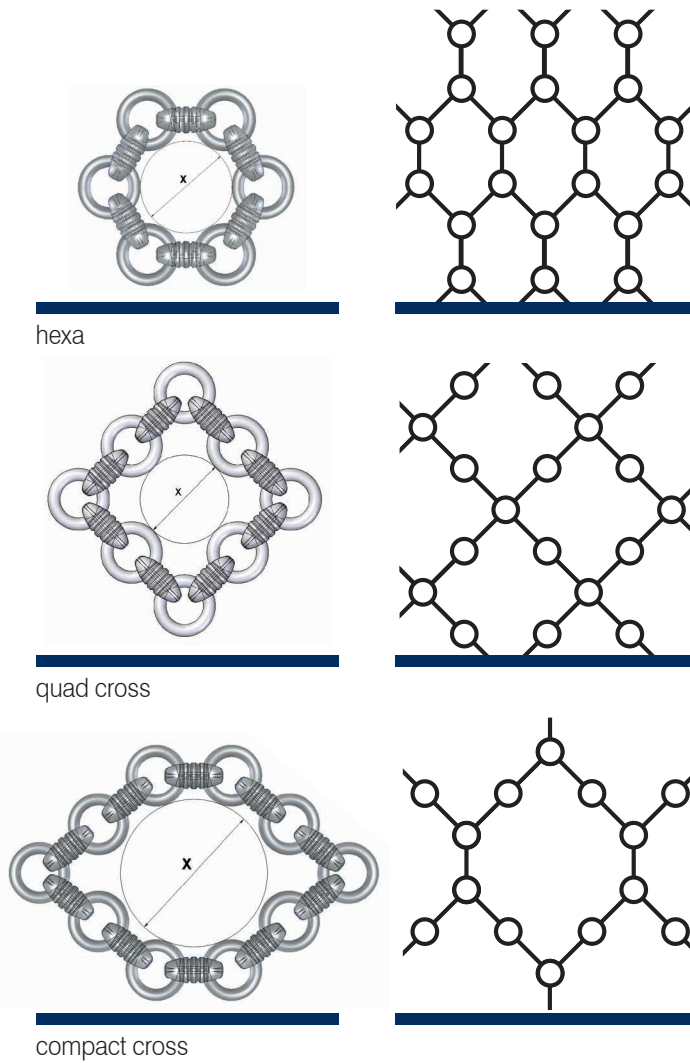
The hexagonal mesh design ensures excellent grip and sufficient tire protection. Suitable for all vehicles where traction is needed before protection.

quad cross

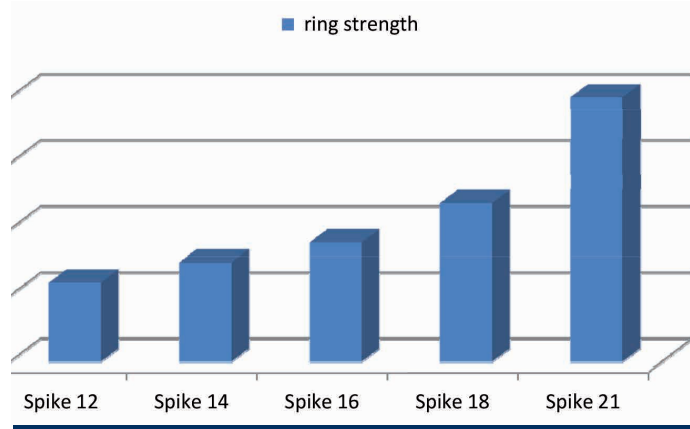
Special 8-link net construction. Traction chains for tough applications.

compact cross

Special 10-link net construction provides excellent grip, stable running and the necessary self cleaning. Suitable for all vehicles that require extra traction to fulfil their operational duties.



compact cross



Recommended link

pewag spike

Narrow link design with prominent grip teeth provides excellent traction and self cleaning. For all applications where traction is needed.

Available sizes: 12 | 14 | 16 | 18

Suitable mesh design:

- hexa
- quad cross
- compact cross



pewag spike 21

Available sizes: 21

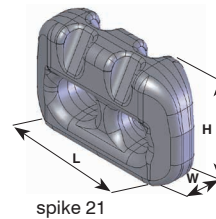
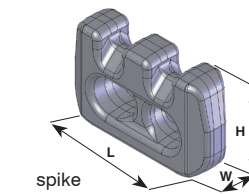
Suitable mesh design:

