JENNMAR
CIVIL

SELECTED PRODUCTS FOR

TUNNELING & CIVIL CONSTRUCTION

REV 03-25

GLOBAL HEADQUARTERS | PITTSBURGH, PA USA | (412) 963-9071 | WWW.JENNMAR.COM

Jennmar Locations

USA

GLOBAL HEADQUARTERS

Office
Pittsburgh, PA
PH: 412-963-9071
FX: 412-963-8099

KENTUCKY

Earlington, KY
PH: 270-383-3171
FX: 270-383-3121

Louisville, KY
PH: 502-473-1010

J-Lok Plant
Earlington, KY
PH: 270-326-3660
FX: 270-383-5670

NEVADA

Hard Rock Office & Warehouse
Elko, NV
PH: 775-753-8998

PENNSYLVANIA

Office
Cresson, PA
PH: 814-886-4121
FX: 814-886-8143

Bolt Plant
Cresson, PA
PH: 814-886-5485
FX: 814-886-4598

J-Lok Plant
Cresson, PA
PH: 814-886-7590
FX: 814-886-7695

Conveyor Plant
Blairsville, PA
PH: 724-459-5690
FX: 724-459-0865

TEXAS

Sinton, TX
PH: 361-446-0445

UTAH

Clearfield, UT
PH: 801-775-0176
FX: 801-775-0188

Tooele, UT
PH: 801-973-7169
FX: 801-913-7172

VIRGINIA

Pounding Mill, VA
PH: 276-964-2107
FX: 276-963-5928

Rich Creek, VA
PH: 540-726-2326
FX: 540-726-7340

Cedar Bluff, VA
PH: 276-964-7000
FX: 276-964-4752

Conveyor Plant
Lebanon, VA
PH: 276-883-5200
FX: 276-883-5199

WEST VIRGINIA

Reedsville, WV
PH: 304-864-3601
FX: 304-864-4169

GLOBAL

JENNMAR AUSTRALIA

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FX: +61 7-4952-8777

Landsdale, WA
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FX: +61 8-9408-9999

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JENNMAR ENGINEERING

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JENNCHEM

Corporate Headquarters
Pittsburgh, PA
PH: 412-963-9071
FX: 412-963-7179

Midwest J-PAK Plant
Marion, IL
PH: 618-889-5474
FX: 618-364-3515

Midwest
Macedonia, IL
PH: 412-713-9561

West
Delta, CO
PH: 970-270-7923

Tooele, UT
PH: 801-708-7420

Northeast
Reedsville, WV
PH: 304-784-4861

Specialty Products
Cedar Bluff, VA
PH: 276-964-7413
FX: 276-963-9389

South
Bessemer, AL
PH: 412-500-6120

JM STEEL

Huger, SC
PH: 843-336-4929
FX: 843-336-4935

JENNMAR CIVIL

Specialty Products
Pittsburgh, PA
PH: 276-964-7000
FX: 276-964-4752

XCAL TOOLS

South Point, OH
PH: 740-377-3354
FX: 740-377-3363

Oak Hill, WV
PH: 304-465-0651
FX: 304-465-5244

Madisonville, KY
PH: 270-825-BITS (2487)

Bristol, VA
PH: 276-644-3520

Clare, MI
PH: 989-386-5376

XCAL INDUSTRIES

Oak Hill, WV
PH: 304-469-4721
FX: 304-469-4750

JENNMAR SERVICES

Corporate East Headquarters
Canonsburg, PA
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Corporate West Headquarters
Delta, CO
PH: 970-874-5256

Corporate Midwest Headquarters
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Corporate South Headquarters
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Value Statement

Our companies set the bar in every industry they serve. We invest heavily in Research and Development. The well-being of our 4,000 employees is paramount in our business model. We appropriate a vast portion of our profits back into our property, plant, and equipment, keeping our stakeholders' best interests in mind. Our employees are held to their value pledge and are to complete their tasks with integrity and stewardship for the environment. Our products enhance productivity levels for our clients and make modern life possible. We commit to our customers that our products will embody **safety, service, and innovation**.

Tony Calandra
CEO of Jennmar Holdings LLC

Quality Products from Quality People | 100% Proudly Made in the U.S.A.

Jennmar Industry Affiliates

In addition to more than twenty strategically located manufacturing facilities, our network of affiliates includes engineering services, resin manufacturing, rolled-steel and drill-steel manufacturing, custom steel fabrication, roof, miner and a full line of road planing, soil stabilization, reclaiming, grading, trenching and foundation drilling bits, chemical roof support and sealing products, and even includes staffing solutions and our own trucking company. From bolts and beams, to channels and trusses, to resin and rebar, Jennmar is proud to manufacture products that make Coal & Hard Rock Mining safer and more efficient. Safely keeping the ground above under control. Our network of industry affiliates ensure quality, compliance, efficiency, availability and safety providing reliable products and engineering solutions for the tunneling industry.

In addition to engineering services, our research and development of new ground control products and systems ensure continuous product improvements making our products the best solution in the most challenging of underground and geotechnical environments.

We've been the innovative leader in ground control for the mining industry for more than forty years. Over the past decade, our growth has led us to above ground for structural buildings, implementing the same vigor and detailed processes. Our arch systems, girders, liner plates and Impact Resistant Laggings® are backed by experienced engineers and technicians who are with you every step of the way, from initial consultation to qualified instruction and on-going technical support. For more information please visit www.jennmar.com.

Table of Contents

Headed Rebar Bolts

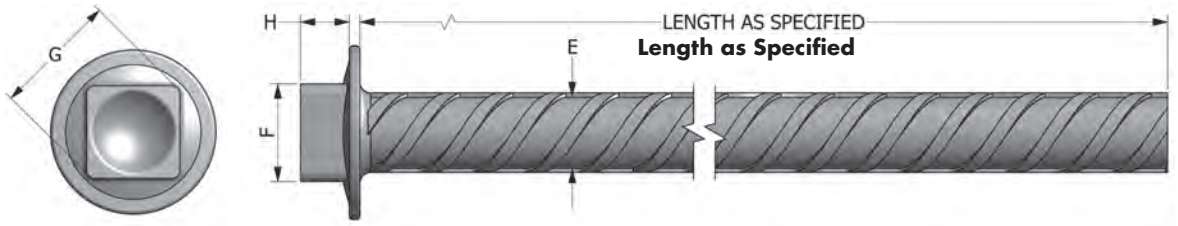
Forged Head, 1-1/8" (29 mm) Square

Dimensions — Rebar and J-BAR

	Bar Type	Bolt Size, in. (mm)			
		5/8 (16)	3/4 (19)	7/8 (22)	1 (25)
Body Diameter (E), Nominal, in. (mm)	Rebar	0.625 (16)	0.750 (19)	0.875 (22)	1.000 (25)
	J-BAR	NA	0.677 (17)	0.804 (20)	0.914 (23)
Head Across Flats Nominal (F), in. (mm)	1.125 (28.58)				
Head Height (H), in. (mm)	0.476 (12.09)				

All dimensions in accordance with ASTM F432.

Rebar

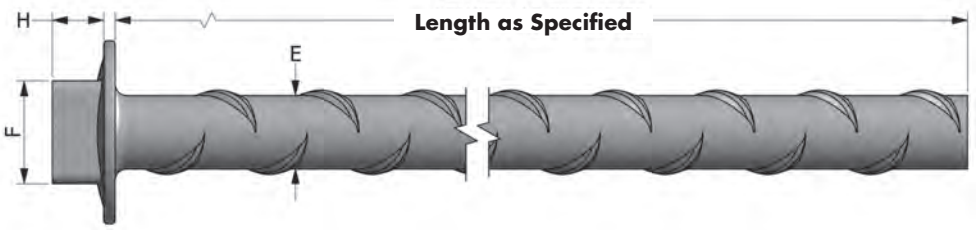


Technical Data — Rebar

Grade	Gr40	Gr60			Gr90
Bolt Size, in. (mm)	3/4 (19)	5/8 (16)	3/4 (19)	7/8 (22)	5/8 (16)
Yield Strength, min., lb (kN)	17,600 (78)	18,600 (83)	26,400 (117)	36,000 (160)	27,900 (124)
Tensile Strength, min., lb (kN)	30,800 (137)	27,900 (124)	39,600 (176)	54,000 (240)	37,200 (165)

All mechanical and physical properties in accordance with ASTM F432.

J-BAR®



Technical Data — J-BAR

Grade	Gr75		
Bolt Size, in. (mm)	3/4 (19)	7/8 (22)	1 (25)
Yield Strength, min., lb (kN)	27,300 (121)	38,100 (169)	49,200 (219)
Tensile Strength, min., lb (kN)	36,400 (161)	50,800 (225)	65,600 (292)

All mechanical and physical properties in accordance with ASTM F432.

Anchor Products

Jennmar's line of expansion anchors provide strong, consistent tension and anchorage for a wide range of strata conditions. Expansion anchors can be used with smooth bar for a high performance conventional bolting system. Jennmar's expansion anchors can be combined with deformed bar and J-LOK resin to make an INSTAL bolt system, a high performance primary bolting system.

F1F D1L J2B J1M

J8 J8 Split J80 Split

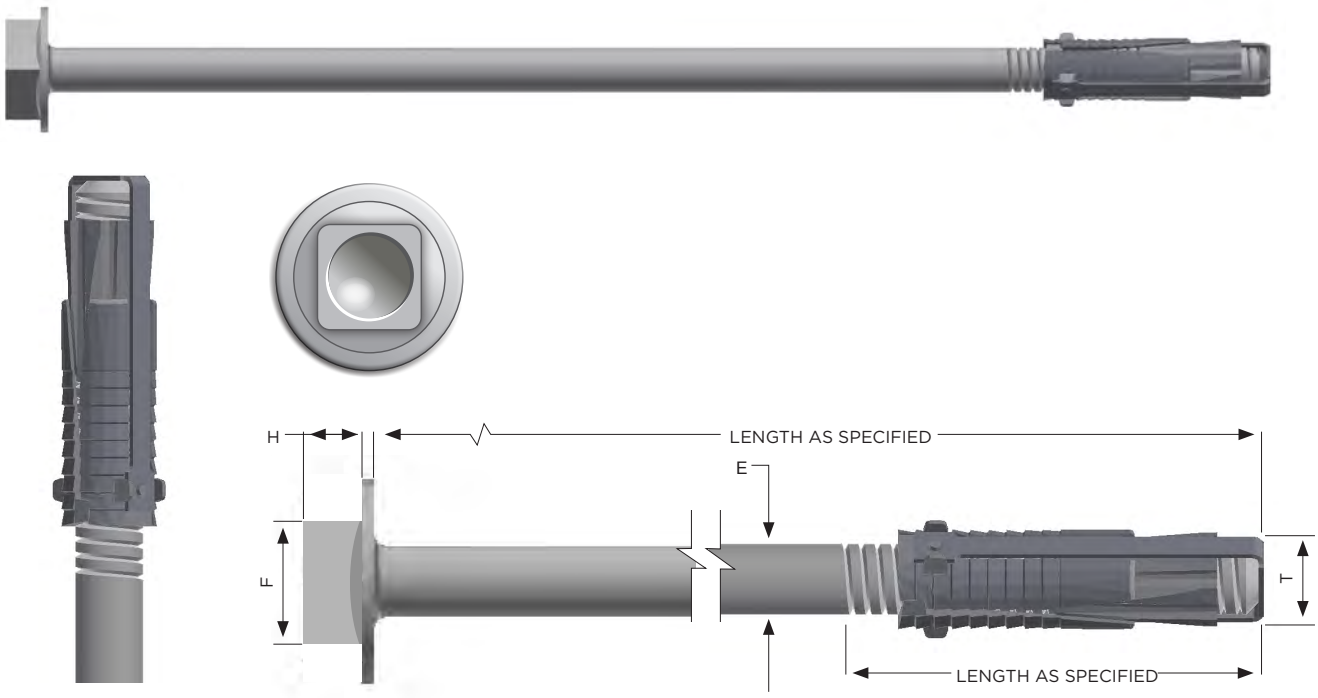
Technical Data — Expansion Anchors

JM	Bar Size	Drill Hole Size	Shell Length	Wedge Length	Non-Seizure Load
F1F	9/16″	1-1/16″ to 1-1/32″	2-1/8″	1-5/8″	18000
	5/8″	1-1/16″ to 1-1/32″	2-1/8″	1-5/8″	18000
F11/4B	5/8″	1-1/4″	3.25″	1.75″	22500
	3/4″	1-1/4″	3.25″	1.75″	30000
D5-1	5/8″	1-3/4″	3″	3-1/8″	22500
	3/4″	1-3/4″	3″	3-1/8″	30000
	7/8″	1-3/4″	3″	3-1/8″	38000
	1″	1-3/4″	3″	3-1/8″	36500
JSB	5/8″	1-3/8″	3.25	2-7/8″	
	3/4″	1-3/8″	3.25	2-7/8″	30000
J1M	5/8″	1″			
J80	3/4″	1-3/8″			
D1L	5/8″	1-1/2″ to 1-3/8″	3″	3-1/8″	22500
	3/4″	1-1/2″ to 1-3/8″	3″	3-1/8″	25000
J2B	5/8″	1-3/8″	2.875″	1.375″	17000
	3/4″	1-3/8″	2.875″	1.375″	30000
J8	7/8″	1-3/8″			
J15	1″	1-1/2″			

Forged Head, 1-1/8" (29 mm) Square

All systems are configured with high strength bar:

- Grade 55 (55,000 psi minimum yield)
- Grade 75 (75,000 psi minimum yield)



Dimensions

	Bar Type	Bolt Size, in. (mm)			
		5/8 (16)	3/4 (19)	7/8 (22)	1 (25)
Body Diameter (E), Nominal, in. (mm)	Smooth	0.563 (14)	0.680 (17)	0.797 (20)	0.906 (23)
Head Across Flats Nominal (F), in. (mm)	Smooth	1.125 (28.58)			
Head Height (H), min., in. (mm)	Smooth	0.476 (12.09)			
Thread Size (T), LH or RH, in.	Smooth	5/8–11 UNC	3/4–10 UNC	7/8–9 UNC	1–8 UNC

All dimensions and thread sizes in accordance with ASTM F432.

Technical Data — Smooth Bar

Grade	Gr55	Gr75			
Bolt Size, in. (mm)	5/8 (16)	5/8 (16)	3/4 (19)	7/8 (22)	1 (25)
Thread Yield Strength, min., lb (kN)	12,400 (55)	17,000 (76)	25,200 (112)	34,700 (154)	45,500 (202)
Thread Tensile Strength, min., lb (kN)	19,200 (85)	22,600 (101)	33,500 (149)	46,250 (205)	60,600 (270)

All mechanical and physical properties in accordance with ASTM F432.

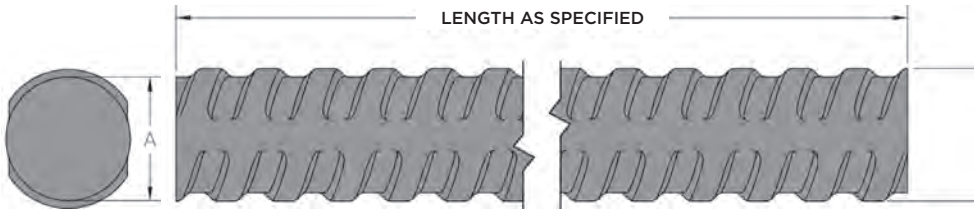
JM All Thread Bar

Features

- Grade 75 rebar
- All mechanical and physical properties in accordance with ASTM A615 and CSA G30.18
- Blunt or tapered ends are available
- Available in galvanized (ASTM A123) or epoxy coated (ASTM A775 or ASTM A934)
- Grade 150 is manufactured to ASTM A722 or ASTM A722 physical and mechanical properties only, depending on diameter

Advantages

- Wide range of applications including rock bolts, rock dowels, rock spiles, soil nails, micropiles, etc.
- Suitable for use with either resin cartridges or cement grout
- Resin shredder design actively promotes shredding of film, mixing of resin components and allows for centralizing of bolt within borehole
- Minimum parts and wrenches required for mixing resin and tensioning plate.
- Both domestic and non-domestic products available



Technical Data - Grade 75 JM Hot Rolled Thread Bar

Bar	Nominal Diameter, in. (mm)	Minimum Net Area Through Threads, in.² (mm²)	Yield Strength, Minimum, kips (kN)	Tensile Strength, Minimum, kips (kN)	Nominal Weight, lb/ft (kg/m)	Major Thread Diameter, Approx, in. (mm)
#6	3/4 (19)	0.44 (284)	33 (147)	44 (196)	1.50 (2.24)	0.86 (21.8)
#7	7/8 (22)	0.60 (387)	45 (200)	60 (267)	2.04 (3.04)	0.99 (25.1)
#8	1 (25)	0.79 (510)	59 (264)	79 (351)	2.67 (3.97)	1.12 (28.4)
#9	1-1/8 (29)	1.00 (645)	75 (334)	100 (449)	3.40 (5.06)	1.26 (32)
#10	1-1/4 (32)	1.27 (819)	95 (423)	127 (565)	4.30 (6.40)	1.43 (36.3)
#11	1-3/8 (36)	1.56 (1006)	117 (520)	156 (694)	5.31 (7.91)	1.61 (40.9)
#14	1-3/4 (43)	2.25 (1452)	168.8 (751)	225 (1001)	7.65 (11.38)	1.86 (47.2)

All dimensions, mechanical and physical properties in accordance with ASTM A615. No markings per A615.

Technical Data - Grade 150 JM Thread Bar

	Nominal Diameter, in (mm)	Minimum Net Area Through Threads, in² (mm²)	Yield Strength Minimum, kips (kN)	Tensile Strength Minimum, kips (kN)	Nominal Weight lb/ft (kg/m)	Major Thread Diameter, Approx, in. (mm)
	1 (26)	0.85 (548)	102 (452)	128 (569)	3.1 (4.6)	1.200 (30.50)
	1-1/4 (32)	1.25 (806)	150 (667)	188 (836)	4.5 (6.7)	1.429 (36.30)
	1-3/8 (36)	1.58 (1019)	190 (845)	237 (1054)	5.7 (8.5)	1.626 (41.30)
	1-5/8 (40)	1.95 (1258)	268 (1192)	297 (1321)	6.9 (10.3)	1.81 (46.0)
	1-3/4 (46)	2.58 (1664)	320 (1423)	390 (1725)	9.1 (13.5)	2.075 (52.70)
	1-7/8 (47)	2.96 (1910)	371 (1650)	409 (1819)	9.5 (14.1)	2.09 (53.1)
	2-1/4 (57)	4.00 (2581)	480 (2135)	600 (2669)	13.6 (20.2)	2.465 (62.60)
	2-1/2 (65)	5.16 (3331)	619 (2753)	774 (3443)	18.3 (27.2)	2.811 (71.40)
	3 (75)	6.85 (4419)	822 (3656)	1028 (4573)	24.0 (35.7)	3.209 (81.50)

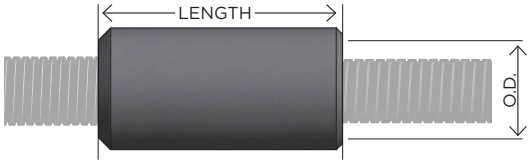
Grade 150 bar available hot or cold rolled threads. *1- 5/8 & 1- 7/8 bar hot rolled only.