- hexa
- quad cross
- compact cross



Measurements

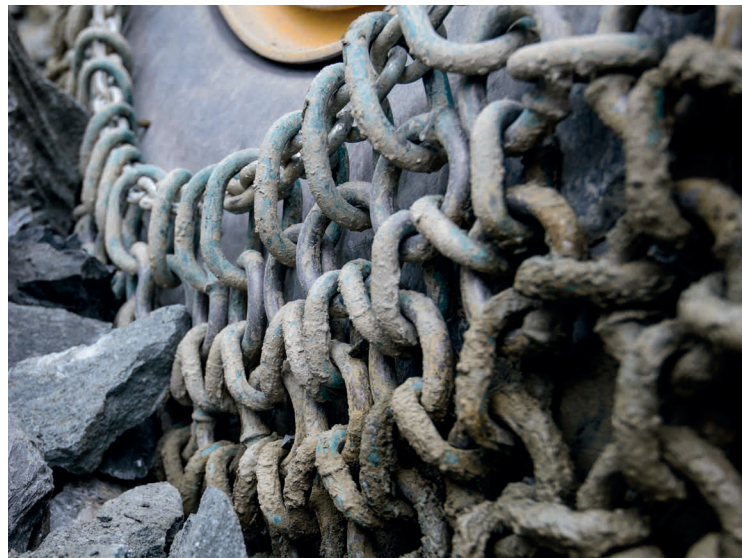
	Link measurements			Ring measurements		Mesh opening (x)		
	L	W	H	d	D	hexa	quad cross	compact cross
12								
spike	60	16	40	12	45	96	99	169
14								
spike	71	19	47	14	50	112	112	194
16								
spike	86	22	54	16	54	130	130	222
18								
spike	88	24	60	18	64	138	140	241
21								
spike	108	32	72	21	70	163	164	275



Flank Protection

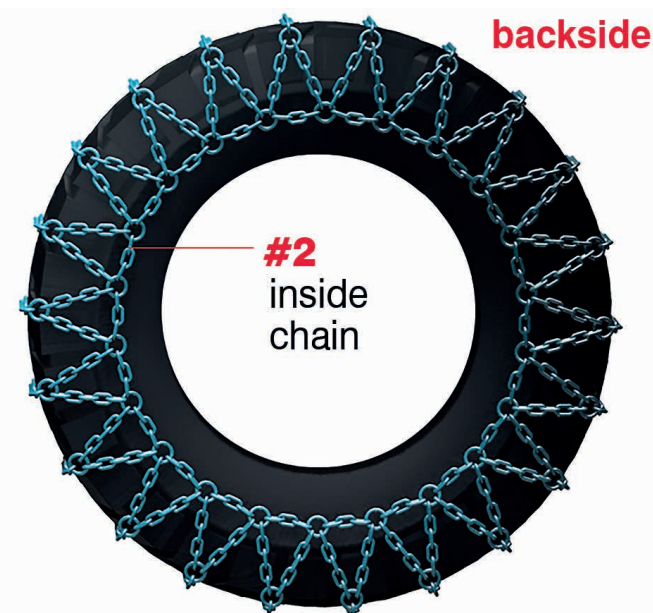
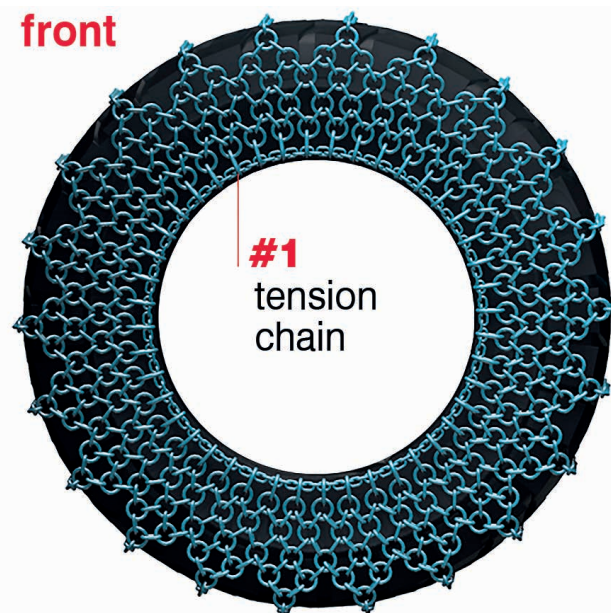
New solution for dump truck

Sidewall damage is one of the leading causes of tire failure and often happens when trucks get too close to berms and high bank faces. These raised surfaces may contain rocks and other hazards that can slash tire sidewalls.



Characteristics

- Ice and snow
- New design solution on market
- No Speedlimit
- Maximum sidewall protection guarantees to reach the maximum tire lifetime
- No downtime due to tire failure (no sudden death)
- All tiresizes available from 18.00-25 up to 59/80-63
- Easy installation
- Long lifetime of sidewall and inside chain construction
- Very easy and fast hammer less change of center tread possible
- Very economic compared to other sidewall protection solutions on the market
- Hammer free Spare Parts
- Supports also traction when required
- Keeps machines rolling



Application abrasiveness

For mohs hardness (1-5)

The Mohs scale of mineral hardness is a qualitative ordinal scale which characterizes the scratch resistance of various minerals through the ability of a harder material to scratch a softer material.

The hardness of a material is measured against the scale by finding the hardest material that the given material can scratch, and/or the softest material that can scratch the given material. For example, if some material is scratched by apatite but not by fluorite, its hardness on the Mohs scale would fall between 4 and 5.

For example

- 1-5: Talc, Gypsum, Calcite
- 5-7: Apatite, Quartz, Mangan
- 7-10: Topaz, Corundum, Diamond

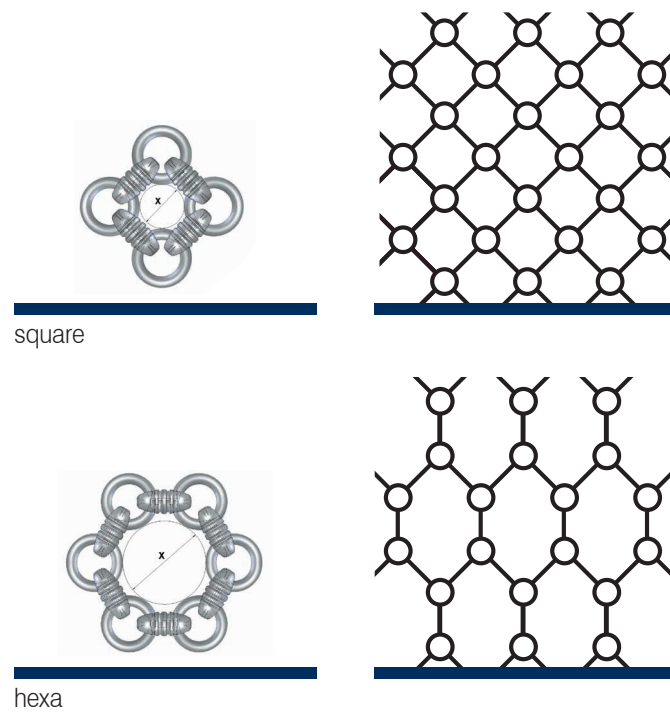
Mesh design

square

The fine mesh of square design provides optimum tire protection even on the sharpest rock.

hexa

The hexagonal mesh design ensures excellent grip and sufficient tire protection. Suitable for all vehicles where traction is needed before protection.



Recommended link

pewag tyro

Mohs hardness (1-5)

Innovative link design with excellent wear volume. By offering best protection and sufficient traction it is suitable for S-L sized earth moving equipment working in soft to medium hard rock applications.

Available sizes: 14 | 16 | 18

Suitable mesh design:

- square
- hexa



pewag spike 21

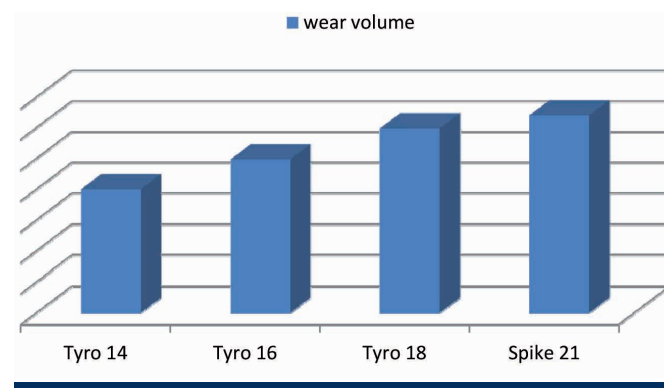
Mohs hardness (1-5)

Narrow link design with prominent grip teeth provides excellent traction and self cleaning. For all applications where traction is needed.

Available sizes: 21

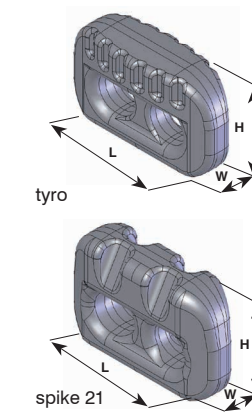
Suitable mesh design:

- square
- hexa



Mohs 1-5

Measurements



	Link measurements			Ring measurements		Mesh opening (x)	
	L	W	H	d	D	square	hexa
14							
tyro	76	26	46	14	50	63	122
16							
tyro	88	30	54	16	54	67	130
18							
tyro	97	34	62	18	64	81	156
21							
spike	108	32	72	21	70	83	163

Application abrasiveness

For mohs hardness (5-7)

The Mohs scale of mineral hardness is a qualitative ordinal scale which characterizes the scratch resistance of various minerals through the ability of a harder material to scratch a softer material.

The hardness of a material is measured against the scale by finding the hardest material that the given material can scratch, and/or the softest material that can scratch the given material. For example, if some material is scratched by apatite but not by fluorite, its hardness on the Mohs scale would fall between 4 and 5.