JM All Thread Bar Accessories

JM Hot Rolled Thread Bar Accessories

- Various types and sizes of plates can be used in conjunction with JM Thread Bar
- Can be used in conjunction with hex style nut and washer setup or with one piece cast anchor nut
- Couplers are available for applications requiring a coupling device to connect multiple pieces of JM Thread Bar
- All accessories made in USA

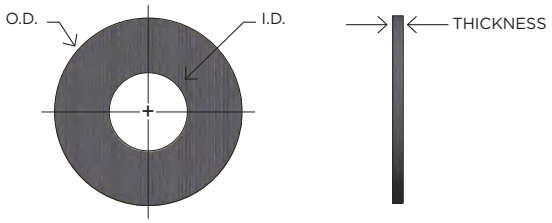
Stop-Type Couplings (ASTM A108 / A47)



Stop-Type Couplings (ASTM A108 / A47)

Bar	Nominal Diameter, in. (mm)	Outside Diameter, in. (mm)	Overall Length, in. (mm)
#6	3/4 (19)	1.50 (38)	4.13 (105)
#7	7/8 (22)	1.50 (38)	4.33 (110)
#8	1 (25)	1.63 (41)	4.53 (115)
#9	1-1/8 (29)	1.75 (44)	4.92 (125)
#10	1-1/4 (32)	2.00 (51)	5.57 (140)
#11	1-3/8 (36)	2.50 (64)	5.91 (150)
#14	1-3/4 (43)	3.00 (76)	7.62 (193.5)

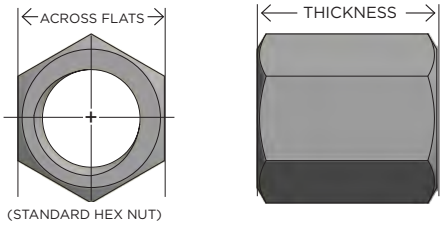
Hardened Washers (ASTM F436)



Hardened Washers (ASTM F436)

Bar	Nominal Diameter, in. (mm)	Outside Diameter, in. (mm)	Inside Diameter, in. (mm)	Thickness, in. (mm)
#6	3/4 (19)	1.75 (45)	0.94 (24)	0.156 (4)
#7	7/8 (22)	2.00 (51)	1.13 (29)	0.156 (4)
#8	1 (25)	2.25 (57)	1.25 (32)	0.156 (4)
#9	1-1/8 (29)	2.25 (57)	1.25 (32)	0.156 (4)
#10	1-1/4 (32)	2.75 (70)	1.53 (39)	0.156 (4)
#11	1-3/8 (35)	3.00 (76)	1.63 (41)	0.156 (4)
#14	1-3/4 (45)	3.25 (83)	1.77 (45)	0.156 (4)

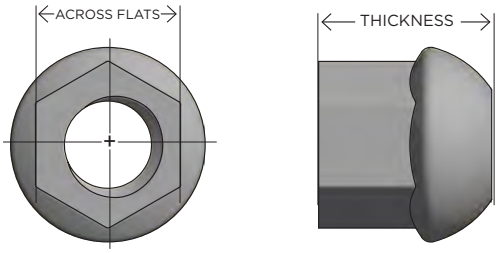
Hex Nuts (ASTM A108 / A47)



Hex Nuts (ASTM A108 / A47)

Bar	Nominal Diameter, in. (mm)	Across Flats, in. (mm)	Across Corners, in. (mm)	Thickness, in. (mm)
#6	3/4 (19)	1.50 (38.1)	1.44 (37)	1.69 (43)
#7	7/8 (22)	1.50 (38.1)	1.66 (42)	1.77 (45)
#8	1 (25)	1.75 (44.5)	1.88 (48)	1.97 (50)
#9	1-1/8 (29)	2.00 (50.8)	2.16 (55)	2.36 (60)
#10	1-1/4 (32)	2.25 (57.2)	2.50 (64)	2.56 (65)
#11	1-3/8 (36)	2.50 (63.5)	2.75 (70)	2.87 (73)
#14	1-3/4 (43)	3.00 (76.2)	3.60 (91)	3.70 (94)

Spherical Nuts (ASTM A108 / A47)



Spherical Nuts (ASTM A108 / A47)

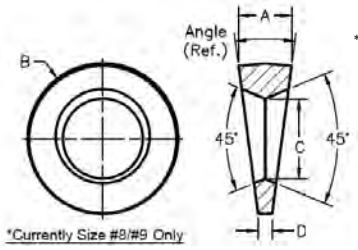
Bar	Nominal Diameter, in. (mm)	across Flats, in. (mm)	Thickness, in. (mm)
#6	3/4 (20)	1.26 (32)	1-1/2 (38.1)
#7	7/8 (22)	1.38 (35)	1-11/16 (42.9)
#8	1 (25)	1.61 (41)	1-13/16 (46)
#9	1-1/8 (29)	1.81 (46)	2-1/4 (57)

JM All Thread Bar Accessories

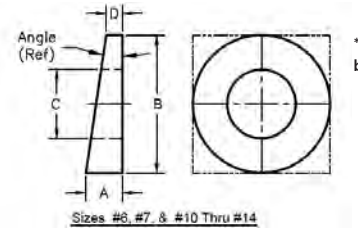
Beveled Washers (ASTM A47 / A536)

Beveled Washers (ASTM A47 / A536)

Bar	Degree of Bevel, °	B- Outside Diameter, in. (mm)	C- Inside Diameter, in. (mm)	Thickness, in. (mm)	
				A - Maximum	D- Minimum
#8	15	2.81 (71)	1.31 (33)	1.00 (25)	0.31 (8)
#9	15	2.81 (71)	1.31 (33)	1.00 (25)	0.31 (8)
#6	9	2.00 (50)	1.00 (25)	0.53 (13)	0.26 (6)
#7	9	2.00 (50)	1.19 (30)	0.56 (14)	0.25 (6)
#10	15	3.375 (85)	1.56 (39)	1.23 (55)	0.375 (9)
#11	15	3.5 (88)	1.75 (44)	1.25 (56)	0.375 (9)
#14	15	5.00 (139)	2.13 (54)	1.81 (82)	0.375 (9)



*Double Beveled Washers



**#6 - 2" square beveled washer

Plates

Jennmar mining plates shown below according to ASTM A1011, A1018 (adheres to requirements and testing per F432). Plates per ASTM A36, A572, A588 available upon request. All plates made in USA.

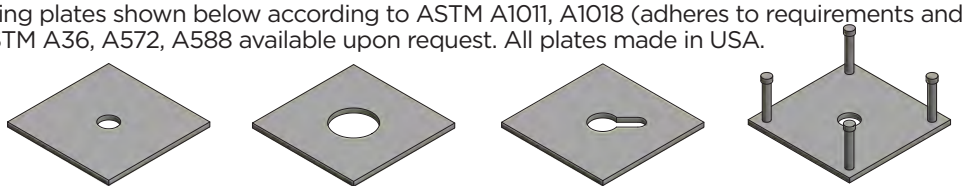
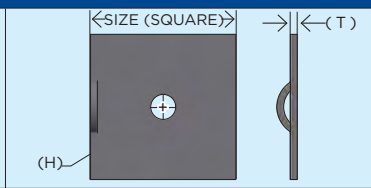
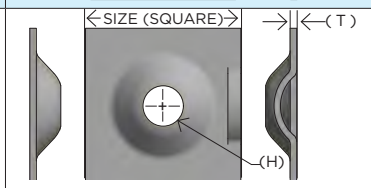
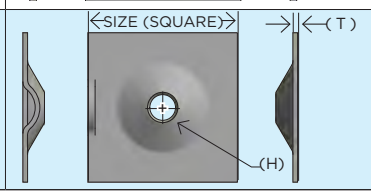
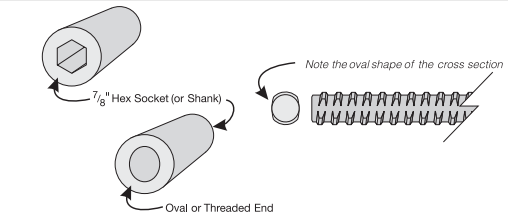
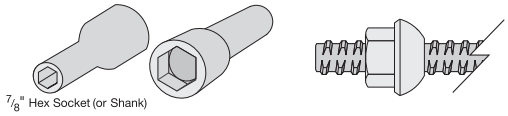


Plate Style		Dimensions, in. (mm)		
		Nominal Sizes, Square	Nominal Thickness, T	Hole Diameter, H
Flat		4 × 4 (102 × 102) 5 × 5 (127 × 127) 6 × 6 (152 × 152) 8 × 8 (203 × 203)	1/4 (6.4) 5/16 (8.0) 3/8 (9.5)	1 – 1-5/8 (25.4 – 41.3)
Dome		5 × 5 (127 × 127) 6 × 6 (152 × 152) 8 × 8 (203 × 203	5/32 (4.0) 3/16 (4.8) 1/4 (6.4) 5/16 (8.0)	7/8 – 1-15/16 (22.2 – 49.2)
Volcano		6 × 6 (152 × 152) 8 × 8 (203 × 203	1/4 (6.4) 5/16 (8.0) 3/8 (9.5)	1-3/8 – 1-5/8 (34.9 – 41.3)

JM Thread Bar Hardware (Black & Galvanized)		#6	#7	#8
	Oval Spinner × 7/8" Hex Socket × 7/8" Hex Shank	Stock	Stock	Stock
	Threaded Spinner × 7/8" Hex Socket × 7/8" Hex Shank	Special Order	Special Order	Special Order
	Nutrunner × 7/8" Hex Socket × 7/8" Hex Shank	Stock	Stock	Stock

Other sizes available by Special Order. T-thread, rope thread, 1" hex, etc .bar spinners and nutrunners available by Special Order.

Stainless Steel Thread Bar Bolts

For projects requiring long term support bolts in highly corrosivity environments that exceed galvanized and epoxy rock bolt limitations a rock bolt consisting of stainless steel thread bar can be used. This required close attention to the installation methods, alloy groups and conditions of the raw materials in order to develop the required strength in the design.

Bolt Diameters

- Including but not limited to, 3/4" to 1 1/4" ø.

Bolt Spinners

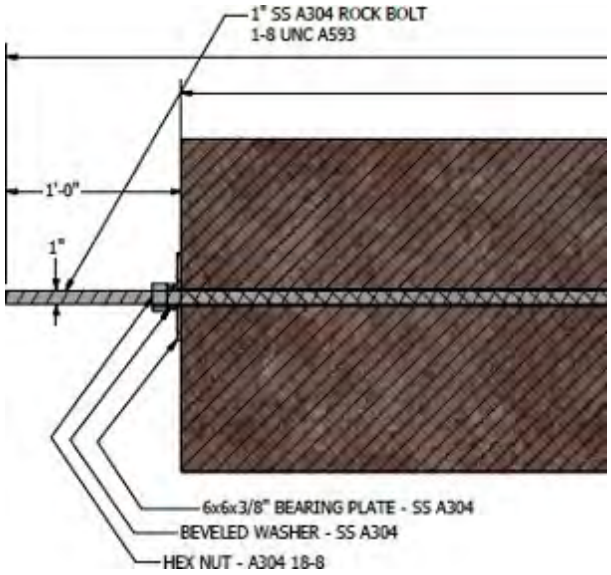
- Specially designed for specific rock bolt or jackleg use.
- Proper spinning direction crucial for accurate installation.

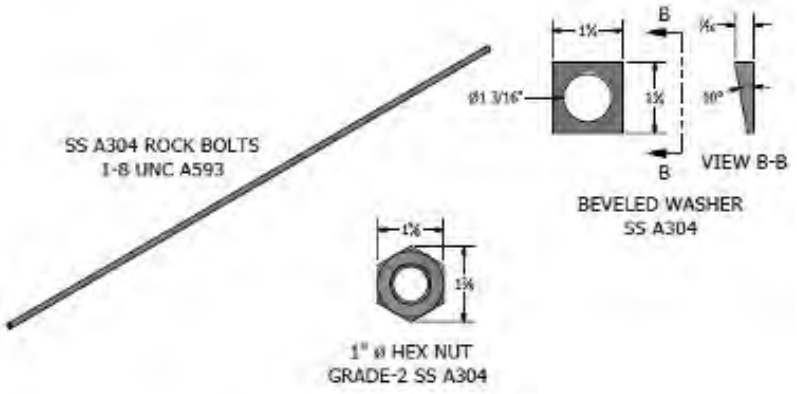
Grades

- Determined by alloy group and condition of the stainless thread bar.
- Grades of stainless steel thread bar vary based on alloy and condition.

Specifications

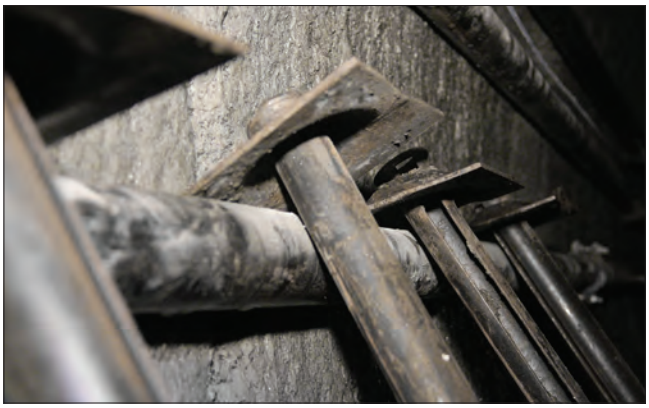
- A304, A316, A2304





FRICTION-LOK® Stabilizer System

The Jennmar FRICTION-LOK® Stabilizer System is a strata control system designed to firmly control hard or soft rock. As lateral ground movement increases, the system increases its superior holding power.



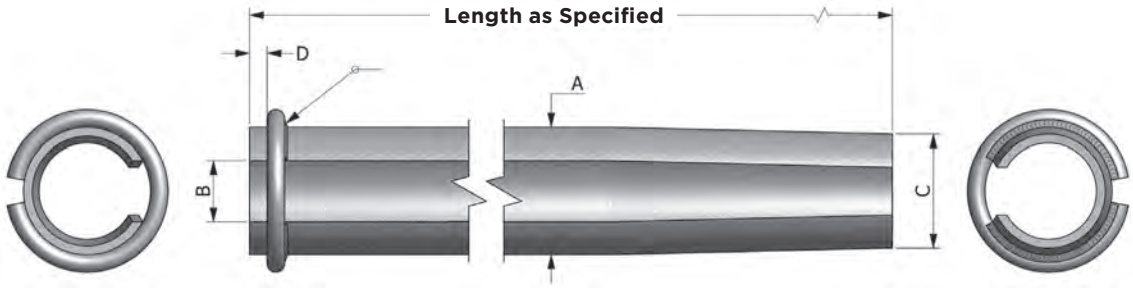
Advantages

- The radial compression of the slotted steel tube inside the borehole provides both radial and axial restraint to rock movement
- Requires no resin mixing or torquing
- Maintains consistent plate load
- Quick and easy installation
- Manufactured by Jennmar and stocked at company's various strategically located warehouses to provide prompt availability.

Selection

The Jennmar FRICTION-LOK® Stabilizer System is available in Bright or Galvanized steel in the following sizes:

- 1.3″ (33 mm)
- 1.4″ (35 mm)
- 1.5″ (39 mm)
- 1.8″ (46 mm)



FRICTION-LOK® Stabilizer System

	FL-33	FL-35	FL-39	FL-46
Recommended Nominal Bit Size, in. (mm)	1-3/16 to 1-5/16 (30 to 33)	1-1/4 to 1-3/8 (32 to 35)	1-3/8 to 1-1/2 (35 to 38)	1-5/8 to 1-3/4 (41 to 44)
Typical Breaking Capacity, Ton (metric ton)	12 (10.88)	12 (10.88)	14 (12.70)	20 (18.14)
Minimum Breaking Capacity, Ton (metric ton)	8 (7.26)	8 (7.26)	10 (9.07)	15 (13.61)
Nominal Tube Lengths, ft. (m) (available to any specified length)	1.5 to 10 (0.5 to 3.1)	1.5 to 10 (0.5 to 3.1)	1.5 to 10 (0.5 to 3.1)	5 to 16 (15 to 4.9)
Recommended Initial Anchorage, Ton (metric ton)	3 to 6 (2.72 to 5.44)	3 to 6 (2.72 to 5.44)	3 to 6 (2.72 to 5.44)	6 to 10 (5.44 to 9.07)

Dimensions

	FL-33	FL-35	FL-39	FL-46
Tube Diameter (A), in. (mm) ±0.030 in.	1.330 (33)	1.400 (35)	1.530 (39)	1.815 (46)
Slot Width (B), in. (mm)	0.440 to 0.640 (11 to 16)	0.600 to 0.750 (15 to 19)	0.560 to 0.760 (14 to 19)	0.820 to 0.920 (21 to 23)
Taper End Diameter (C), max., in. (mm)	1.180 (30)	1.180 (30)	1.180 (30)	1.620 (41)
Ring Standoff (D), in. (mm)	0.085 ±0.035 (2 ±1)			

All dimensions in accordance with ASTM A615.

M3™ * Expandable Rock Bolt

M3™ expandable rock bolts offer superior quality that responds to the most demanding roof support applications. Its high load capacity and excellent elongation properties ensure safer working conditions and faster excavation cycles.

This latest generation of rock bolt includes these improvements:

- **Redesigned Tooling** to reduce the thinning in the tongue area of the profile and prevent premature failures.
- **Improved Steel Chemistry** means full strength is achieved during our forming process avoiding any detrimental effects of cold working.
- **Improved Profile** to minimize stress concentration during roll forming and maximizing ability for surface preparation and coating application.
- **Modernized Equipment** (cold saw, tube end former, automatic sizing section, robotic welding, accumulator, etc.) for superior quality control.

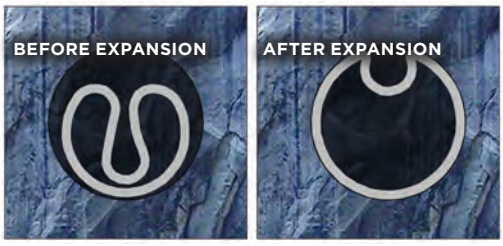
M3 bolts tie and join fractures because they can withstand high loads and have excellent elastic properties, allowing the bolt to remain intact after rock movement without cutting. It is a versatile bolting solution for variable ground conditions.

Improved design and tooling means greater consistency and reliability.

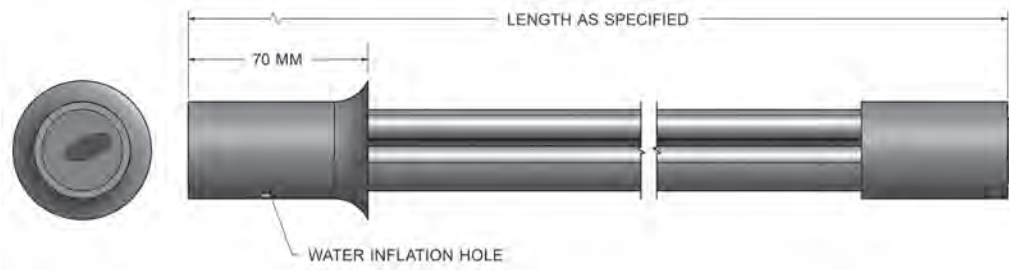
Our best expandable rock bolt yet!

Advantages

- Immediate full length support for faster excavation cycles and safer working conditions
- Simple and clean installation
- Adjusts to borehole irregularities
- Excellent elongation properties and flexibility allow for variations in drill diameter
- M3 bolts can be manufactured to any length up to a maximum of 20 ft (240 in.).



* Domestically Manufactured. The M3 is the subject of pending U.S. patent applications issued to FCI Holdings Delaware, Inc.



Technical Data – M3 Expandable Rock Bolts

	Standard	Midi	Super
Typical Breaking Strength, ton (kN)	13.5 (120)	18.0 (160)	27 (240)
Typical Elongation (Parent Material)	25%	25%	25%
Profile Diameter, nominal, in. (mm)	1.05 (27)	1.42 (36)	1.42 (36)
Material Thickness, nominal, in. (mm)	0.078 (2)	0.078 (2)	0.118 (3)
Hole Diameter Range, in. (mm)	1.25 – 1.50 (32 – 38)	1.70 – 2.05 (43 – 52)	1.70 – 2.05 (43 – 52)
Optimal Hole Diameter, in. (mm)	1.38 – 1.50 (35 – 38)	1.75 – 2.00 (44 – 51)	1.75 – 2.00 (44 – 51)
Inflation Pressure, psi (bar)	4350 (300)	3481 (240)	4350 (300)

M3™ * Custom Protective Coating

In general, regular expandable rock bolts are not resistant to corrosive environments. To alleviate this problem in mining and tunneling applications, Jennmar is using a special coating that isolates and actively protects the steel. The coating does not interfere with normal installation procedures.