For example

- 1-5: Talc, Gypsum, Calcite
- 5-7: Apatite, Quartz, Mangan
- 7-10: Topaz, Corundum, Diamond

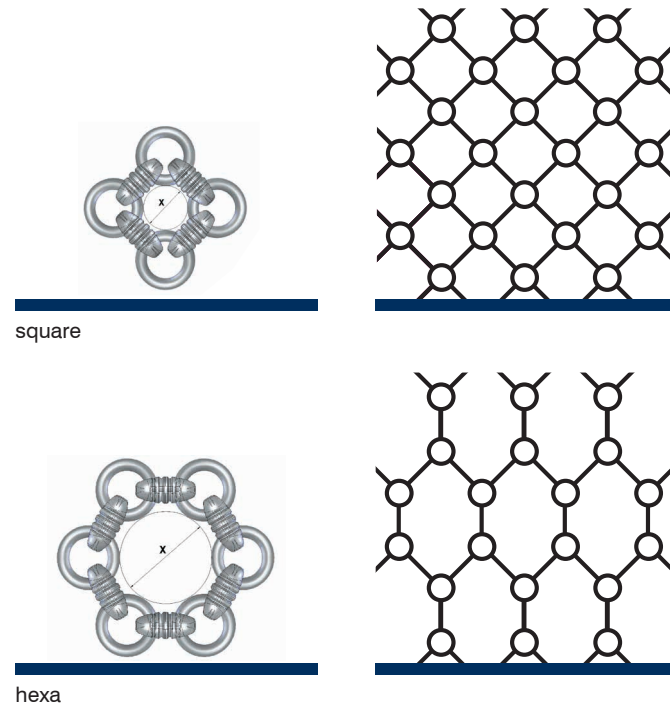
Mesh design

square

The fine mesh of square design provides optimum tire protection even on the sharpest rock.

hexa

The hexagonal mesh design ensures excellent grip and sufficient tire protection. Suitable for all vehicles where traction is needed before protection.



Recommended link

pewag granite

Mohs hardness (5-7)

The multipurpose chain link suitable for slag and scrap handling as well as for all rock applications. This link design offers excellent tire protection and traction.

Available sizes: 12 | 14 | 16 | 18 | 18/20S
Suitable mesh design:

- square
- hexa



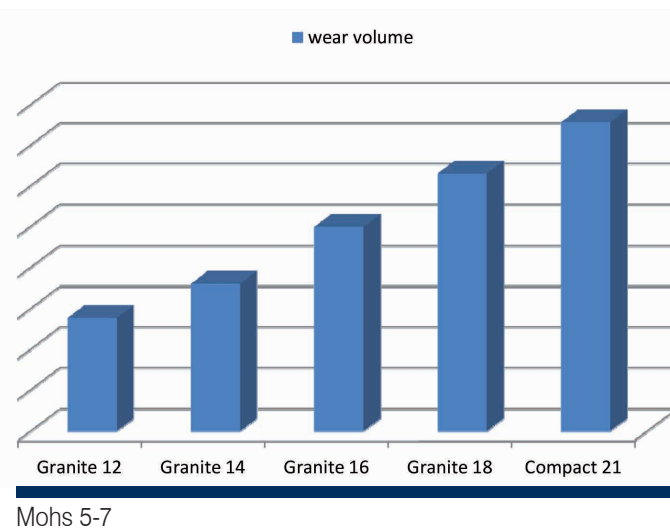
pewag compact

Mohs hardness (5-7)

Heavy duty link for giant loaders with large wear volume for maximum service life. Suitable for all rock applications and in large scale mining operations.

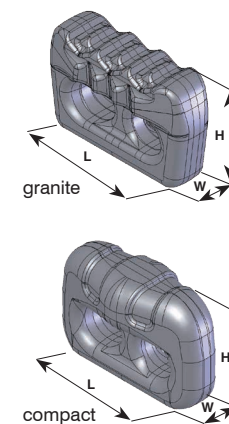
Available sizes: 21
Suitable mesh design:

- square
- hexa



Mohs 5-7

Measurements



	Link measurements			Ring measurements		Mesh opening (x)	
	L	W	H	d	D	square	hexa
12							
granite	63	22	38	12	45	53	103
14							
granite	79	27	46	14	50	63	122
16							
granite	90	34	53	16	54	67	130
18							
granite	100	38	65	18	64	81	156
18/20S							
granite	100	38	65	20	64	78	153
21							
compact	108	46	72	21	70	83	163

Application abrasiveness

For mohs hardness (7-10)

The Mohs scale of mineral hardness is a qualitative ordinal scale which characterizes the scratch resistance of various minerals through the ability of a harder material to scratch a softer material.

The hardness of a material is measured against the scale by finding the hardest material that the given material can scratch, and/or the softest material that can scratch the given material. For example, if some material is scratched by apatite but not by fluorite, its hardness on the Mohs scale would fall between 4 and 5.