PYFLEX™ Superior Corrosion Coating

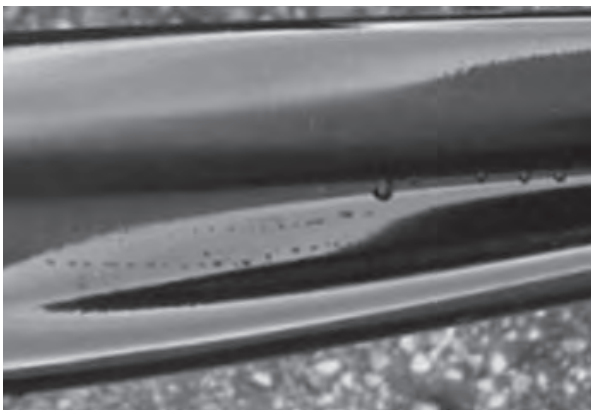
M3 bolts utilize our innovative PYFLEX coating that is thick (6+ mils), impervious to liquid and air, self-healing, durable (excellent abrasion and scratch resistance), and UV resistant. The PYFLEX coating has exceptional flexibility and adhesion to prevent microcracks or fractures of the coating after bolt inflation and possesses excellent corrosion resistance to acids (pH <1), alkalis (pH >11), fuels, and salt solvents. The damage resistant coating offers a very effective protection of the bolt for extra longevity in corrosive environments. For even greater corrosion resistance, **PYFLEX U2™ *** features an additional layer applied to the bolt giving the M3 maximum protection!

PlastiMax™

As a cost-effective corrosion resistant coating solution to the mining industry, Plastimax™ exhibits excellent flexibility and adhesion to prevent micro-cracks or fractures of the coating after bolt installation. The coating has exceptional corrosion resistance at acids (pH < 2), alkalis (pH > 11), fuels and salt solvents and good surface hardness against scratch damage during bolt installation.

K2 ThermoPlastic

Excellent flexibility, adhesion and hardness are the hallmark characteristics of this familiar, single layer plastic bolt coating. Very good resistance to humidity, acids, alkalinity and salts, it remains a top coating choice for many mining sites.



Zinc Epoxy Coating

Zinc Epoxy is an economic yet effective coating material for rock bolts against corrosion in challenging geotechnical environment, where resistance to abrasion and electrochemical corrosion is required. The innovative zinc epoxy coating system applied on Jennmar rock bolts.

Features

- An optimal zinc content: The zinc epoxy is specially formulated with an optimal zinc content that provides an excellent cathodic protection (CP) of metal substrate with greatly improved mechanical properties (crack resistance), cohesion, and adhesion.
- A self-healing effect: The corrosion byproduct of the zinc blocks microcracks on the coating and creates an inhibitor effects by collecting insoluble complexes of zinc, oxygen, and chlorides and trapping these species in the coating so they don't reach the surface of the steel substrate.
- A good scratch damage resistance: The Zinc epoxy coating has a good surface hardness against scratch damage during bolt installation.
- An excellent corrosion resistance: The zinc epoxy coating has an exceptional corrosion resistance to acids (pH 4-7), alkalis (pH up to 13), fuels and salt solvents. Laboratory test indicates that the zinc epoxy coated M3 expandable rock bolts withstood more than 1,000 hours of salt spray exposure without red or white corrosion products that are normally found after 72 hours on uncoated rock bolts.

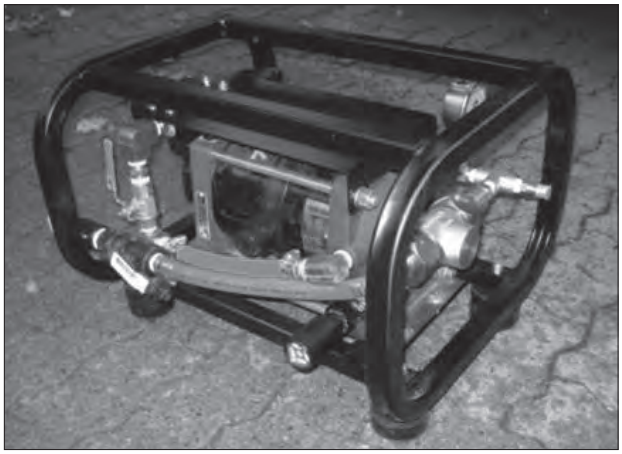
* The M3, PYFLEX and PYFLEX U2 are all the subject of pending U.S. patent applications issued to FCI Holdings Delaware, Inc.

M3™ Pump

Hydraulic Pump

Inlet Air Pressure Range	Outlet Water psi
70 to 100 psi	280 to 300 bar (4060 to 4350 psi)

Electric Pump



Specifications Electric Pump Type 300E (SI Units)

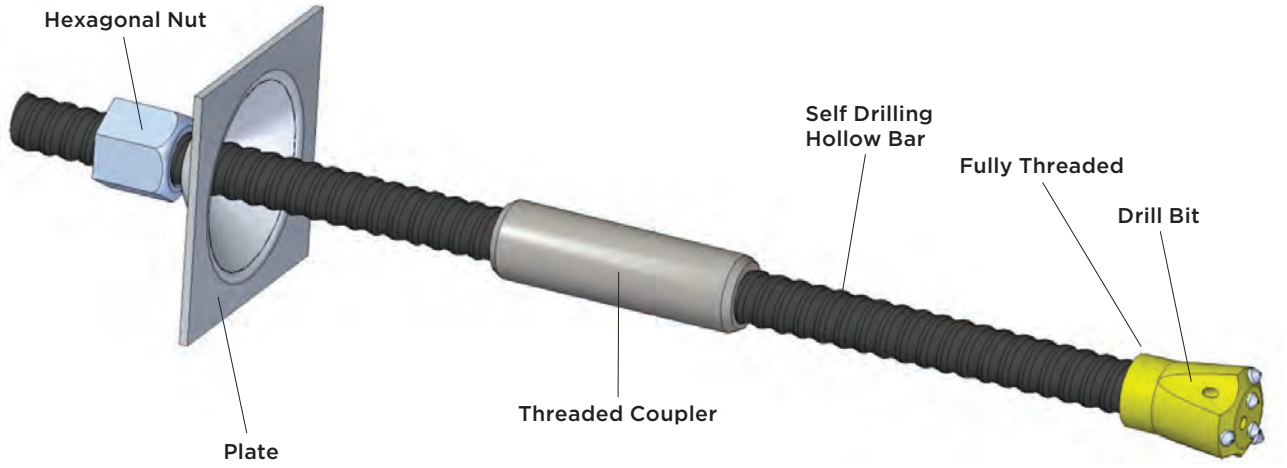
Characteristics	Unit	Value
Dimensions (L x W x H)	(mm)	800x400x445
Weight	(kg)	90
Max. flow rate	(l/min)	21
Operating pressure*	(bar)	300
Max. operating pressure	(bar)	320
Power supply**	(V)	3-400
Nominal power**	(kW)	11
Electrical connection**	(A)	25
Pumping rotation speed	(rpm)	1,400

*Required tube connection 3/4", water connection pressure: 2 [bar]

**According to IEC 60309 (not CSA approved). Other electric pumps are available on request

All values are subject to change

Self-Drilling Hollow Bar Anchor System



The Self-Drilling bolt is a fully threaded hollow bar that initially serves as a drill rod, utilizing a lost bit. The thread is made to comply to ISO 10208. For use in unconsolidated ground or other difficult ground conditions.

- Excellent for spiling (fore-poling)
- Bolt is drilled in and grout is pumped through the center hole with pumpable resin or cement grouts
- The couplers are designed to exceed the ultimate load of the bar by 20%. The couplers are designed to minimize the loss of drill energy
- Several drill bits are available. Most widely used is the EXX Tungsten carbide chisel bit
- Standard length is 3 m (9 ft –10 ft) — Longer lengths are available: 4 m, 6 m
- Galvanized option under ASTM A123

Installation

The Hollow Bar System is typically installed using rotary percussive drilling. This technique enables high rates of installation, good directional stability and also helps to consolidate the grout within the borehole.

Rotation speeds should be sufficient to cut a true borehole (120–150 RPM for soil nails; 100–130 RPM for mini piles), as opposed to displacement of the soil with the drill bit through percussion and heavy feed pressures (driven installation). Drilled boreholes ensure enlarged grout bodies together with better permeation of the grout into the surrounding ground. Feed pressures on the drill rods should be regulated in accordance with the cutting performance of the drill bit.

Simultaneous Drilling and Grouting

Suitable for granular soils and fills. This installation method utilizes a Grout Swivel, grout pump and drifter. The technique combines drilling and grouting as a single operation, ensuring that grout is placed over the full length of the borehole. For ground conditions where borehole collapse is anticipated or where subsequent grout injection down the center of the bar is problematic, simultaneous drilling and grouting is the preferred solution.

Grouting pressures should be regulated to maintain circulation at all times (typically up to 100 psi), with a small amount of grout return visible at the mouth of the borehole. Pressures in excess of 100 psi are generally only required for specialist applications (i.e. anchors in cohesive soils or mining applications).

The choice of grout pump varies between applications, but basic requirements are; thorough mixing of the grout – to avoid blockages at the drill bit; delivery of a continuous volume – to ensure consistent grouting; and maintenance of sufficient pressure.

R-Thread & T-Thread Hollow Bar

Geotechnical Applications

- Self-drilling system for deep foundations, soil nails, and ground stabilization.
- Combines drilling, anchoring, and grouting into a single process.
- Ideal for loose, fractured, or water-influenced soils—eliminates the need for casing pipes.
- High-strength hollow anchor bar with continuous threading for optimal grout bonding.
- Pressure grouting enhances load-bearing capacity and prevents soil collapse.

Underground Applications

- Hollow Bar bolts allow for efficient resin or grout injection.
- Enhanced anchorage, load transfer, and structural stability.
- Ideal for post-installation grouting and reinforcement in various ground conditions.
- Used in Soft Ground tunneling (SEM & NATM) to create pre-advanced support spiling.
- Installed with specialty anchoring devices and bearing plates for added ground support.

R-Thread Specs

Part No.	Inner Diameter	Outer Diameter	Yield Load	Ultimate Load	Unit Weight lbs/ft kg/m
R25N (R2512)	15 mm	1 in (25 mm)	33.8 Kips (150kN)	45 Kips (200kN)	1.54 (2.2)
R32N (R3219)	22 mm	1-1/4 in (32 mm)	51.8 Kips (230kN)	63 Kips (280kN)	2.28 (3.36)
R32S (R3215)	18 mm	1-1/4 in (32 mm)	63 Kips (280kN)	81 Kips (360kN)	2.75 (4.16)
R38N (R3819)	23 mm	1.5 in (38 mm)	90 Kips (400kN)	112.6 Kips (500kN)	4.02 (6.09)
R51L (R5136)	39 mm	2 in (51 mm)	101.2 Kips (450kN)	123.6 Kips (550kN)	4.7 (2.13)
R51N (R5133)	34 mm	2 in (51 mm)	141.6 Kips (630kN)	180 Kips (800kN)	5.63 (8.5)

T-Thread Specs

Part No.	Inner Diameter	Outer Diameter	Yield Load	Ultimate Load	Unit Weight lbs/ft kg/m
T30N (T3011)	15 mm	30 mm	58.5 Kips (260kN)	72 Kips (320kN)	2.2 (3.3)
T40L (T4020)	24 mm	40 mm	95.6 Kips (425kN)	121.4 Kips (540kN)	3.8 (5.6)
T40N (T4016)	20 mm	40 mm	118 Kips (525kN)	148.4 Kips (660kN)	4.8 (7)
T52N (T5226)	30 mm	52 mm	164.2 Kips (730kN)	208 Kips (925kN)	7.3 (10.9)
T76N (T7651)	53 mm	3 in (76 mm)	270 Kips (1200kN)	360 Kips (1600kN)	34.5 (52.2)
T76S (T7645)	48 mm	3 in (76 mm)	337.2 Kips (1500kN)	427.1 Kips (1900kN)	41.36 (62.6)
T103N (T10378)	78 mm	103 mm	337.2 Kips (1200kN) (1800kN)	427.1 Kips (1600kN) (2270kN)	16.85 (24.9)

Fast Anchor™ 3 Bolt System

The Fast Anchor 3 is a double corrosion resistant steel bolt for strata control that provides quick assembly and secure installation due to its expansion shell that provides immediate anchorage and generates superior grip upon application. Fast Anchor 3 is designed within the highest quality standard for this type of bolt and performs accordingly.

The injection system allows for a quick and easy grouting operation, where grout enters through the center hole of the bolt from the bottom and fully encapsulates the bolt.

Features

- Improved advance cycles
- Easy and fast installation
- Immediate anchorage
- Suitable for pre-or post-grouting
- Improved reinforcement cycles
- Improved savings in time and workmanship
- Provide both mechanical and chemical anchorage
- Galvanized option under ASTM 123-9 Standard for corrosion protection
- Plastic sleeve provides additional corrosion protection

Installation Procedure

1. Drill 2 in. hole diameter. The drill hole length must be longer than the bolt by approx. 2 in.
2. Domed Bearing Plate is fitted to Fast Anchor
3. Insert Fast Anchor into the hole.
4. After placing the bolt in the hole, the bolt is then rotated to anchor the expansion shell to the required tension.
5. Attach grouting adaptor to anchorage.
6. Mix 0.33 to 0.35 W/C grout. Pump grout. Grout is pumped through inner annulus to the bolt end and returns along outer annulus.
7. Terminate grouting with visible grout return.
8. Detach adaptor and proceed to next bolt.

Technical Data - Fast Anchor 3

Grade		Gr75			
Bolt Size, in. (mm)		**.677 (17)**	**.804 (20)**	**.914 (23)**	**#10 (32)**
Steel Specification		ASTM F432	ASTM F432	ASTM F432	ASTM A615
Yield ksi (MPa)		83 (572)	83 (572)	75 (517)	75 (517)
Tensile ksi (MPa)		108 (744)	108 (744)	100 (698)	100 (698)
Young's Modulus ksi (GPa)		29000 (200)	29000 (200)	29000 (200)	29000 (200)
Point Anchored Capacity	Yield kip (kN)	27.8 (123)	38.3 (170)	45.4 (201)	72.6 (322)
	Ultimate kip (kN)	36.1 (160)	49.9 (221)	60.5 (269)	96.9 (431)
Fully Grouted Capacity	Yield kip (kN)	30.1 (133)	42 (186)	49.2 (218)	95.2 (423)
	Ultimate kip (kN)	39.2 (174)	54.8 (243)	65.6 (291)	127 (564)
Bar Cross-Sectional Area in^2 (mm^2)		0.363 (234)	0.508 (327)	0.656 (423)	1.27 (819)
Thread Size/ Spec - in (mm)		3/4"-10 UNC	7/8"-9 UNC	1"-8 UNC	1-1/4"-7 UNC
Nominal Bar Diameter - in (mm)		0.677 (17)	0.804 (20)	0.914 (23)	1.27 (32)
Typical Drill Hole Diameter - in (mm)		2" (51)	2" (51)	2" (51)	2.5" (65)

Glass Fiber Reinforced Polymer

GFRP Bolts

Jennmar offers glass fiber reinforced polymer (GFRP) Bolts for environments that require high corrosion resistance, high tensile strength, durability and cutability. GFRP Bolts have double the strength of normal steel, but only one quarter of the weight. They are highly corrosion resistant and can be manufactured in many shapes and forms.

Features

- 3/4", 7/8", 1", 1 1/8", 1 1/4"
- Right Hand and Left Hand Options
- Anchorage with polyester resin or cement grout
- Nuts are design as "breakout" when torque exceeds the breakout following mixing of resin cartridge
- The entire length of the Rock bolts are threaded.
- Rock bolt standard lengths up 10 feet (other lengths available upon request).

* Tensile modulus is based on the working area of the rock bolt and not the nominal size

** Various types of washers such as swivel or high capacity plates can be made according to the customers needs and applications

† Products in prototype development phase, values to be validated.

Rock Bolts

		†20 mm	22 mm	25 mm	†29 mm	†32 mm
Ultimate tensil load	kN	260	350	460	550	615
	lbs	58,500	78,491	103,500	123,500	138,500
Tensile modulus*	GPa	53				
	Msi	7.7				
Reinforcement content	%	82				
Glass transition temperature	*C	110				
	*F	230				
Transverse shear strength (single shear)	kN	50	70	80	110	120
	lbs	11,250	15,700	18,000	24,669	27,000
Unit weight	kg/m	0.58	0.70	0.94	1.26	1.50
	lbs/ft	0.39	0.47	0.53	0.84	1.01

Standard Nuts

		†20 mm	22 mm	25 mm	†29 mm	†32 mm
Punch-out torque	m/kg	7.6	8.3	9.0	9.7	—
	ft/lb	55	60	65	70	—
Tensile capacity (Tested with composite rockbolt)	kN	65	70	100	120	130
	lbs	14,577	15,700	22,500	26,911	29,200
Hex size	mm	38	38	44	50	50
	in	1 ½	1 ½	1 ¾	1 15/16	1 15/16
Length	mm	51			63.5	
	in	2			2 ½	
Thread engagement length (prior to punch-out)	mm	41			1.26	
	in	1 5/8			2 1/8	

Fixed Square Heads
(molded on rock bolts)

		20 mm	22 mm	25 mm	†29 mm
Head tensile capacity	m/kg	100	110	—	110
	ft/lb	22,426	24,669	—	24,750
Square drive size	kN	28.5	28.5	—	28.5
	lbs	1 1/8	1 1/8	—	1 1/8
Head length	mm	100			
	in	3.94			

Standard Washer Plate**

		†20 mm	22 mm	25 mm	†129 mm	†132 mm
Standard flat washer plate diameter	mm	190				
	in	7 ½				
Maximum compression load capacity	kN	50	50	65		
	lbs	11,200	11,200	14,500		
Flexural load capacity (parallel 155 mm span)	kN	3,344				
	lbs	750				

Pourable Resin Grout

Pourable Resin Grout

- Fine aggregate filled liquid resin supplied in a mixing pail with a tube of cream hardener.
- Once cured, the product forms an effective corrosion barrier from a pH of 2 through a pH of 11.
- Uses include grouting dowels and anchor bolts in concrete, rock or masonry.

Specifications:

Compressive strength	ASTM C578-01: At 2 hours - 55 MPa (8,000 psi); At 7 days - 83 MPa (12,000 psi)
Tensile strength	ASTM C307-03: At 7 days – 7.5 MPa (1,100 psi)
Typical pull strength	305 mm (12") of grouted #7 bar in a 32 mm hole has a pull strength of 13.6 metric tons (30,000 lbs.)
Shelf Life	Four months under good storage conditions
Packaging	Pail of resin grout, tube of cream hardener, mixing paddle
Kit Size	3.3 L (200 cubic inches) of grout
Pot Life	20 minutes at 25 degrees C . (Lower temperatures slow pot life)

J-LOK® Resin

J-LOK® equipment is the most modern and technologically advanced in the resin business, equipped with the most accurate system for ratio control of the resin/limestone mixture ensuring that resin/catalyst proportions are consistent. The entire plant is interconnected to provide coordinated control of the entire process. Operators utilize PLC touch screens to enter product recipes and to make operational adjustments. Quality control testing encompasses everything from raw material testing, in-process testing and final product quality and performance testing.

The labs at J-LOK® have custom designed equipment such as the automated gel time tester that takes all the technician variation out of the test providing consistent results every time. Both J-LOK® plants as well as the R&D lab in Pittsburgh have modified roof bolting machines to measure parameters such as pull strength and insertion force allowing products to be customized as necessary.

J-LOK® personnel work with key suppliers to optimize raw material specifications. J-LOK® has created many innovations such as TWIN-LOK® 2-speed resin cartridges for torque-tension applications, J-LOK® LIF, Low Insertion Force resin where bolter thrust is an issue and J-LOK P™, pumpable resin for grouting from a distance. Several of these products have been patented.

J-LOK® produces resin products to complement Jennmar products and provide an optimum system of bolt and resin. J-LOK®'s R&D capability utilizing product formulation expertise from the resin plants in conjunction with the mining expertise of Jennmar's engineering affiliate, **Jennmar Engineering** is unmatched.