For example

- 1-5: Talc, Gypsum, Calcite, Fluorite
- 5-7: Apatite, Quartz, Mangan
- 7-10: Topaz, Corundum, Diamond

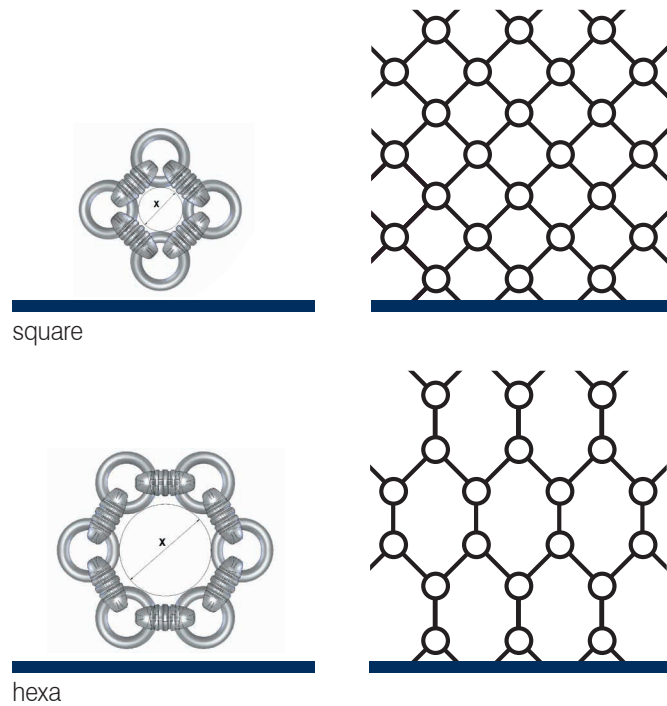
Mesh design

square

The fine mesh of square design provides optimum tire protection even on the sharpest rock.

hexa

The hexagonal mesh design ensures excellent grip and sufficient tire protection. Suitable for all vehicles where traction is needed before protection.



Recommended link

pewag tycoon ultimate

Mohs hardness (7-10)

Ultra-resistant heavy duty wear link especially developed for the world's largest wheel loaders as well as for operations in most abrasive hard rock conditions.

Suitable mesh design:

- square
- hexa



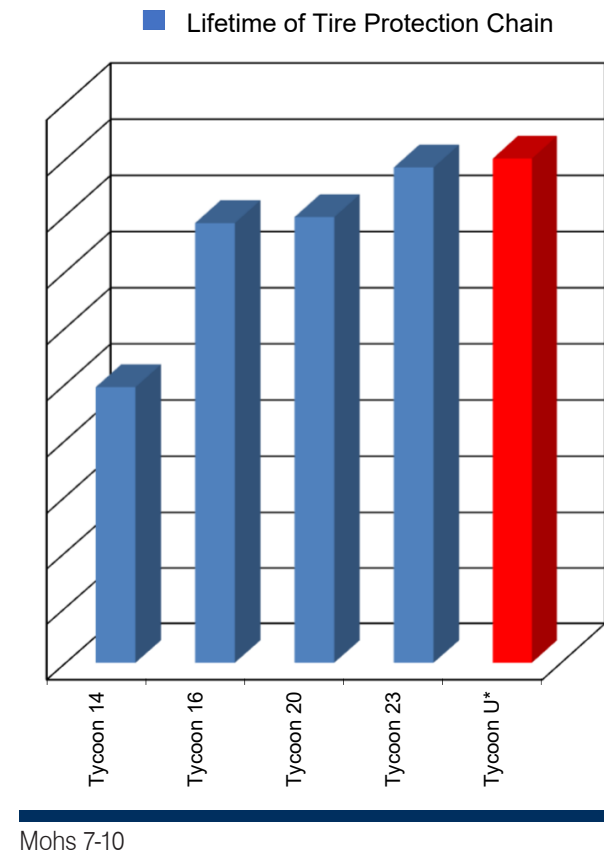
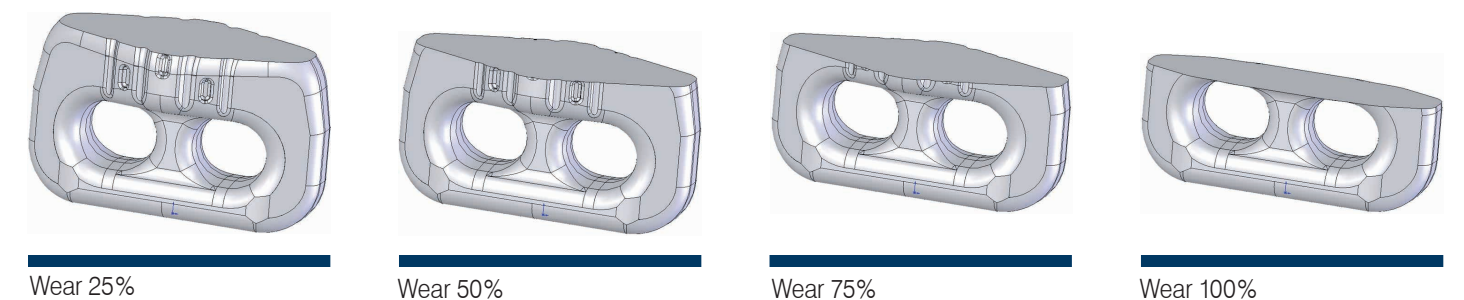
Characteristics