GEL, Spin and Hold Times

Gel Time

Generally, the sum of the Spin Time and Hold Time is the Gel Time. The time from the start of mixing until the resin starts to harden is the Gel Time. Gel Time is influenced by temperature of resin, strata and bolt. Additionally, the amount of heat generated in mixing during the spin time also affects Gel Time. Field trials are recommended.

Spin Time

Cartridge contents should be completely mixed to achieve maximum anchorage. The generally accepted mix standard is a minimum of 30 revolutions of the bolt. Spin Time is the time required, at typical bolter rotation of 400–600 rpm, to achieve the complete mix.

Hold Time

After the cartridge contents are mixed, the resin must harden to achieve strength. The time required after mixing is completed and the bolt has achieved a firm anchorage is referred to as Hold Time.

Gel, Spin and Hold Times

Gel Time, Seconds	Spin Time, Seconds	Hold Time, Seconds	Color Code
10	3 to 5	3 to 8	Pink
20	3 to 6	4 to 8	Orange
30	3 to 7	8 to 15	Blue
45	4 to 9	8 to 20	White
60	5 to 10	18 to 28	Green
75 & 90	5 to 10	20 to 40	Green/ White
120	5 to 10	25 to 75	Yellow
120–240 & Higher	5 to 15	45 to 240	Yellow/ White
TWIN-LOK, 10	3 to 5	3 to 5	Pink/ White
TWIN-LOK, 20	3 to 6	3 to 6	Orange/ White

Resin Cartridge Size

The diameter and length of the J-LOK cartridge depends on the dimensions of the specific bolt and borehole. Cartridges are available in lengths from 12″ to 60″. The diameter and length of cartridges employed in USA coal mines are specified by ASTM F-432-10. The systems developed by J-LOK engineers following ASTM F-432-10 are summarized in the following table:

Technical Data — J-LOK Resin Cartridges

Cartridge Diameter, in. (mm)	Hole Diameter, in. (mm)	Bolt Type	Bolt Diameter, in. (mm)	J-Lok System*	Product Use Class	Strength Index
0.9 (23)	1 (25)	#6 Rebar	3/4 (19)	A	I, II, III	10
0.9 (23)	1 (25)	Point Anchor #6 Tension	3/4 (19)	A-TA	I, II, III	10
0.9 (23)	1 (25)	#5 Rebar	5/8 (16)	B	I, II, III	10
0.9 (23)	1 (25)	Cable	0.5, 0.6, 0.7 (13, 15, 18)	CA, A, B	I, II, III	10
0.9 (23)	1 (25)	INSTaL Resin	5/8 (16)	BI	I, II, III	10
1.25 (32)	1-3/8 (35)	#7 Rebar	7/8 (22)	J, CJ, JI	I, II, III	10
1.25 (32)	1-3/8 (35)	Cable	0.5, 0.6, 0.7 (13, 15, 18)	CJ	I, II, III	10
1.25 (32)	1-3/8 (35)	INSTaL Resin	3/4–7/8 (19–22)	JI	I, II, III	10
1.25 (32)	1-3/8 (35)	Combination	7/8 (22)	CBJ, J	I, II, III	10
0.9 (23)	1 (25)	#6 Rebar	3/4 (19)	TA	I, II, III	10
0.9 (23)	1 (25)	#5 Rebar	5/8 (16)	TB	I, II, III	10

* Designated J-LOK Systems are shown for typical applications and can be used for other bolt types and sizes.

J-LOK® Resin Cartridges

Polyester Resin Anchoring System

The J-LOK® resin in the cartridge is used to anchor bolts to the surrounding strata. This unification of the resin, bolt and strata layers provides the necessary strength and rigidity to prevent sag by acting as a reinforcement which anchors the individual stratified layers of rock into a single high strength beam.

The two-compartment cartridge shown in illustration A above consists of a heat-sealed tube of polyester film clipped at both ends. One compartment contains a dark gray resin; the other, a light gray catalyst. A cross section of the cartridge is shown in illustration B.

A film barrier of heat sealed polyester film prevents migration between the resin and the catalyst to provide optimum shelf life. The excellent chemical resistance of the film minimizes migration from the inside and the absorption of contaminants from the outside.

The lightweight, dimensionally stable casing of film is strong enough to withstand rough handling, but shreds quickly and thoroughly during the installation procedure.

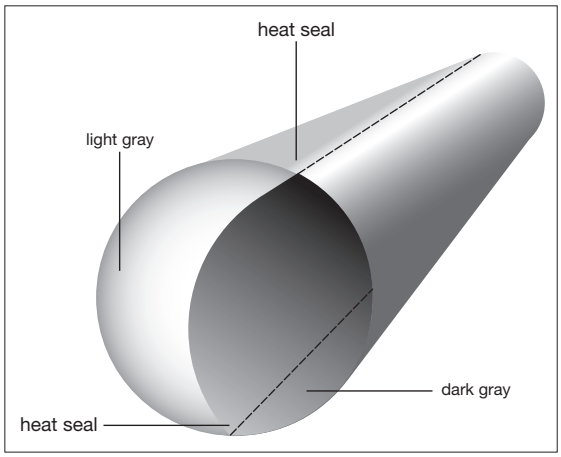
J-LOK is thixotropic and fast setting. This reduces viscosity during insertion of the bolt and permits relatively low installation force and torque. The results are fast installation, rapid achievement of full strength, and a minimum tendency for ungelled resin to drip from the holes during installation.

Storage Recommendations

For maximum shelf life, J-LOK cartridges should be stored away from direct sunlight in a reasonably cool, well-ventilated, dry area. Storage life is up to 1 year, depending on ambient temperature conditions. Under adverse conditions shelf-life is reduced. To ensure proper storage, the product should not be subjected to temperatures in excess of 90°F for prolonged periods. Storage is recommended under cover, on original pallets with adequate ventilation. If stored in trailers in hot weather, door should be left ajar or a sun screen erected over the trailer. Conversely, while cold storage does not adversely affect the shelf-life of J-LOK, it should be warmed to a range of 50°–60°F before using to assure gel times within the specified range (see Figure 2).

The time required for cases of J-LOK to warm or cool to ambient temperature is dependent on both the initial temperature and how the cases are stacked. Where the initial temperature is anywhere between 25° and 85°F, cases will come within 5° of ambient temperature in 48 hours when stacked in single columns with 4 sides of each case exposed to the air. Multiple columns should be separated by at least 2" to assist air circulation between columns.

The Cartridge



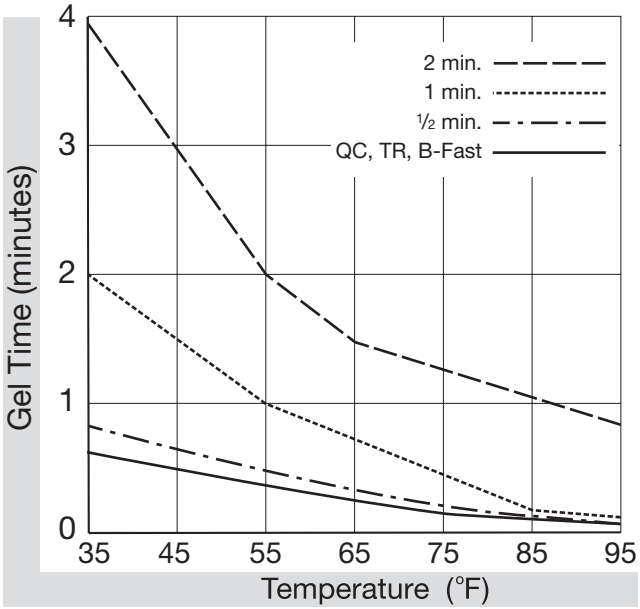
Cross Section

Advantages

The proprietary J-LOK® package has a distinct advantage over other resin systems due to:

- High catalyst/resin ratio
- Uniform installation time
- Mixing efficiency

Fig. 2. Gel time



Plates

Technical Data — Plate Products

		Nominal Sizes, in. (mm)	Nominal Thicknesses, in. (mm)	Hole Diameters, in. (mm)
Donut Plate		5 × 5 (127 × 127) 6 × 6 (152 × 152) 8 × 8 (203 × 203) 9 × 9 (229 × 229) 12 × 12 (305 × 305)	5/32 (4.0) 3/16 (4.8) 7/32 (5.6) 1/4 (6.4)	13/16–1-9/16 (20.7–39.7)
Flat Plate		4 × 4 (102 × 102) 5 × 5 (127 × 127) 6 × 6 (152 × 152) 8 × 8 (203 × 203)	1/4 (6.4) 5/16 (8.0) 3/8 (9.5) 1/2 (12.7)	7/8–1-15/16 (22.2–49.21)
Dome Plate		5 × 5 (127 × 127) 6 × 6 (152 × 152) 8 × 8 (203 × 203)	5/32 (4.0) 3/16 (4.8) 1/4 (6.4) 5/16 (8.0)	7/8–1-15/16 (22.2–49.2)
Volcano Plate		6 × 6 (152 × 152) 8 × 8 (203 × 203)	1/4 (6.4) 5/16 (8.0) 3/8 (9.5)	1-3/8–1-5/8 (34.9–41.3)
Channel Plate Donut or Domed		5 × 7-3/8 (127 × 187)	7/32 (5.6)	1–1-3/8 (25.4–34.9)
Header Plate Bell Style		6 × 16 (152 × 406)	3/16 (4.8) 7/32 (5.6)	1–1-1/2 (25.4–38.1)
Header Plate Race Track Style		6 × 10 (152 × 254) 6 × 16 (152 × 406)	5/32 (4.0) 1/4 (6.4)	1–1-3/8 (25.4–34.9)

*All plate styles except channel plates are available with hanger openings.

**Customized sizes are available upon request.

*** We recommend the plate capacity to always match the bolt manufacturer recommendation

Plates

Features

Jennmar plate products feature high strength, light weight and a low profile, effectively distributing roof bolt load evenly in all directions. Manufactured under rigid quality-control conditions in accordance with ASTM F432, plate ratings range from 20,000 to 60,000 lbs Customized sizes and coatings are available upon request.

Jennmar Roof & Rib Plate

- Increased surface area 18″ × 18″
- Double rib design for extra high strength
- New rolled edge for increased safety, handling and strength
- Lightweight for handling and stacks easily
- Provides increased surface support when used with 6″ × 6″ or 8″ × 8″ plate
- Standard center hole is 1-3/8″ diameter with optional 1″ diameter hole

SHADOW PLATE®

- Galvanized or black
- Controlled edge shearing to eliminate sharp, jagged edges
- Ideal for added surface coverage with added strength
- Lightweight with large surface area
- 12″ × 12″, 14 Gauge thickness
- Maximum 2″ hole diameter
- Can be welded to other plates to form combination plate

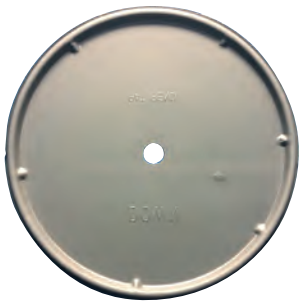
Channel Plate

- Channel plate systems offer superior performance in mining and tunneling industries
- Compatible with Jennmar's full line of channel
- Distributes bolt tension uniformly over entire plate and channel. Bolt plate and channel work as complete system to resist vertical and lateral movement
- For use with any bolt system

Push Plate

- Used to secure welded wire mesh without additional nut and plate
- Fast installation of mesh by using previously installed threaded bolts
- Push plate for 5/8″–11, 3/4″–10 or 7/8″–9 Standard UNC 1A thread
- Plates yield at 6000 lbs of load

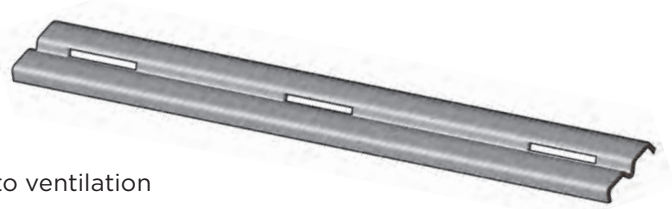
19″ Surface Control Plate



- All plates have the "rolled edge" to provide for safe handling
- Large diameter plates for surface control
- These plates are to be used in conjunction with a roof bolt and roof plate
- 19″ diameter with a 1″ center hole
- Mill thicknesses of 0.022″ cold rolled or coated steel

Channels and Roof Mats

T-Channels



- Increased strength, compared with roof mats
- Easily installed with regular bolting cycles
- T5 channels for higher strength, less resistance to ventilation
- Available in 4′ through 20′ sections with other lengths on request
- Gauges range from 12 gauge to 5/16″ Channels have tensile strength of 36,000 to 80,000 psi
- High beam strength resists roof sag
- Use with Jennmar Advanced Channel Plates

Roof/Rib Safety Channel

- Gauges range from 12 gauge to 5/16″
- Tensile strength of 38,000 to 80,000 psi
- Prevents accidents caused by rib-roll
- Promotes safe working environment
- Easy to install
- Enhances beaming effect
- Provides resistance to roof sag and rib sloughage
- For use with Jennmar Channel Plate
- Controls roof/rib sloughage
- Controls “cutter” roof
- Enhances performance of wire mesh
- Easy installation
- Provides active support to roof and rib
- Prevents accidents caused by rib-roll and sloughage
- Promotes safe working environment

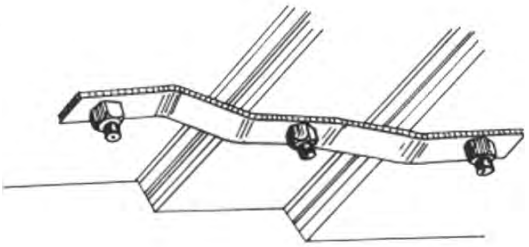


Figure 7. Strap

Roof Mats

- Temporary or permanent preventive for roof deterioration, as addition to roof bolt plan
- Lengths 54″ to 240″; seven widths from 4-1/2″ to 10-1/2″
- Gauges 10, 2, 14, 16
- Hot rolled, cold rolled, galvanized
- Strong and flexible; bolt holes punched to suit your roof bolt plan
- Custom sizes available

Mini Monster Mat

- Mini Monster Mats available in following sizes: 13″ × 16″, 13″ × 24″, 10″ × 24″

Custom sizes and/or galvanizing available on request.

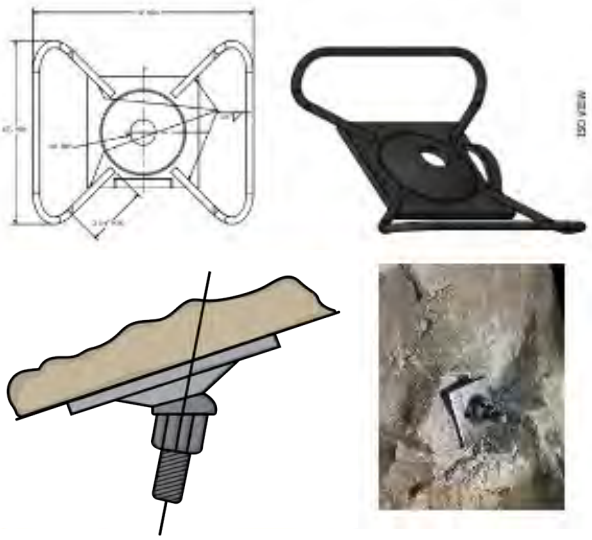
Rock Bolt Accessories

Rock Bolt Plates

- Available in various sizes,shapes and sections.
- Selection based on ground conditions and bolts used.
- Plates align perpendicular to tunnel or mining strata.
- Plate configurations include sections, domes, and flat options.

Rock Bolt Accessories

- Accessories used to achieve normal facing rock bolts plates include: dome nuts or washers for “ball and socket” connection to dome plates, beveled washers to account for the angle compensation.
- They can included hanger devices or mechanical connections to shotcrete or final liner.
- Accessories can also include straps, channels or mesh for further surface control which depends on the layered rock, block nature or spalling effects in the tunnel or mine (*See page 28).*

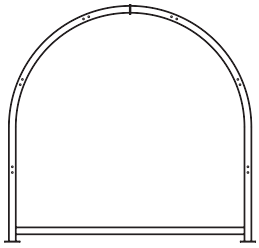


Scan to learn more.

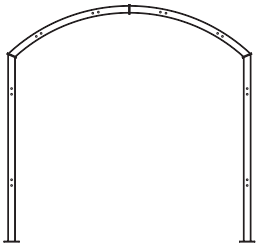
Steel Rib Supports

Advantages

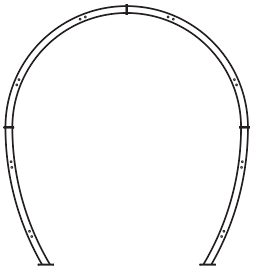
- Customized cold formed beam constructions
- Various rib rupport types available on request
- Flexible adaptation of the beam geometry to the respective excavated cross-section
- TH sections and other special support profiles available on request
- Custom formed lagging resistant to machine jack thrusts and impact loads



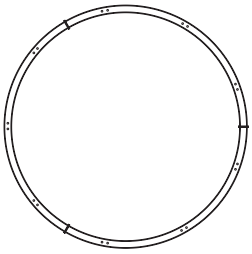
Type 1:
2 pcs. horseshoe with optional invert strut



Type 2:
4 pcs. modified horseshoe



Type 3:
4 pcs. horseshoe



Type 4:
3 pcs. circular

Butt Joint Accessory

- Butt plate height: rib depth plus 1
- Width: flange width plus 1″
- Thickness: 4″ and 5″ sections — 3/8″
  - 6″ sections — 1/2″
  - 8″ sections — 5/8″
  - 10″ sections — 3/4″
  - 12″ sections — 1″
- Bolt size (A325) and quantity:
  - 4″ sections: (2) 3/4″ dia
  - 5″ and 6″ sections: (2) 1″ dia
  - 8″ and 10″ sections: (4) 1″ dia
  - 12″ sections: (6) 1″ dia

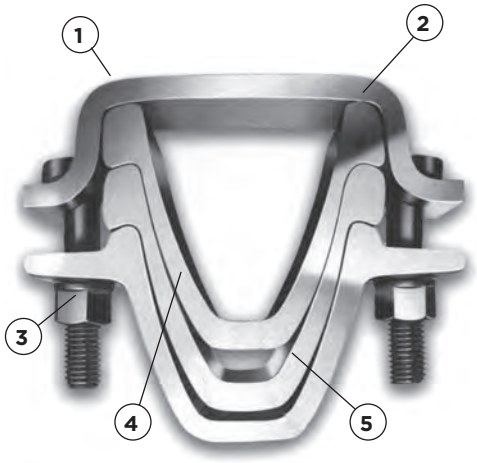
The above are for normal loading conditions. For extreme conditions, a full-moment strength joint may be required.

Specifications – US Customary Units

- Pipe spacers
  - Schedule 40 pipe stock Ø 2″ (for Ø ¾″ tie rods)
  - Length: rib spacing minus web thickness
- Tile rods
  - ASTM A706 Ø ¾″ rod stock with 4″ NC threaded each end
  - Length: rib spacing plus 6″
  - Beam width 12″ and above structural spreaders are recommended
- Jacking Luggs – 1″
- Invert Slip Plates

TH Arch System

The TH Arch System has quickly gained wide market acceptance by uniting high resistance to load along with dynamic behavior that is unseen in other arches in the industry. Due to its section type design, the TH Arch produces a relation of transversal and longitudinal force that is nearly one, which in turn means that it works evenly in any direction of support. The TH Arch systems are frequently used in European, North American and Latin American markets.



Applications

- Civil works in general
- Development and mining projects
- Tunnel projects
- Split-offs
- Machine shops
- Adequate for any type of terrain

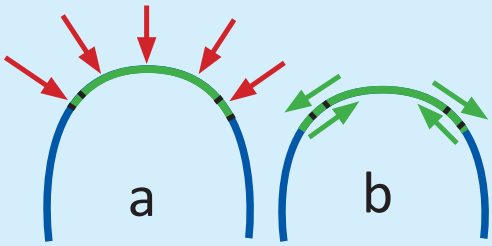
Advantages

- Manganese-enriched steel guarantees better quality
- Equal stress resistance in all directions
- Fast and easy installation
- Dynamic system allows for improved energy absorption
- Adequate for large convergence areas
- Total functionality even in variable inclination areas
- Adaptable to any excavation
- Inverted curve if desired
- Can couple to other ground support systems

1. The Joint braces the profile, making it highly resistant to bend.
2. Its shape eliminates any movement between columns and clamps.
3. Application of recommended torque on bolts avoids slippage.
4. The friction between profiles and between profiles and clamps is performed on a large surface area for support.
5. Static characteristics of buckling:
   - High resistance to buckling
   - High resistance to deformation in deformation area

TH29 TH25 TH21

TH Arches are assembled by overlapping one beam to another. They are then connected to one another using a special joint. With this revolutionary assembly technique, the beams slide between each other at the overlapping joints and dissipate the load, energy and friction from the rock mass without suffering any deformation and still maintaining balance.



4-Flange Steel Liner Plates

Fields of Application

- Ground support in conventional excavation
- Soft ground Tunneling
- Vertical and inclined tunnels
- TBM and MTBM jacking load resistance system
- Shaft and cofferdam support
- Smooth liner plates: shield excavation or tunnel boring machines
- Gasketed liner plates: hydrostatic conditions and reduction of water inflow
- Tapered liner plates: used for changes in alignment, both horizontal and vertical

Main Advantages

- Optimized cycle times and manpower requirements
- Maximum consistent passive support strength with minimum weight of steel
- Safe support system
- Easy to store, handle, and erect
- Flexible design for different tunnelgeometries and ground conditions
- Fire resistant system components
- Optional gasket plates for sealing of joints available on request 4-flange smooth liner plates are the only liner plate type capable of resisting tunnel boring machine jacking loads without any supplemental structural support

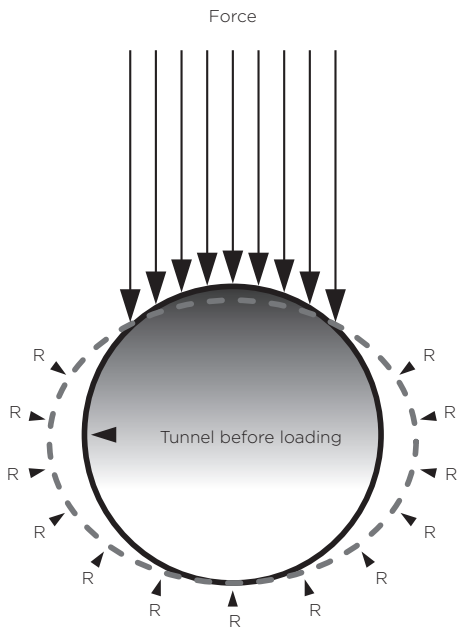
System Components

- Cold-formed 4-flange steel liner plates, 16[“] and 24[“] (406 and 610 [mm]) widths
- Thicknesses of 12, 10, 8, 7, 5, 3 gages, 5/16[“], or 3/8[“] available
- Corrugated or smooth plate, steel grade according to ASTM A1011
- Galvanized (ASTM A 123) and/or bituminous coated (AASHTO M190) versions available
- Customized partial plates are available to meet specific dimensions
- Liner plate gaskets and 2[“] (51 [mm]) grout holes available on request
- Bolts and nuts with quick acting coarse thread according to ASTM A 307 (hot-dip galvanized: ASTM A 153)
- Obduro® polymer coating according to the aerospace standard SAE AS1003

System Description

4-flange steel liner plates provide a relatively light-weight, easy-to-handle, and safe support for soft ground tunneling because the ground that supplies the loading also supplies the respective resistance. The liner plate assembly simply distributes and transmits the load to the surrounding ground. As a steel liner plate ring takes load vertically, it tends to deflect inward at the top and outward at the sides. The ground resists deflection of the lining by developing a passive force equal in magnitude and opposite in direction to the force exerted by that of the lining. The ability of the surrounding ground to resist the outward bulge of the liner plate ring is the key to vertical load support. With the ring confined to a small amount of deflection, the thrust line induced by the load is forced to follow the ring of liner plates. Thus, the ability of the assembly to withstand the applied load depends upon its ability to transmit ring thrust from plate to plate around the ring. Obviously, this ability is enhanced by the four-flange design of our systems. There are various methods for determining the required strength of tunnel linings. Nevertheless, type of ground, location and depth of cover, size and length of the tunnel, level of ground water, superimposed loading, and history always guide these calculations. Our designs conform to the latest guidance of AASHTO (American Association of State Highway and Transportation Officials) and AREMA (The American Railway Engineering and Maintenance-of-Way Association).

Diagram of Load and Load Reactions



R = Ground Resistance

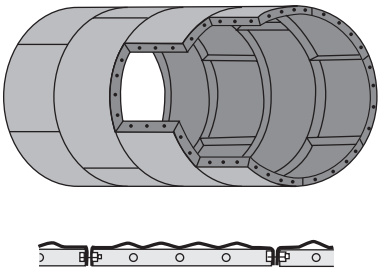
4-Flange Steel Liner Plates

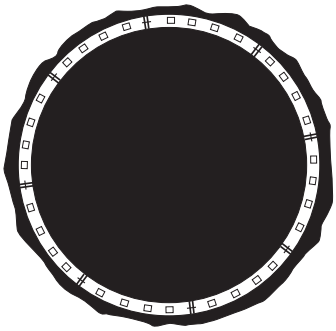
Advantages of 4-flange Tunneling Liner Plates over conventional 2-flange Liner Plates

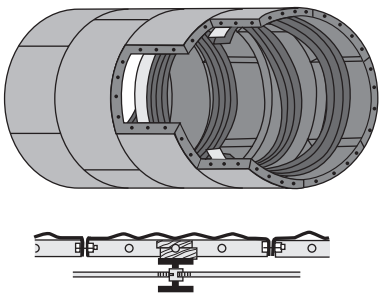
- All 4-flange liner plates are similar in size and shape, e.g. 2-flange plates vary considerably in length
- 4-flange liner plates are erected from inside the tunnel, whereas 2-flange plates require reaching behind the plates to install bolts and nuts
- Storage, manipulation, and erection of 4-flange linger plates requires less time and manpower
- 4-flange liner plates are the only liner plate system form which can be used to push off the liner plate flange with a TBM, MTBM, or shield without supplemental structural reinforcement
- Less excavation because 4-flange plates are only 2 to 2 ½ [in] deep while the deeply corrugated two-flange plates can be 4 to 5 [in] deep
- Less grout is used behind 4-flange plates because of the shallower corrugations versus the deeper 2-flange plates
- 4-flange liner plates are measured to the outside of plate while 2-flange plates are measured to the net neutral axis (NNA)

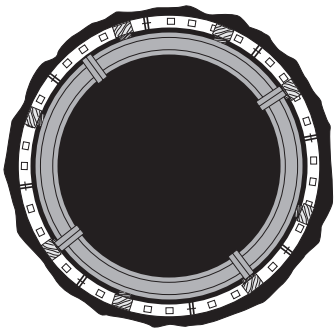
Liner Plate Support Types

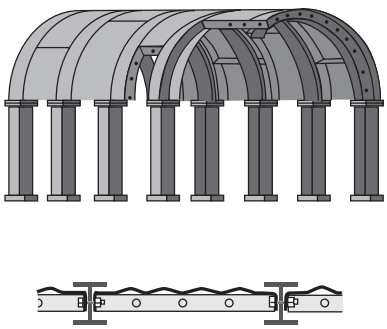
- Liner Plates only
- Ribs inside Liner Plates
- Liner Plates between ribs

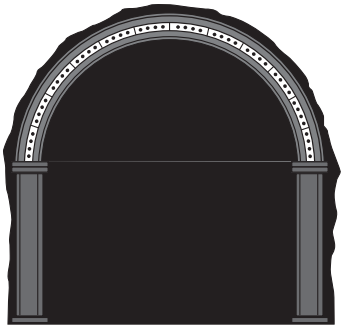












4-Flange Steel Liner Plates

Sectional Properties for 16[“] Wide Corrugated Liner Plates

US Customary Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[in]	[in]	[in]	[in]	[in²]	[in²/in]	[in²/ft]	[in⁴]	[in⁴/in]	[in]	[lbs]	[lbs]
12	0.1046	0.614	1.948	2.000	2.1268	0.1329	0.7976	0.6766	0.0423	0.56	24.2	12.9
10	0.1345	0.616	1.946	2.000	2.7184	0.1699	1.0194	0.8788	0.0549	0.57	31.2	16.5
8	0.1644	0.664	2.023	2.125	3.3442	0.2090	1.2541	1.1882	0.0743	0.60	38.2	20.6
7	0.1793	0.664	2.023	2.125	3.6368	0.2273	1.3638	1.2964	0.0810	0.60	40.9	21.7
5	0.2092	0.695	2.117	2.250	4.2182	0.2636	1.5818	1.7288	0.1081	0.64	48.6	26.2
3	0.2391	0.718	2.094	2.250	4.7924	0.2995	1.7972	1.9146	0.1197	0.63	54.9	28.9
5/16[“]	0.3125	0.763	2.174	2.375	6.1718	0.3857	2.3144	2.8418	0.1776	0.68	68.6	36.1
3/8[“]	0.3750	0.913	2.149	2.500	7.3598	0.4600	2.7600	3.7020	0.2314	0.71	82.3	43.3

SI Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[mm]	[mm]	[mm]	[mm]	[mm²]	[mm²/mm]	[mm²/mm]	[mm⁴]	[mm⁴/mm]	[mm]	[kg]	[kg]
12	2.657	15.60	49.48	50.80	1372.13	3.38	1.73	2,816,166	693.2	14.22	11.0	5.9
10	3.416	15.65	49.43	50.80	1753.80	4.32	2.21	3,657,769	899.6	14.48	14.2	7.5
8	4.176	16.87	51.38	53.98	2157.54	5.31	2.72	4,945,563	1217.6	15.24	17.3	9.3
7	4.554	16.87	51.38	53.98	2346.32	5.77	2.95	5,395,917	1327.4	15.24	18.6	9.8
5	5.314	17.65	53.77	57.15	2721.41	6.70	3.43	7,195,666	1771.4	16.26	22.0	11.9
3	6.073	18.24	53.19	57.15	3091.86	7.61	3.89	7,969,008	1961.5	16.00	24.9	13.1
5/16[“]	7.938	19.38	55.22	60.33	3981.80	9.80	5.01	11,828,229	2910.3	17.27	31.1	16.4
3/8[“]	9.525	23.19	54.58	63.50	4748.25	11.68	5.98	15,408,581	3792.0	18.03	37.3	19.6

Sectional Properties for 16[“] Wide Smooth Liner Plates

US Customary Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[in]	[in]	[in]	[in]	[in²]	[in²/in]	[in²/ft]	[in⁴]	[in⁴/in]	[in]	[lbs]	[lbs]
12	0.1046	0.246	1.754	2	2.0482	0.1280	0.7681	0.3386	0.0212	0.46	24.2	12.9
10	0.1345	0.260	1.740	2	2.6176	0.1636	0.9816	0.5544	0.0346	0.46	31.2	16.5
8	0.1644	0.295	1.830	2.125	3.2209	0.2013	1.2078	0.7944	0.0497	0.50	38.2	20.6
7	0.1793	0.301	1.824	2.125	3.5025	0.2189	1.3134	0.8583	0.0536	0.50	40.9	21.7
5	0.2092	0.338	1.912	2.250	4.1136	0.2571	1.5426	1.1647	0.0728	0.53	48.6	26.2
3	0.2391	0.351	1.899	2.250	4.6729	0.2921	1.7523	1.3083	0.0818	0.53	54.9	28.9
5/16[“]	0.3125	0.408	1.967	2.375	6.0938	0.3809	2.2852	1.9294	0.1206	0.56	68.6	36.1
3/8[“]	0.3750	0.460	2.040	2.500	7.3126	0.4570	2.7422	2.6142	0.1634	0.60	82.3	43.3

SI Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[mm]	[mm]	[mm]	[mm]	[mm²]	[mm²/mm]	[mm²/mm]	[mm⁴]	[mm⁴/mm]	[mm]	[kg]	[kg]
12	2.657	6.25	44.55	50.80	1,321.42	3.25	1.66	140,936	347.4	11.68	11.0	5.9
10	3.416	6.60	44.20	50.80	1,688.77	4.16	2.13	230,759	567.0	11.68	14.2	7.5
8	4.176	7.49	46.48	53.98	2,078.00	5.11	2.62	330,654	814.4	12.70	17.3	9.3
7	4.554	7.65	46.33	53.98	2,259.67	5.56	2.85	357,251	878.3	12.70	18.6	9.8
5	5.314	8.59	48.56	57.15	2,653.93	6.53	3.34	484,785	1,193.0	13.46	22.0	11.9
3	6.073	8.92	48.23	57.15	3,014.77	7.42	3.80	544,556	1,340.5	13.46	24.9	13.1
5/16[“]	7.938	10.36	49.96	60.33	3,931.48	9.67	4.95	803,077	1,976.3	14.22	31.1	16.4
3/8[“]	9.525	11.68	51.82	63.50	4,717.80	11.61	5.94	1,088,112	2,677.6	15.24	37.3	19.6

4-Flange Steel Liner Plates

Sectional Properties for 24[“] Wide Corrugated Liner Plates

US Customary Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[in]	[in]	[in]	[in]	[in²]	[in²/in]	[in²/ft]	[in⁴]	[in⁴/in]	[in]	[lbs]	[lbs]
12	0.1046	0.584	2.041	2	2.9379	0.1224	0.7345	0.7832	0.0326	0.52	34.5	18.7
10	0.1345	0.597	2.028	2	3.7532	0.1564	0.9383	0.9910	0.0413	0.51	44.2	23.6
8	0.1644	0.628	2.122	2.125	4.5984	0.1916	1.1496	1.3683	0.0570	0.55	52.8	28.4
7	0.1793	0.635	2.115	2.125	4.9990	0.2083	1.2498	1.4814	0.0617	0.54	56.9	30.7
5	0.2092	0.667	2.208	2.250	5.8468	0.2436	1.4617	1.9463	0.0811	0.58	68.5	37.0
3	0.2391	0.680	2.195	2.250	6.6383	0.2766	1.6596	2.1933	0.0914	0.58	80.2	43.2
5/16[“]	0.3125	0.731	2.269	2.375	8.6130	0.3589	2.1533	3.1563	0.1315	0.61	101.6	54.0
3/8[“]	0.3750	0.779	2.346	2.50	10.2846	0.4285	2.5712	4.1816	0.1742	0.64	121.9	65.8

SI Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[mm]	[mm]	[mm]	[mm]	[mm²]	[mm²/mm]	[mm²/mm]	[mm⁴]	[mm⁴/mm]	[mm]	[kg]	[kg]
12	2.657	14.83	51.84	50.80	1,895.42	3.11	1.59	325,992	534.2	13.21	15.6	8.5
10	3.416	15.16	51.51	50.80	2,421.41	3.97	2.03	412,485	676.8	12.95	20.0	10.7
8	4.176	15.95	53.90	53.98	2,966.70	4.87	2.49	569,529	934.1	13.97	23.9	12.9
7	4.554	16.13	53.72	53.98	3,225.15	5.29	2.71	616,605	1011.1	13.72	25.8	13.9
5	5.314	16.94	56.08	57.15	3,772.12	6.19	3.17	810,111	1329.0	14.73	31.1	16.8
3	6.073	17.27	55.75	57.15	4,282.77	7.03	3.60	912,920	1497.8	14.73	36.4	19.6
5/16[“]	7.938	18.57	57.63	60.33	5,556.76	9.12	4.67	1,313,751	2154.9	15.49	46.1	24.5
3/8[“]	9.525	19.79	59.59	63.50	6,635.21	10.88	5.57	1,740,513	2854.6	16.26	55.3	29.8

Sectional Properties for 24[“] Wide Smooth Liner Plates

US Customary Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[in]	[in]	[in]	[in]	[in²]	[in²/in]	[in²/ft]	[in⁴]	[in⁴/in]	[in]	[lbs]	[lbs]
12	0.1046	0.190	1.810	2	2.8850	0.1202	0.7210	0.4630	0.0193	0.40	34.5	18.7
10	0.1345	0.203	1.767	2	3.6940	0.1539	0.9235	0.5840	0.0243	0.40	44.2	23.6
8	0.1644	0.233	1.892	2.125	4.5360	0.1890	1.1340	0.8400	0.0350	0.43	52.8	28.4
7	0.1793	0.240	1.885	2.125	4.9370	0.2057	1.2343	0.9080	0.0378	0.43	56.9	30.7
5	0.2092	0.271	1.979	2.25	5.7870	0.2411	1.4468	1.2360	0.0515	0.46	68.5	37.0
3	0.2391	0.284	1.966	2.25	6.5860	0.2744	1.6465	1.3900	0.0579	0.46	80.2	43.2
5/16[“]	0.3125	0.334	2.041	2.375	8.5940	0.3581	2.1485	2.0610	0.0859	0.49	101.6	54.0
3/8[“]	0.3750	0.381	2.119	2.5	10.3130	0.4297	2.5783	2.8070	0.1170	0.52	121.9	65.8

SI Units												
Plate Thickness		Dimensions			Theoretical Area		Effective Area	Moment of Inertia		Radius of Gyration	Weight	
Gage	Decimal	X	Y	Side Flange							Full Plate	Half Plate
	[mm]	[mm]	[mm]	[mm]	[mm²]	[mm²/mm]	[mm²/mm]	[mm⁴]	[mm⁴/mm]	[mm]	[kg]	[kg]
12	2.657	4.83	45.97	50.80	1861.29	3.05	1.56	192,715	316.3	10.16	15.6	8.5
10	3.416	5.16	44.88	50.80	2383.22	3.91	2.00	243,079	398.2	10.16	20.0	10.7
8	4.176	5.92	48.06	53.98	2926.45	4.80	2.46	349,634	573.5	10.92	23.9	12.9
7	4.554	6.10	47.88	53.98	3185.15	5.22	2.67	377,938	619.4	10.92	25.8	13.9
5	5.314	6.88	50.27	57.15	3733.54	6.12	3.13	514,462	843.9	11.68	31.1	16.8
3	6.073	7.21	49.94	57.15	4249.02	6.97	3.57	578,562	948.8	11.68	36.4	19.6
5/16[“]	7.938	8.48	51.84	60.33	5544.51	9.10	4.66	857,853	1407.6	12.45	46.1	24.5
3/8[“]	9.525	9.68	53.82	63.50	6653.54	10.91	5.59	1,168,362	1917.3	13.21	55.3	29.8

2-Flange Liner Plate

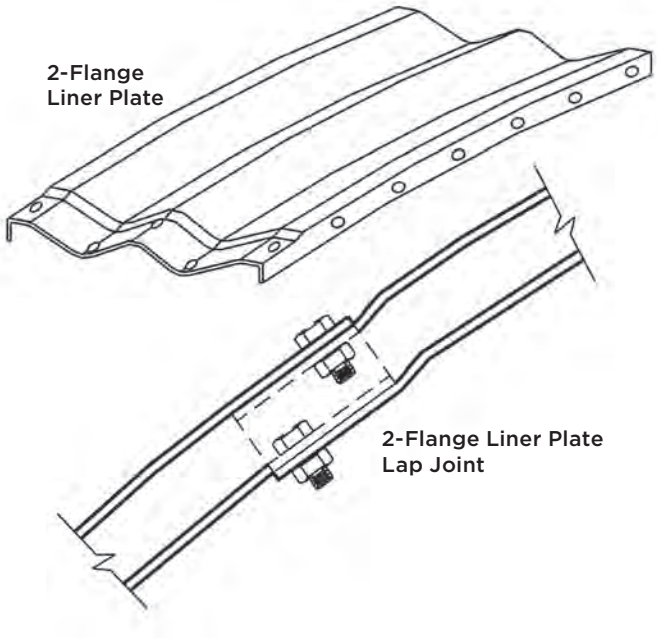
Jennmar Civil offers 2-Flange Liner Plate that provides optimum shaft stability and protection when constructing new utility tunnels, relining structures under highways and railroads, and lining vertical shafts.