- Lower acquisition price than Tycoon 23
- Longer lifetime than Tycoon 23
- Is lower in weight than the Tycoon 23 - 7.2% less weight
- Better fuel efficiency
- Easier installation
- Lower shipping costs
- Lowest cost of ownership per operating hour
- Required clearances are reduced
- Less chain re-tensioning as inner link and ring bearing points are more wear resistant

Measurements

	Link measurements			Ring measurements		Mesh opening (x)	
	L	W	H	d	D	square	hexa
tycoon ultimate	108	57	72	21	70	81	163

Wear indicators



Recommended link

pewag tycoon

Mohs hardness (7-10)

Ultra-resistant heavy duty wear link especially developed for the world's largest wheel loaders as well as for operations in most abrasive hard rock conditions.

Available sizes: 14 | 16 | 20 | 23

Underground: 14/16 | 16/18S | 20

Suitable mesh design:

- square
- hexa



pewag ringstar

Mohs hardness (7-10)

Extremely tight (square) mesh design for optimum tire protection and long service life in wet and abrasive conditions. Excellent traction on ice and snow in hexagonal mesh design.

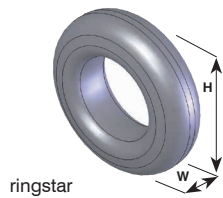
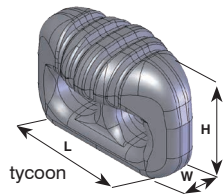
Available sizes: 16

Suitable mesh design:

- square
- hexa

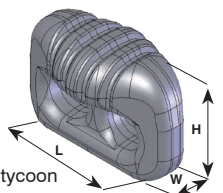


Measurements



	Link measurements			Ring measurements		Mesh opening (x)	
	L	W	H	d	D	square	hexa
14							
tycoon	79	39	47	14	50	61	122
16							
tycoon	88	48	59	16	54	60	130
ringstar	-	21	69	16	54(*45)	44	96
20							
tycoon	97	54	67.5	20	64	74	153
23							
tycoon	112	60	76	23	72	84	170

Underground



	Link measurements			Ring measurements		Mesh opening (x)	
	L	W	H	d	D	square	hexa
14/16							
tycoon	79	39	47	16	54	64	122
16/18S							
tycoon	88	48	59	18	54	60	126
20							
tycoon	97	54	67.5	20	64	74	153

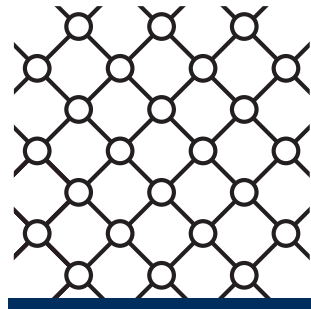
With reinforced rings for long driving distance in wet underground applications.



Mesh design

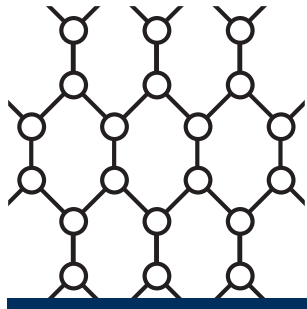
square

The fine mesh of square design provides optimum tire protection even on the sharpest rock.



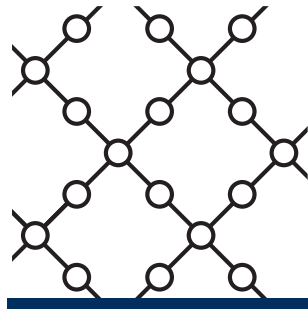
hexa

The hexagonal mesh design ensures excellent grip and sufficient tire protection. Suitable for all vehicles where traction is needed before protection.



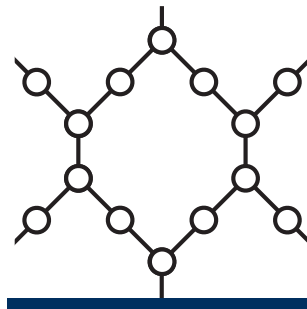
quad cross

Special 8-link net construction. Traction chains for tough applications.