Applications

- New utility tunnels and enclosures
- Relining and rehabilitation of bridges and large culverts
- Vertical shafts

Advantages

- Stiffest plate available – usually does not require ring-beam stiffeners
- Minimizes installation expense
- Optimizes shaft stability
- Unsurpassed in strength and safety
- Available in black (uncoated) or galvanized steel
- Made in USA.



Deep, full length corrugations and lapped joints for more effective stiffness and ring compression.

Technical Data - 2-Flange Liner Plate

Uncoated Nominal Thickness, in.	Area, $in.^2/ft$	Section Modulus, $in.^3/in.$	Moment of Inertia, $in.^4/in.$	Radius of Gyration, in.	Approx. Plate Weights including Bolts, lb		
					12 Pi. Plate	14 Pi. Plate	16 Pi. Plate
0.0747 (14 ga)	1.149	0.0323	0.0345	0.600	25	28	31
0.1046 (12 ga)	1.618	0.0457	0.0491	0.604	33	37	42
0.1345 (10 ga)	2.086	0.0590	0.0640	0.607	41	47	52
0.1644 (8 ga)	2.559	0.0726	0.0795	0.610	49	56	63
0.1793 (7 ga)	2.796	0.0798	0.0877	0.613	53	61	68
0.2092 (5 ga)	3.263	0.0928	0.1031	0.616	61	70	79
0.2391 (3 ga)	3.740	0.1065	0.1193	0.619	70	80	90

Impact Resistant Lagging® (IRL®)

To protect mine personnel, belts, moving vehicles and other facilities, mine operators typically install steel structures such as square or arch sets in roof fall areas. Wood lagging is usually installed between the steel sets to enclose the area and protect the entry from recurring falls. Jennmar, along with Jennmar Engineering our affiliate engineering company, have designed, tested and developed the Impact Resistant Lagging® (IRL®) system to protect steel sets. Various steel sets that are protected with IRL panels have been approved by MSHA and installed in several underground roof fall rehabilitation projects.

The IRL® panel consists of the following components:

V-Deck Panel

Galvanized V-Deck Panel (18 × 46″ × 12 gage) is used to provide primary flexural strength. Two clips are attached to facilitate easy installation of the lagging panel to the upper flange of the beam.

Special Lagging Block (SLB)

Special Lagging Blocks are comprised of two pieces of medium-soft wood (6 × 6 × 46″) that are attached to the V-deck panel. The blocks provide additional flexural strength to the system, absorb impact energy, distribute impact load over a larger area of the V-deck panel and extend the duration of impact.

Cushion Inserts

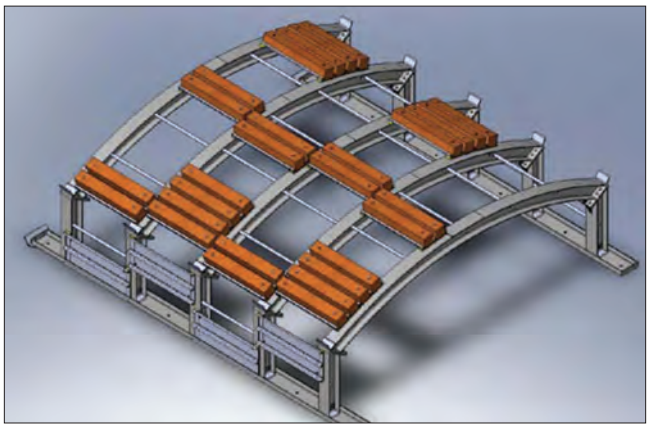
Two pieces of hard foam strip (0.5″ thick) are installed between the V-deck panel and the flange of the W-beam. The foam strips act as a cushion, increase impact duration and reduce the magnitude of the instantaneous impact load on the system.

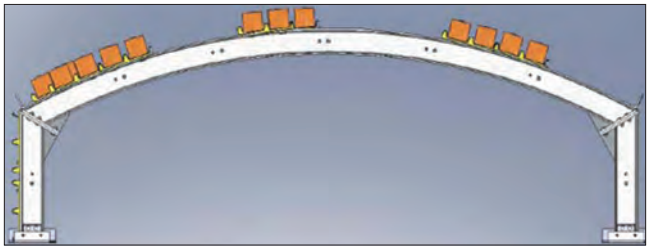
Surface Coating

A thin layer of water-proof bonding coating is applied to the surface of the Special Lagging Blocks. The tough-textured coating provides necessary protection against water, acid, chemicals, UV exposure, salt water, abrasion, fire and freeze-thaw. This coating dramatically extends the life span of the SLB when compared with plain wood blocks.

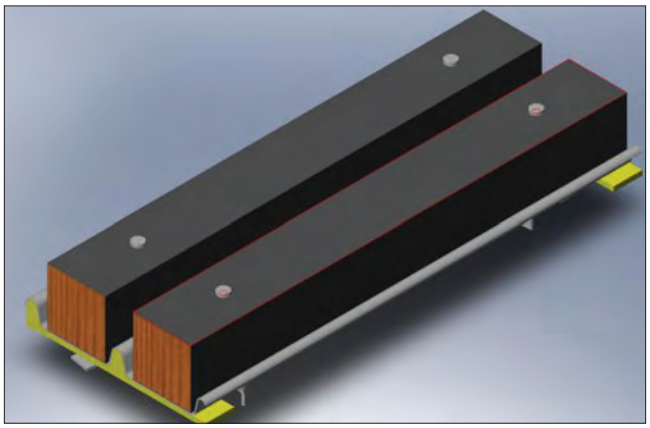
Advantages

- Provides sufficient flexural strength and acceptable cushioning effect
- Corrosion resistant
- Cost effective
- Easy material handling and installation





Impact Resistant Arch Set Design for Roof Fall Rehabilitation



Impact Resistant Lagging Panel

V-Deck Lagging Panels

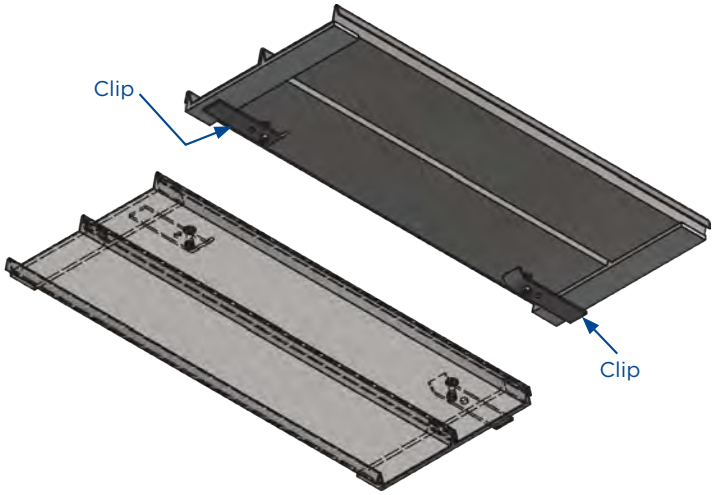
Jennmar Engineering has designed, tested, and developed the Impact Resistant Lagging (IRL) system to protect steel sets. Various steel sets that are protected with IRL panels have been approved by MSHA and installed in several underground roof fall rehabilitation projects.

Features

- Galvanized V-Deck Panel (18 × 46″ × 12 gage) is used to provide primary flexural strength. Two clips are attached to facilitate easy installation of the lagging panel to the upper flange of the beam.
- 10 GA - 18 GA thickness options
- 2′ L - 15’ L Options
- 18” Overlapping widths
- Foam Inserts, carriage bolts, lagging clips

Advantages

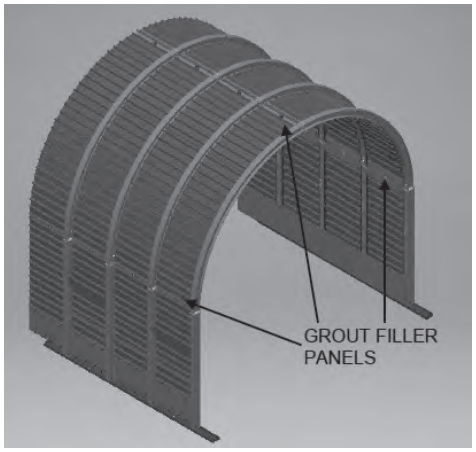
- Provides sufficient flexural strength and acceptable cushioning effect
- Corrosion resistant
- Cost effective
- Easy material handling and installation

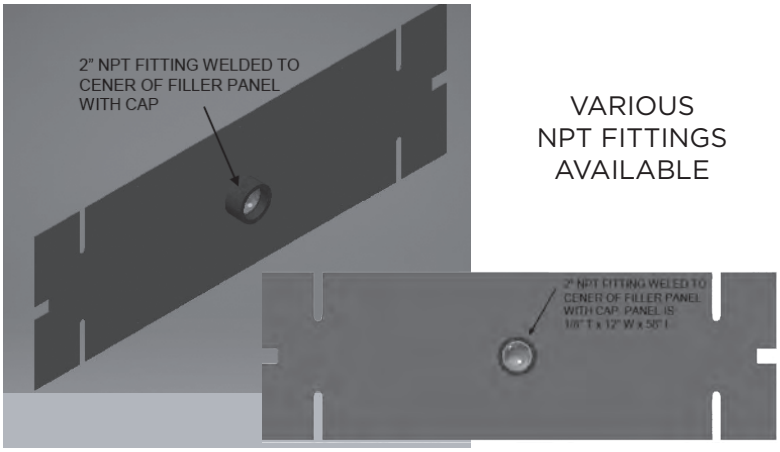


Lagging Gage	Gage Thickness, in.	MoI, in^4	Elastic Modulus, psi	Yield Strength, psi
10	0.1382	1.330	29,000,000.00	28,000.00
12	0.1084	1.050		
16	0.0635	0.600		
18	0.0516	0.480		
20	0.0396	0.360		

18 inch panel width. Available with galvanized coating.

Grout Filler Panels





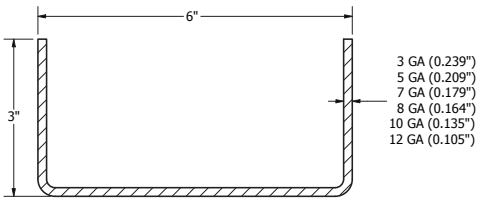
VARIOUS
NPT FITTINGS
AVAILABLE

Channel Lagging Panels

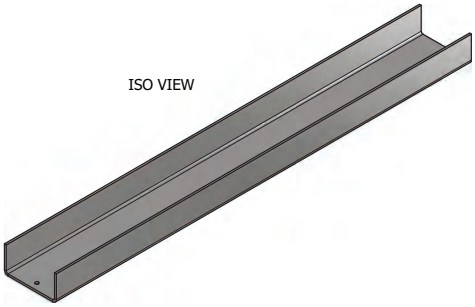
Jennmar's channel lagging is designed specifically to handle the ground conditions, backfill and mining equipment pressures. The channel sections are specifically designed for use with structural members and ease of installation. The sections and materials used is design for efficient installation and transportation to the tunnel location. A variety of sections, thickness and coating are available for project specific designs and applications.

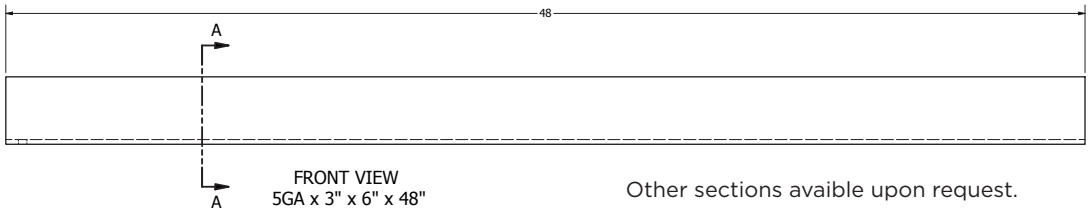
Advantages

- Provides sufficient flexural strength and acceptable cushioning effect
- Easy material handling and installation
- Corrosion resistant
- Cost effective



SECTION A-A



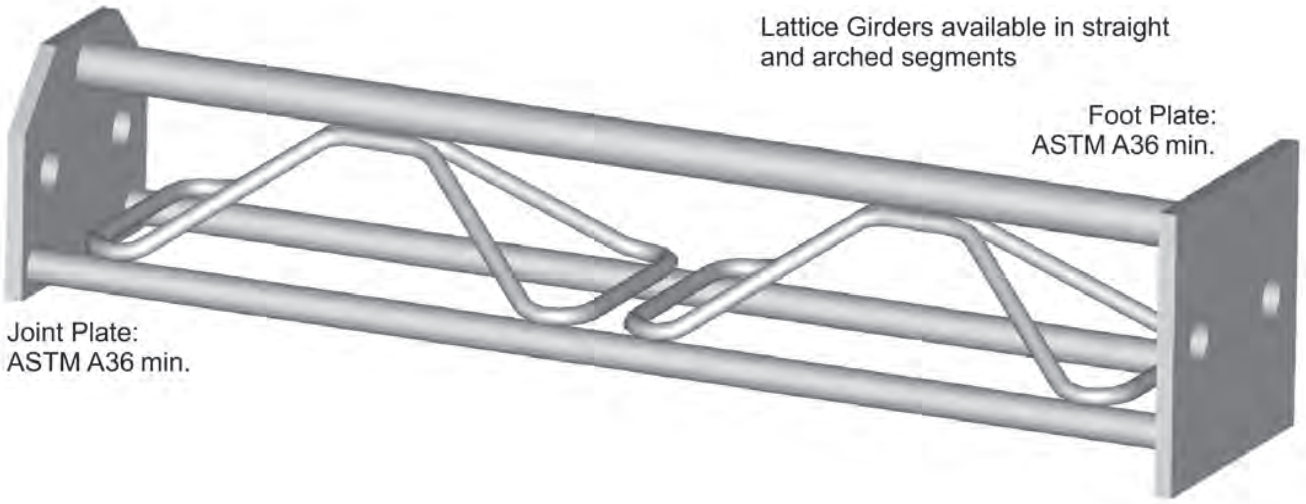


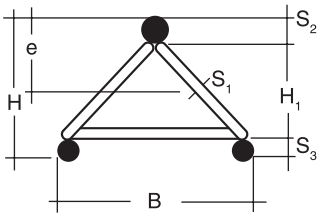
FRONT VIEW
5GA x 3" x 6" x 48"

Other sections avaible upon request.

Channel Lagging Description	Cross Sectional Area (in^2)	Ix (in^4)	Iy (in^4)	Grade	Tensile/Yield (ksi)	Coating (As Specified)
(3GA x 3" x 6")	2.68	14.617	2.344	A1011	29/42	Plain / A123 HDG / Epoxy
(5GA x 3" x 6")	2.364	13.054	2.086	A1011	29/42	Plain / A123 HDG / Epoxy
(7GA x 3" x 6")	2.043	11.417	1.818	A1011	29/42	Plain / A123 HDG / Epoxy
(8GA x 3" x 6")	1.880	10.569	1.680	A1011	29/42	Plain / A123 HDG / Epoxy
(10GA x 3" x 6")	1.555	8.846	1.402	A1011	29/42	Plain / A123 HDG / Epoxy
(12GA x 3" x 6")	1.219	7.021	1.109	A1011	29/42	Plain / A123 HDG / Epoxy

3-Bar Type





Lattice Girder Bar Material:
Tensile Strength 80ksi (550 MPa) min.
Yield Strength 70ksi (480 MPa) min.
Elongation 10% minimum

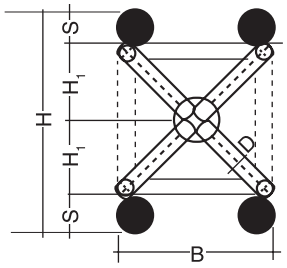
Connecting Bolts:
ASTM A 325N ø 3/4" minimum

Dimensions

O.P. Type	Bar Size			Weight (lbs/ft.)	H (in.)	B (in.)	e (in.)	H1 (in.)	Ix (in.²)	Sx (in.²)	Iy (in.²)	By (in.²)	Joint Plate			Foot Plate	
	S3	S2	S1										Size (in.)	Length (in.)	Unit Wt (lbs)	Size (in.)	Unit Wt (lbs.)
50	6	8	0.39	6.72	3.70	3.94	2.01		3.441	1.716	2.324	1.180	L4 × 3 × 3/8	4 9/16	3.2	3/8 × 5 × 5	2.7
	6	10		8.26	3.94		1.88		4.676	2.226	2.395	1.216		4 9/16	3.2		
70	6	8	0.39	6.95	4.50	5.60	2.42	2.75	5.544	2.295	5.064	1.846		5 5/16	3.5	3/8 × 6 × 6	3.8
	6	10		8.59	4.77		2.20		7.376	2.886	5.135	1.867		5 1/2	3.7		
	8	11		11.83	5.16		2.69		12.108	4.465	8.226	2.991		5 3/4	3.9		
95	6	8	0.39	7.07	5.50	7.09	2.94	3.76	8.937	3.036	8.950	2.526		5 9/16	4.4	3/8 × 7 × 8	6.0
	6	10		8.70	5.77		2.59		11.741	3.751	9.028	2.548		6 3/4	4.6		
	8	11		12.05	6.16		3.18		18.883	5.854	14.840	4.188		7 1/16	4.8		
115	6	8	0.47	7.94	6.25	8.66	3.37	4.50	12.182	3.636	13.906	3.21	L5 × 3 × 1/2	7 11/16	8.0	3/8 × 8 × 9-1/2	8.1
	6	10		9.58	6.52		2.91		15.849	4.416	13.985	3.229		7 13/16	8.1		
	8	11		12.92	6.91		3.69		25.208	6.953	23.342	5.390		8 1/8	8.4		
130	6	8	0.47	7.76	6.87	8.66	3.69	5.12	15.015	4.068	13.906	3.211		8 1/8	8.4	3/8 × 8 × 9-1/2	8.1
	6	10		9.39	7.14		3.15		19.379	4.929	13.977	3.229		8 5/16	8.6		
	8	11		12.73	7.53		3.93		30.623	7.794	23.342	5.390		8 3/4	9.3		

Continued

4-Bar Type



Lattice Girder Bar Material:
Tensile Strength 80ksi (550 MPa) min.
Yield Strength 70ksi (480 MPa) min.
Elongation 10% minimum

Connecting Bolts:
ASTM A 325N ø 3/4" minimum

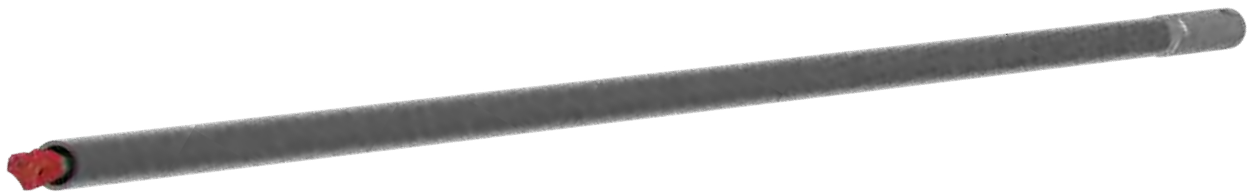
Dimensions

O.P. Type	D (mm)	S Bar Size	Weight (lbs/ ft.)	H (in.)	B (in.)	A Bars (in.²)	Ix (in.²)	Sx (in.²)	Iy (in.²)	Sy (in.²)	Joint Plate			Foot Plate	
											Size (in.)	Length (in.)	Unit W (lbs)	Size (in.)	Unit Wt (lbs)
100	10	5	7.61	5.19	3.94	1.2	6.42	2.47	3.40	1.72	L5 × 3 x 1/2	51/4	5.6	1/2 × 5 × 7	5.0
		6	8.88	5.44		1.8	9.77	3.59	4.56	2.31		51/2	5.9		
		7	10.23	5.69		2.4	10.04	4.94	5.75	2.92		53/4	6.1		
		8	13.43	5.94		3.1	19.34	6.52	6.97	3.54		6	6.4		
		10	17.16	6.44		4.9	33.50	10.41	9.34	4.75		61/2	6.9		
140	10	5	7.88	6.76	5.51	1.2	11.54	3.42	7.32	2.66		63/4	7.2	1/2 × 7 × 9	8.3
		6	9.14	7.01		1.8	17.32	4.95	10.03	3.65		7	7.5		
		7	10.51	7.26		2.4	24.55	6.77	12.98	4.72		71/4	7.7		
		8	13.71	7.51		3.1	33.38	8.90	16.10	5.66		71/2	8		
		10	17.42	8.01		4.9	56.39	14.10	22.65	8.24		8	8.5		
180	10	5	8.51	8.34	7.09	1.2	20.28	4.64	12.85	3.63		83/8	8.9	1/2 × 8 × 10-1/2	11.9
		6	9.78	8.59		1.8	30.13	6.70	17.82	5.03		85/8	9.2		
		7	11.51	8.84		2.4	42.29	9.14	23.34	6.58		87/8	9.6		
		8	14.35	9.09		3.1	56.94	11.99	29.32	8.27		81/8	9.7		
		10	18.06	9.59		4.9	94.44	18.89	42.33	11.94		85/8	10.3		
220	12	5	9.80	9.91	6.66	1.2	28.45	5.55	19.84	4.58		915/16	10.6	5/8 × 10 × 12	21.2
		6	11.06	10.16		1.8	42.06	8.01	27.71	6.40		103/16	10.9		
		7	12.43	10.41		2.4	58.75	10.93	36.57	8.44		107/8	11.1		
		8	15.63	10.66		3.1	78.74	14.32	46.29	10.65		1011/16	11.8		
		10	19.34	11.16		4.9	129.41	22.51	67.88	15.68		118/16	11.9		

J-Spile

Self-Drilling Tube Spiles

The self-drilling tube spile is versatile enough to be used in all types of ground and this is achieved through the outside diameter of the pipe. The pipe allows the spile to advance without fear of the hole caving and drainage holes in the pipe can be altered to match the varying site conditions. A variety of drill bits are available for a wide range of geological conditions and may be easily exchanged as conditions change. As the name implies, the spiles are self-drilling and use a disposable drill bit for each spile. Lengths of each spile may be modified and adapters allow the tube spile to be extended. The biggest advantages of the self-drilling tube spile include the simplicity of installation, ability to be installed with conventional equipment and less risk of the holes collapsing which leads to less risk of surface settlement. Self-drilling spiles are an excellent product to install prior to excavation and will lead to a more successful, but more importantly, safer project.



J-Spile

Description	Yield	Outer Diameter	Wall Thickness	Weight lbs/ft (kg/m)	Standard Lenght
Self Drilling Tube Spiles	33ksi (235 N/mm^2)	2.0″ (51 mm)	.12″ (3.2 mm)	2.55 (3.8 kg)	9, 12, 18 (2, 4, 6 m [*1])
Self Drilling Tube Spiles (High Strength)	51ksi (355 N/mm^2)	2.0″ (51 mm)	.18″ (4.5 mm)	3.76 (5.6 kg)	9, 12, 18 (3, 4, 6 m [*1])

PUR70 Polyurethane Resin

PUR70 Polyurethane Resin is a two-component polyurethane resin system. When properly mixed at a ratio of one to one, PUR70 cures to a rigid polymer with unique physical properties, resistance to water and chemical attack, and long term durability. The fast reactivity of PUR70 is used to control high water flows and consolidate loose rock strata.

The product's high adhesive strength, outstanding mechanical properties and flexibility create an excellent bond with the strata. When injected into the strata for preventive or curative purposes, the low viscosity mixture remains liquid for several seconds and penetrates into the smallest fissures. The polyurethane then expands, sets and effectively consolidates and seals the broken rock.

PUR70 can be applied with various types of dual piston pumps.

Applications

Typical applications include:

- Ground consolidation in the event of fractured and unstable ground
- Sealing against water ingress
- Injection of rock bolts, see the Fully Grouted Cable Bolt (FGCB)
- Ground stabilization
- Storm water systems, tunnels, manholes & underground vaults
- Concrete and earthen dams

Advantages

- Low viscosity product with good penetration into small fissures
- Non-flammable, non-toxic and does not contain any Volatile Organic Compounds (VOCs)
- Excellent adhesion, resistance and durability
- Ground cohesion quickly re-established under wet or dry conditions
- High flexibility, coherence maintained even in the event of strata movement
- Swells in the presence of water, suitable for stemming water ingress
- Full mechanical strength achieved very quickly, resulting in minimum disruption to workplace
- Storage and Shelf Life:
  - Product is moisture sensitive. Store product in original sealed containers at temperature range of 60–90° F (15–32°C). Opened containers must be handled properly to prevent moisture contamination. Shelf life is 12 months when properly stored

Technical Data — Solid Cured PUR70 Polymer Resin

		Test Method
Density, lb/ft.^{3} (kg/m^3)	70 (1121)	ASTM D-1622
Compressive Strength, psi (MPa)	10,000+ (70+)	ASTM D-1621
Tensile Strength, psi (MPa)	5100 (35)	ASTM D-638
Shear Strength, psi (MPa)	10,000+ (70+)	ASTM D-732
Flexural Strength, psi (MPa)	10,000+ (70+)	ASTM D-790
Water Absorption (by volume)	<1%	ASTM D-2842
Elongation	8%	ASTM D-638
Gel Time (ratio of 1:1 by volume)		
77°F (25°C)	45 seconds	—
50°F (10°C)	60 seconds	—

Technical Data — PUR70 Polyurethane Resin

Physical Properties – Liquid	Resin A	Resin B	Test Method
Viscosity, cps	250	500	ASTM D-1638
Specific Gravity	1.23	1.10	ASTM D-1475
Color	Dark Amber	Light Amber	—
Flash Point, °F (°C)	>250 (121)	>250 (121)	ASTM D-92

JSC Grout

JSC Grout is Jennchem's series of single-component hydrophobic polyurethane grouts that are used for sealing leaking cracks or joints in a variety of applications.

Types of JSC Grout available are Flex, LV, Ultra and Classic.

Applications

- Mine seal grouting
- Rehab of older works
- Water control on slopes, shafts and all active underground areas
- Waste treatment plants and water related facilities
- Storm water systems and manhole facilities
- Concrete and earthen dams
- Tunnels
- Concrete and masonry repair
- Water control grouting

Advantages

- 100% solids
- Expands up to 30 times initial volume
- Pumps as single component
- Controllable reaction times
- Excellent resistance and durability
- Outstanding adhesion
- Non-hazardous shipping
- Non-flammable
- Cures inert, non-toxic permanent seal
- Closed cell/hydrophobic formula
- Low viscosity
- No shrinkage in wet/dry and freeze/thaw cycles

Use of Accelerator B Component

The reaction profile is adjusted prior to pumping by the addition of Accelerator B into the base resin and is affected by temperature and the amount of moisture encountered. At 2.5% (1 pint per five gallons), the expansion will start at 15 seconds and be complete at about 65 seconds. These reaction times were determined at 77°F with the addition of 2.5% water.

JSC Grout – Flex

JSC Grout — Flex Physical Properties

Liquid

	Flex	Accelerator B	Test Method
Viscosity	500 cps	25 cps	ASTM D-2196A
Specific Gravity	1.15	0.95	ASTM D-1475
Color	Amber	Clear	
Flash Point	> 250°F	225°F	ASTM D-92
Solid Cured			
Density	4 lb/ft.^{3}		ASTM D-1622
Elongation	44%		ASTM D-638
Tensile	29 psi		ASTM D-638
Shear	17 psi		ASTM C-273
Water Absorption	< 1%		ASTM D-2842
Toxicity	Non-toxic		

JSC Grout – LV

JSC Grout — LV Physical Properties

Liquid

	Flex	Accelerator B	Test Method
Viscosity	250 cps	25 cps	ASTM D-1638
Specific Gravity	1.1	0.9	ASTM D-1475
Color	Light Amber	Clear	
Flash Point	> 250°F	225°F	ASTM D-92
Solid Cured			
Density	4 lb/ft.^{3}		ASTM D-1622
Elongation	50%		ASTM D-638
Tensile	29 psi		ASTM D-638
Shear	17 psi		ASTM C-273
Water Absorption	< 1%		ASTM D-2842

NSF

Certified to NSF/ANSI 61

Manufacturing Location: Canton, GA

For potable water applications, the minimum cure time is 12 hours at ambient temperature, with up to 2.5% accelerator.

Continued

JSC Grout – Ultra

JSC Grout — Ultra Physical Properties

Liquid			
	Flex	**Accelerator B**	**Test Method**
Viscosity	650 cps	25 cps	ASTM D-1638
Specific Gravity	1.07	0.95	ASTM D-1475
Color	Pale Yellow	Clear	
Flash Point	> 250°F	225°F	ASTM D-92
Solid Cured			
Density	4 lb/ft.^{3}		ASTM D-1622
Elongation	300%		ASTM D-638
Tensile	300 psi		ASTM D-638
Toxicity	Non-Toxic		

JSC Grout – Classic

JSC Grout — Classic Physical Properties

Liquid			
	Flex	**Accelerator B**	**Test Method**
Viscosity	700 cps	25 cps	ASTM D-1638
Specific Gravity	1.13	0.95	ASTM D-1475
Color	Amber	Clear	
Flash Point	> 425°F	225°F	ASTM D-92
Solid Cured			
Density	4 lb/ft.^{3}		ASTM D-1622
Elongation	44%		ASTM D-638
Tensile	29 psi		ASTM D-638
Shear	17 psi		ASTM C-273
Water Absorption	< 1%		ASTM D-2842

JSC Gel Foam

JSC Gel Foam is a low viscosity, hydrophilic, polyurethane formulation with high elongation properties for sealing leaking cracks or joints in concrete structures with continuous moisture exposure. The single-component system reacts with water to form a foam or gel based on the amount of water encountered. This hydrophilic resin is a MDI based, solvent free formulation. The product may be pumped as a single component or as a dual component system with water.

Advantages

- 100% solids
- Expands up to 25 times initial volume
- Pumps as a single component
- Controllable reaction times
- Excellent resistance and durability
- Outstanding adhesion
- Non-hazardous shipping
- Non-flammable
- Cures inert, non-toxic permanent seal

Typical Application

- Water related facilities
- Waste treatment plants
- Storm water systems
- Underground vaults
- Manhole facilities
- Concrete dams
- Tunnels
- Earthen dams
- Parking garages

Typical Reaction Profile

When mixed at a one to one ratio with water at 77° F the typical initiation time is 30 seconds and full rise is about 6 minutes.

Standard Packaging

JSC Gel Foam is available in 250 gallon totes, 50 gallon drums and 5 gallon pails.

Physical Properties - JSC Gel Foam

Liquid		
	Gel Foam	**Test Method**
Viscosity	400 cps	ASTM D-4016
Specific Gravity	1.16	ASTM D-1475
Color	Pale yellow	
Flash Point	>200ºF	ASTM D-93

Cured		
Elongation	450%	ASTM D-3574
Tensile Strength	1950 psi	ASTM D-3574
Toxicity	Non-toxic	

Read and understand the SDS prior to use.

J-FIRM™ Soil Stabilization Grout

Jennchem's J-FIRM™ Soil Stabilization Grout is a free flowing, low viscosity, sodium silicate grout and hardener that fully encapsulates and hardens loose soil in order to allow for safe excavation. Pumped at a 1:1 ratio, this product will permeate soil and sand to provide consolidation and support. Good for soils with very low void spacing.

Technical Data – J-FIRM™

Physical Properties	JPH Foam Resin
Viscosity (cP, mixed)	5-8
Specific Gravity	1.6
Gel Time (minutes)	30
Compressive Strength (psi, 24 hours)	200

Applications

- Pre-Excavation Grouting
- Temporary Shoring

Advantages

- Pumped out of bulk containers from above ground
- Environmentally friendly
- Low viscosity
- Easy Clean up with water

Packaging

- Tote and truckload quantities

Storage and Shelf-Life

- Storage Temperature: 32-90°F (0-32°C)
- Shelf Life: 1 Year

Mixing

- Parts A and B are pumped at a 1:1 ratio. Part A should be mixed well prior to pumping. The components that comprise Part B should be combined and mixed 30 minutes prior to pumping and mixed again during the pumping process.

Ultra-LOK

Ultra-LOK is a superior two-component urea silicate grout optimized for strength and providing industry leading advancement times.

This grout is designed to secure rock and cable bolts in tunnel and mine applications. It quickly develops a thixotropic characteristic that minimizes free flow but allows continuous, as well as interrupted, pumping overhead.

Cross section of a grouted cable bolt

Applications

- Strata consolidation
- Water control
- Cable grouting
- Bolt grouting
- Rock containment

Advantages

- Optimized for rapid strength development.
- Secures rock and cable bolts in tunnels and mines.
- Thixotropic characteristic allows controlled overhead pumping.

Mechanical Properties	Ultra-Lok 60	Ultra-Lok 240
Pull, tons	>= 1.5 tons/inch (<3 minutes)	>= 1 tons/inch (<10 minutes)
Pull, tons (<24 Hours)	>= 2 tons/inch	>= 2 tons/inch
Compressive, psi	5000	5000
Set Time, mins	1	4-6

Chemical Properties	Part A (Isocyanate)	Part B (Silicate)
Viscosity, cps (@70F)	220	450
Specific Gravity	1.16	1.40
Parts by Volume	50	50
Color	Amber	Slightly yellow
Physical State	Liquid	Liquid

*Pull test results (R32 Bolt - in limestone block)

Product customizable to application needs

MSDS should be read before using Jennchem products

J-PLUG Acrylate Grout

J-PLUG Acrylate Grout is a fast reacting, low viscosity, acrylate polymer that is used to seal water leaks in concrete structures and stabilize soils. J-PLUG utilizes environmentally safe acrylic resins in conjunction with catalysts and accelerators. The system is typically pumped at a ratio of 1:1 (catalyst & water : resin & promoter), when controlling active water leaks and at higher ratios with water when ultra-low viscosity is needed to penetrate fine soil particles. At 1:1 ratio, the resulting product is a flexible elastomer, while at higher ratios of water to catalyst, a pliable gel results.

Applications

J-PLUG is typically used to seal any leak below grade and applications include:

- Tunnels of all types
- Below grade parking garages
- Foundations
- Tanks, sewers, shafts
- Around large diameter pipes, cracked concrete and various failed construction joints.

Advantages

- Super low viscosity
- Easy clean up (soap and water)
- Non Hazardous for shipping
- Non Hazardous when cured
- Economical
- Non-flammable
- Reaction is site *adjustable*

Packaging, Storage and Mixing

J-PLUG Acrylate Grout is supplied in 275 gallon totes, 55 gallon drums and 5 gallon pails. The promoter and catalyst are supplied in plastic containers filled by weight as required. Materials should be stored above 40°F and below 80°F in plastic (or stainless steel) containers at all times and must be kept separated prior to use.

All equipment used to pump J-PLUG must be designed specifically for this acrylic formulation. Stainless steel pumps and equipment are required due to the corrosive nature of the materials. ***Do not use aluminum components***. Catalyst and promoter components may form a toxic gas if mixed prior to field application.

Technical Data – J-PLUG Acrylate Grout

Physical Properties	
Viscosity	5-8 cps mixed
Specific Gravity	1.2
Elongation	300%
Boiling Point	>212°F
Freezing Point	32°F
PH	6.5-7.5

Set Time

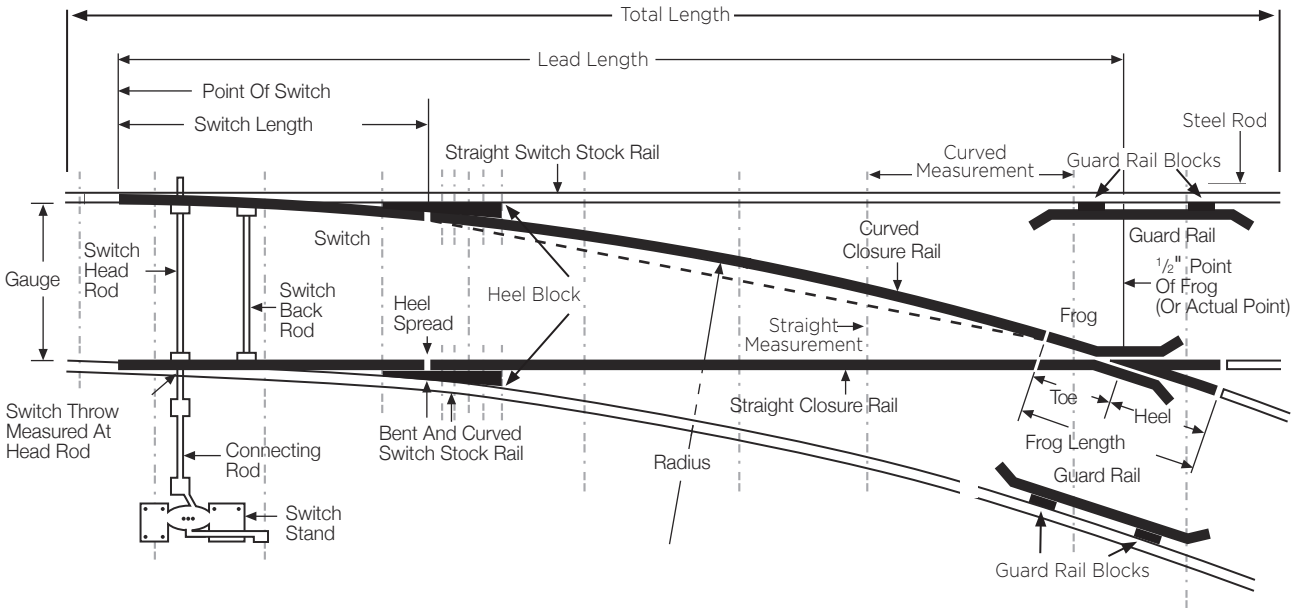
% of complete solution by weight		
Catalyst in Water	Promoter in Resin	Setting Time
0.25	0.25	40 Minutes
0.50	0.50	15 Minutes
1.00	1.00	3 Minutes
2.00	2.00	30 Seconds

Follow manufacturer's instructions carefully during mixing and application. Always wear protective clothing in accordance with current OSHA requirements. Avoid skin and eye contact. Do not ingest. Do not mix catalyst and promoter exclusively from other components.

Handling and Clean Up - Read MSDS and understand safety issues prior to use.

Rail Switch Specifications

Diagram illustrates the principal elements of a turnout which consists of a frog, a switch, two guard rails, straight and curved closure rails, stock rails and a switch stand.



Rail Switch Specifications

Rail Weight	Turn Out Number	Track Gauge	Switch Point Length	Total Length	Lead Length	Curved Measurement	Straight Measurement
40 lb.	#3	42"	5'	Appox. 24' 7"	19'	13' 8.5"	13' 3.5"
60 lb.	#3	42"	5'	Appox. 24'-25'	19'	13' 8.5"	13' 3.25"
60 lb.	#3	44"	5'	Appox. 26'	20'	14' 8.5"	14' 3.5"
60 lb.	#4	44"	7.5'	Appox. 33'	28'	19' 10.25"	19' 6.75"
85 lb.	#3	42"	7.5'	Appox. 27'	21' 4.56"	13' 4.43"	12' 11.56"
85 lb.	#4	42"	7.5'	Approx. 30' 11.81"	25' 4.375"	16' 11.31"	16' 7.75"
85 lb.	#3	44"	7.5'	Approx. 27' 10"	22' 2.56"	14' 2.375"	13' 9.562"
85 lb.	#4	44"	7.5	Approx. 33'	26' 5"	18' .125"	17' 8.375"
115 lb.	#4	47' 6.75"	11'	Approx. 47' 6.75"	33' 2.687"	19' 1"	18' 9.687"

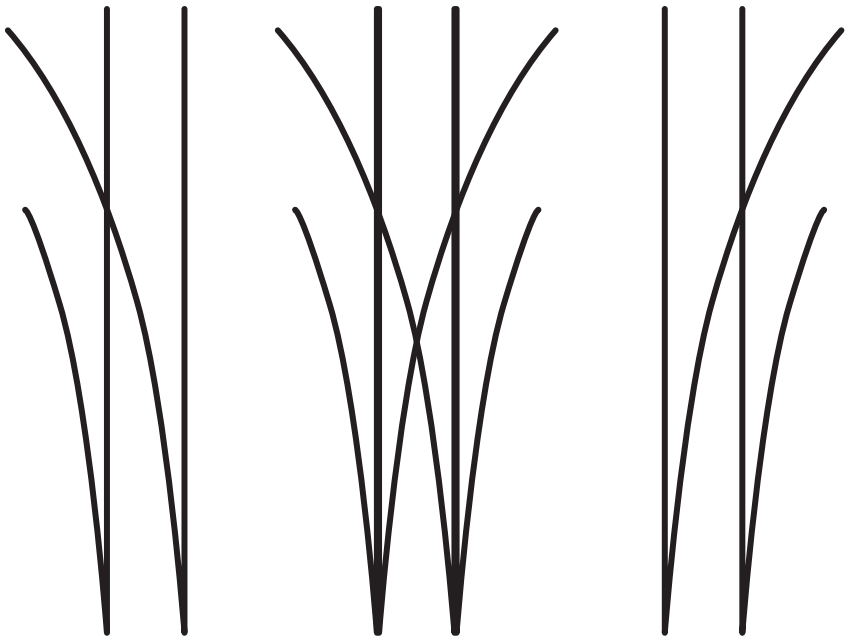
Turnouts - Fully Erected and Knockdown Kits

Turnouts

Jennmar can supply fully erected turnouts, rails and accessories for 40 lb., 60 lb., 85 lb. and 115 lb. light rail trackwork in any gauge. We can also supply you with 60 lb. or 80 lb. knockdown turnout kits on skids. You can specify all individual components from switch points, fittings, switch rods, stands and replacement parts, to complete switches and turnouts, with any selection of combination slide plates and braces, plain plates and accessories.