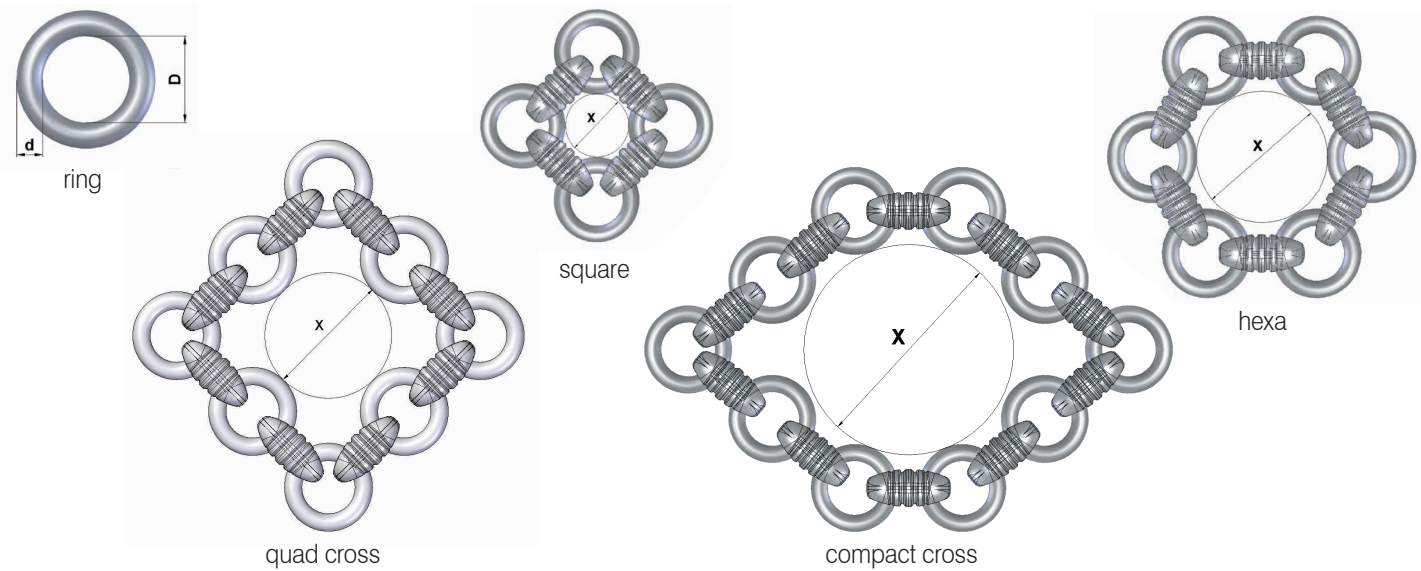


compact cross

Special 10-link net construction provides excellent grip, stable running and the necessary self cleaning. Suitable for all vehicles that require extra traction to fulfil their operational duties.

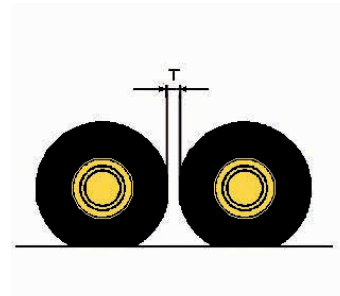
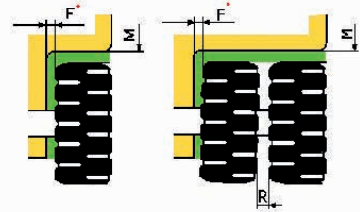
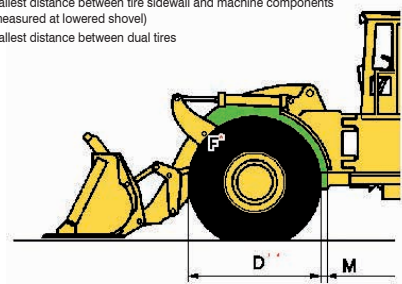


Ring measurements and mesh opening (x)



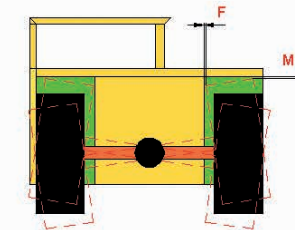
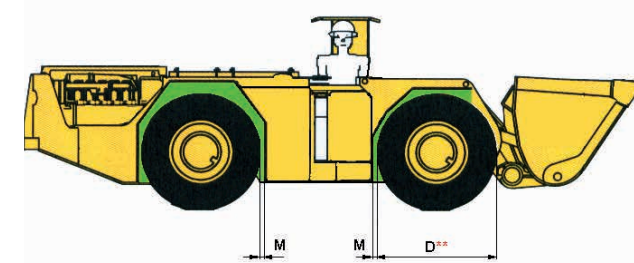
Clearance required for TPC

Attention: "F" & "M" measured at fully oscillated axle
 M smallest distance between tire surface and machine components
 F smallest distance between tire sidewall and machine components
 (*measured at lowered shovel)
 R smallest distance between dual tires



Measurements

	Link measurements			Ring measurements		Mesh opening (x)				Clearance required for TPC		
	L	W	H	d	D	square	hexa	quad cross	compact cross	M	F	R
tycoon ultimate	108	57	72	21	70	81	163	-	-	120	80	110
12												
granite	63	22	38	12	45	53	103	103	174	70	50	70
spike	60	16	40	12	45	50	96	99	169	70	50	70
14												
tycoon	79	39	47	14	50	61	122	-	-	80	60	80
granite	79	27	46	14	50	63	122	122	204	80	60	80
tyro	76	26	46	14	50	63	122	122	204	80	60	80
spike	71	19	47	14	50	57	112	112	194	80	60	80
14/16												
tycoon	79	39	47	16	54	64	122	-	-	80	60	80
16												
tycoon	88	48	59	16	54	60	130	-	-	90	70	90
granite	90	34	53	16	54	67	130	130	222	90	70	90
spike	86	22	54	16	54	67	130	130	222	90	70	90
tyro	88	30	54	16	54	67	130	130	222	90	70	90
ringstar	-	21	69	16	54(*45)	44	96	-	-	115	70	90
16/18 S												
tycoon	88	48	59	18	54	60	126	-	-	90	70	90
18												
granite	100	38	65	18	64	81	156	156	258	100	70	100
spike	88	24	60	18	64	70	138	140	241	100	70	100
tyro	97	34	62	18	64	81	156	156	258	100	70	100
18/20 S												
granite	100	38	65	20	64	78	153	-	-	100	70	100
20												
tycoon	97	54	67.5	20	64	74	153	-	-	100	70	100
21												
compact	108	46	72	21	70	83	163	-	-	120	80	110
spike	108	32	72	21	70	83	163	164	275	120	80	110
23												
tycoon	112	60	76	23	72	84	170	-	-	120	80	110



Spare parts and accessories

Mounting and repair parts



No. 24 End shackle
to fix the loose end of the
tension chain



No. 31 Connecting-/Repair ring
to connect the tire protection chain and
to repair broken rings



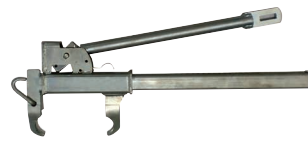
No. 37 Pin lock
to connect the inside and outside chain and
to repair broken links

Accessories

Special tools for easier TPC handling



No. 49 Lever hoist



No. 50 Assembly pliers



No. 61 Allen key



No. 58 Drawing-out hook



No. 59 Mounting spike



No. 60 Tension aid
(10 mm, 13 mm, 16 mm)

Lifetime Guarantee Conditions

Lifetime Guarantee Conditions

- 1.) pewag guarantees that the pewag tire protection chains are made only from excellent steel corresponding to works specifications and are fabricated by competent staff according to the latest state of technology.
The individual production steps are subject to a rigorous quality control according to ISO 9001.
- 2.) Claims for damages, liability and other demands, which are based on pewag's General Terms and Conditions of Sales and Delivery, are not affected by this guarantee.
- 3.) This guarantee is only valid provided the conditions shown in the mounting instruction ("Warning against incorrect use") are complied with. If any of the warnings shown in the mounting instruction are not complied with, the guarantee will be deemed invalid.
- 4.) For every tire protection chain and every machine exact data of the operating hours must be recorded with the help of a functioning operating hours counter and all measures carried out (i.e. fitting of spare parts, shortening, reversing, removing of the tire protection chain for a certain period) must be recorded.
- 5.) pewag reserves the right to check the tire protection chains and the operating conditions any time during the guarantee period; otherwise the guarantee expires. Therefore within 24 hours of pewag's request the machine should be made available with the tire protection chains cleaned.
- 6.) Any significant change of the operating conditions indicated, particularly changes of the place of operation, type of rock, machine or working distance will lead to an immediate withdrawal of the guarantee.
- 7.) Damage due to abnormal operating conditions, i.e. unusual chemical influence, longterm exposure to temperatures of over 200 °C respectively 392 °F as well as mechanical overloading of individual parts of the tire protection chain due to incorrect use are not covered by this guarantee. Regarding operations in hot slag pewag recommends:
 - a) For slag temperatures of 500 °C respectively 900 °F the maximum exposure must not exceed 30 seconds.
 - b) For slag temperatures of 900 °C respectively 1600 °F the maximum exposure must not exceed 10 seconds.

Warranty exclusions:

Destroyed chains and chain breakages as a result of packing up with molten steel due to running over hot liquid slag. Annealing of the chains due to long term exposure in hot slag (loss of hardness), see point a) and b).

- 8.) Any claim must be accompanied by the corresponding guarantee certificate and an exact description of the damage including all circumstances must be sent to pewag at the latest one week after the damage occurs. Claims received after expiration of the guarantee period cannot be accepted. Defective parts and components whether caused by faulty material or incorrect production will be replaced. Any other claim for consequential loss or damage, i.e. personal injury, damage or loss of production, is specifically excluded.
- 9.) Should a claim be made against this guarantee pewag reserves the right to stipulate the measures required to achieve the guaranteed lifetime. This particularly covers the repair or replacement of the tire protection chain either in full or in part. No cash refund can be allowed. If the tire protection chain is replaced either in full or in part the customer has to pay on a prorate basis the service hours already achieved compared with the guaranteed hours.



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