Available Components

- Frogs
- Frog Bolts
- Switch Points
- Switch Point Protectors
- Gauge Rod 42 to 44 in 4 castings
- Heel Blocks
- Design 11 Switch Stand
- Design 9 Spring Connecting Rods
- Side Jaw Clips
- Guard Rail
- Wheel Stop
- De-railers
- Re-railers
- Rail Benders



Left Hand Turnout | Three-way Turnout | Right Hand Turnout

Fully Erected

Knockdown Turnout Kits on Skids

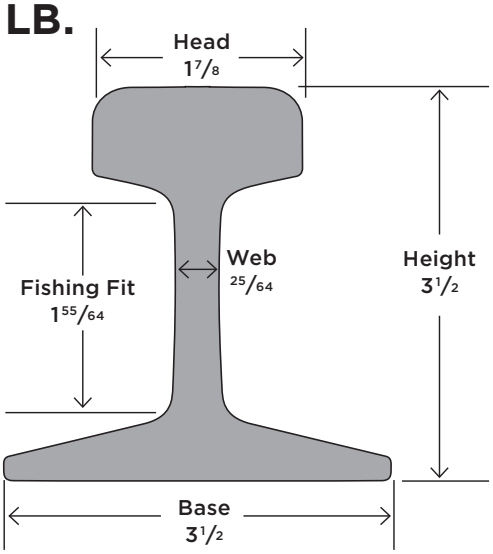
Rail Sections

Rail

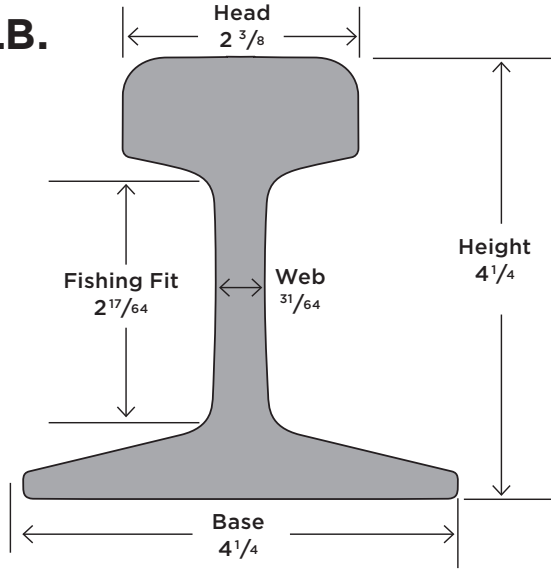
Technical Data — 40 lb, 60 lb, 85 lb and 115 lb Rail

	Standard Length, in.	Standard Drilling, in.	Joint Bar Length, in.	Bolt Diameter, in.	Height, in.	Base, in.	Head, in.	Web, in.	Fishing, in.
40 LB	30 in	2.5 in x 5 in	20 in	.75 in	3.5 in	3.5 in	1.875 in	.3906 in	1.8593 in
60 LB	30, 33, 39 in	2.5 in x 5 in	20 in	.75 in	4.25 in	4.25 in	2.375 in	.4843 in	2.2656 in
85 LB	30, 33, 39, 60 in	2.5 in x 5 in	24 in	.875 in	5.1875 in	5.1875 in	2.5625 in	.5625 in	2.75 in
115 LB	33, 39 in	2.5 in x 6x6 in	36 in	1in	6.625 in	5.5 in	2.7187 in	.625 in	3.8125 in

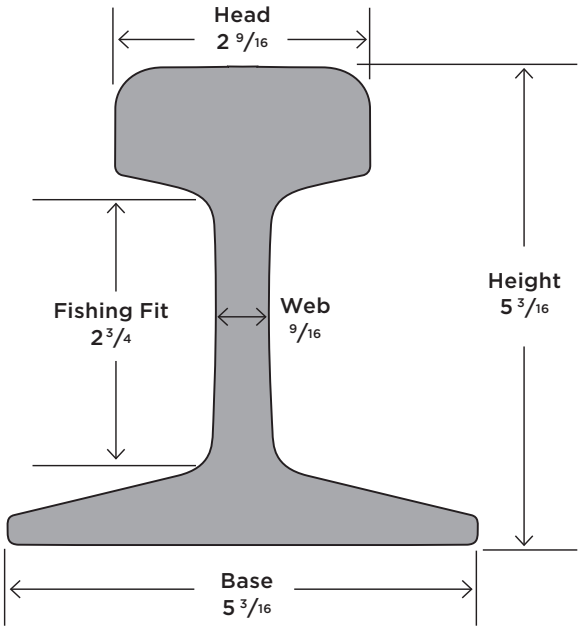
40 LB.



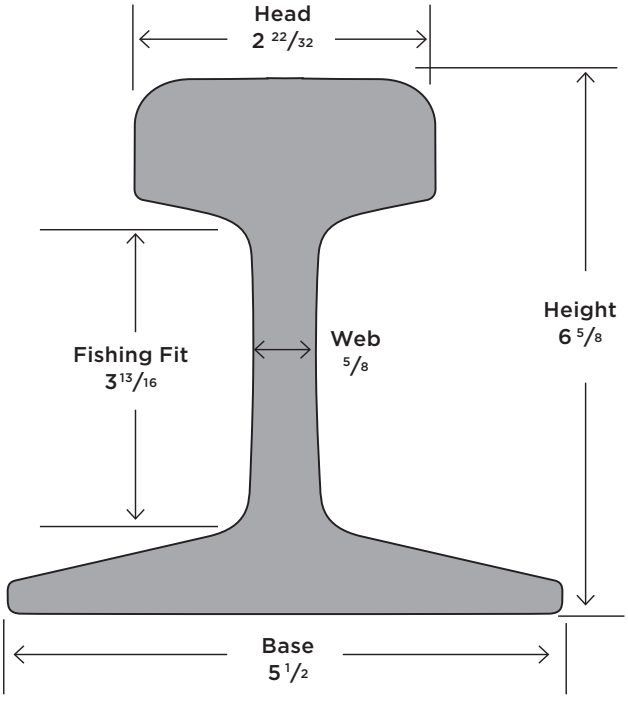
60 LB.



85 LB.



115 LB.

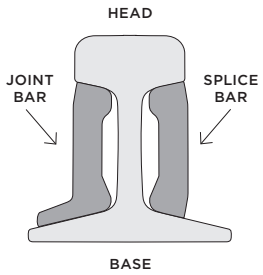


Joint and Compromise Bars

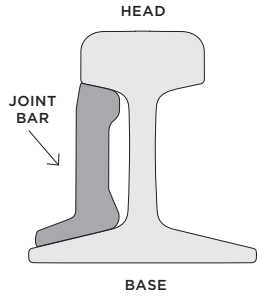
Joint and Splice Bars (Fish Plates)

Jennmar offers a a wide range of rail connector bars including compromise bars, splice bars, and joint bars. Our bars are hot formed with high quality steel for maximum strength.

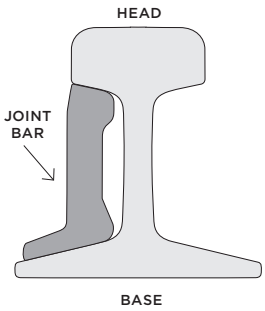
40 LB.



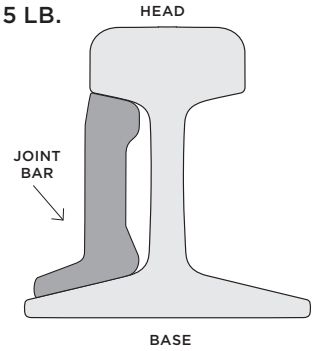
60 LB.



85 LB.

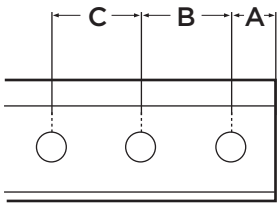


115 LB.

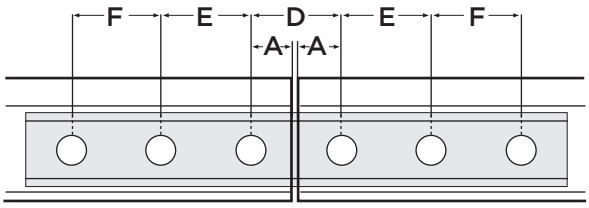


Technical Data — Joint Bar and Splice Bar

	Joint Bar Length, in.	Joint Bar Weight, lb.	Splice Bar Length, in.	Bolt Diameter
40 LB	20 in	15.2 lbs/pr	20 1/8 in	.75 in
60 LB	20 in	27.2 lbs	20 1/8 in	.75 in
85 LB	24 in	49.6 lbs/pr	20 1/8 in	.875 in
115 LB	36 in	105.5 lbs/pr	20 1/8 in	1 in



Rail Drillings



Bar Punchings

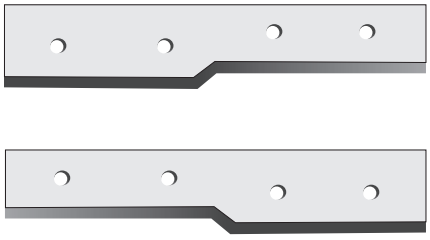
Technical Data — Joint Bar

	Rail Drillings			Bar Punchings		
	A	**B**	**C***	**D**	**E**	**F***
40-85 lb	2 1/2 in	5 in	---	5 1/8 in	5 in	---
115 lb	3 1/2 in	6 in	6 in	7 1/8 in	6 in	6 in

*These dimensions to be omitted doe 4-hole bars.

Compromise Bars

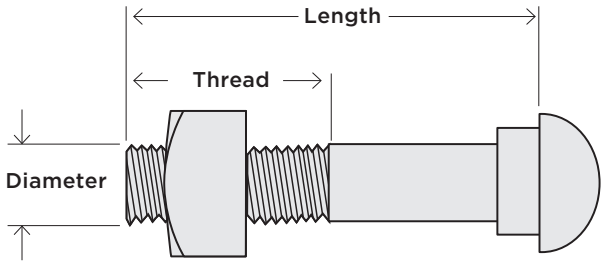
Compromise joint bar is a type of non-standard fish plate consisting of two separate bars— an outside joint bar and an inside joint bar, these bars are designed to smoothly match the gauge-head face of two rails. Each compromise joint bar will provide proper alignment of rails on gauge line and top of head and prevent excessive wear at the joint. They are easy to install and are available in sizes to join 60 lb to 85 lb and join 85 lb to 115 lb combinations of sections.



- Come in pairs
- Bolt holes are alternately round and oval
- Bolts are not provided

Track Bolts and Spikes

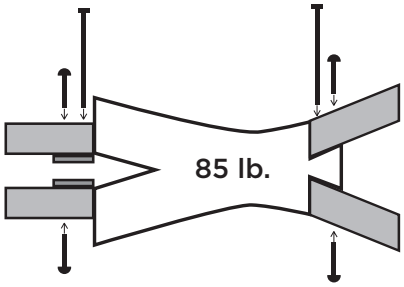
Track Bolts

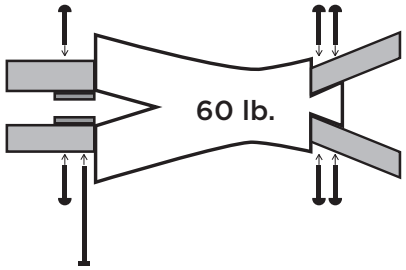


Technical Data — Track Bolts Standard Size

Rail Weight	Diameter, in.	Length	Thread	Avg. Pieces 200 lb keg	Avg. Pieces 50 lb keg
115	1 in	5-1/2 in	2-1/4 in	111	27
85	7/8 in	4-1/2 in	2 in	163	40
60	3/4 in	4 in	1-3/4 in	272	68
40	3/4 in	3-1/2 in	1-3/4 in	293	73

Frog Bolts & Heel Block Bolts

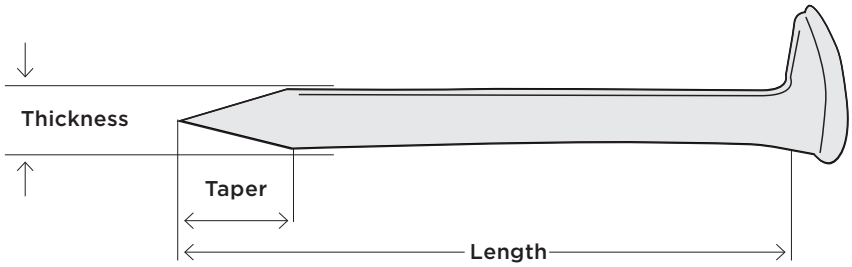




Technical Data — Frog and Heel Block Bolts

Rail Weight		Frog Bolt Length, in.	Pieces	Heel Block Bolt Length, in.	Pieces
85	Button Head	7/8 in x 4-1/2 in, 7/8 x4 in or 7/8 x 11 in	4	7/8 in x 11 in	4
	Square Head	7/8 in x 9 in or 7/8 x 8-1/2 in	2		
60	Button Head	3/4 x 3-1/2 in, 3/4 x 4 in or 3-1/4 x 10 in	6	3/4 x 9 in	4
	Square Head	3/4 x 7 in	1		

Track Spikes



Technical Data — Track Spikes

Rail Weight	Thickness	Length	Taper	Avg. Pieces 200 lb keg	Avg. Pieces 100 lb keg
140-100[1]	5/8 in	6 in	1-1/4 in	244	122
90-80	9/16 in	5-1/2 in	1-1/8 in	322	161
70-40	1/2 in	4-1/2 in	7/8 in	505	252

* Manufactured to AREA and ASTM specifications 1. Note: 100 lb AREA may require a 9/16 inch spike

Rail Ties

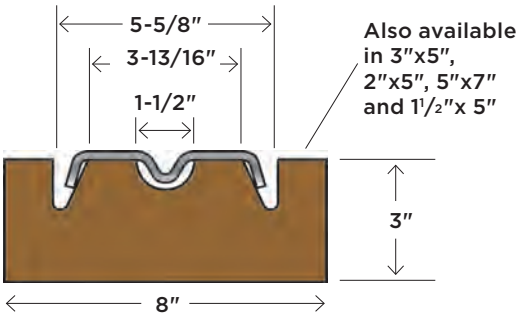
Jennmar offers a complete line of steel and iron clad ties to the mining and tunneling industries. We can engineer our ties to meet your specific haulage application. Our ties can be designed for any type of rail and gauge.

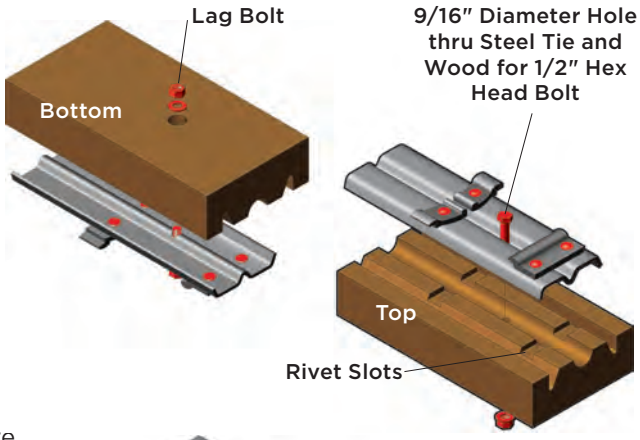
Advantages

- Designed for easy installation
- Lend themselves to the most punishing main line haulage needs
- Do not require constant inspection and maintenance

Iron Clad Ties

Jennmar's Iron Clad Ties have been redesigned to accommodate our new No. 6 shortleg steel tie. The flat section of the top of the tie mates perfectly with the flat section of the top of the wood providing crush resistance exceeding 20,000 lbs.





Steel Ties

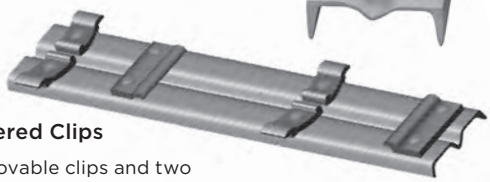
Jennmar steel ties feature special riveted rail clips, are lightweight and easy to handle. Our quality control standards ensure consistent track gauging, and superior strength steel. Our T4, T5 and T6 Shortleg Ties add superior crush resistance.

Jennmar also offers an exceptionally strong T-9 Steel Rail Tie. This design, can be manufactured for any special application. The T-9 is designed for mining and industrial applications such as: coal, hard rock, factories, mills, quarries, tunnel, and various construction projects. This heavy duty design provides long-life use.

- For 30 lb rail and heavier
- Easily installed; manufactured to fit any track gauge; assures exact and constant track gauge
- Readily available from all Jennmar locations

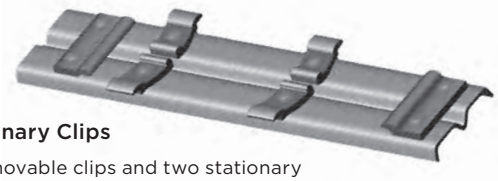
Shortleg Tie

T9



Staggered Clips

Four movable clips and two stationary clips one on the outside end and one on the inside end.



Stationary Clips

Four movable clips and two stationary clips on the outside ends.

Technical Data — Steel Ties

Tie Section	Weight, lb/ft. (kg/m)
T-4	3.85 (5.7)
T-5	5.0 (7.4)
T-6	6.0 (8.9)
T-9	10.5 (15.6)

Tunneling Ties

Our Tunneling Ties are specifically designed for use in tunnel projects where the bottom surface is not flat. These tunneling ties are designed to project specifications for tunnel diameter, wheel load and tie spacing. They can be used without blocking and provide engineering support while maintaining proper track gauge. Axle loads of 45,000 lbs on 30" tie spacing have been successfully implemented.

Clips

Large inventories of rail clips are available for most rail sections.

Tunneling Tie

TURNSTONE INDUSTRIAL SOLUTIONS, LLC.

A joint venture between ABC Technology Group USA and Calandra Group, LLC, Turnstone Industrial Solutions manufactures non-metal structural support systems, flexible ducting and semi-rigid polymer tubing products for mine and tunnel ventilation, industrial flexible ducting for temperature and environmental control, and rapidly-deployable air-stop seals and barriers. ABC Technology Group's vertically-integrated manufacturing experience of high-quality ventilation products, along with the support of Jennmar's and Jennchem's leading sales and service network, offers a comprehensive ventilation product line and application solutions throughout the USA.

Some of the products manufactured and sold by Turnstone Industrial Solutions:

PILLAR BAGS: A range of rapidly deployable cement containment bags used to provide load bearing roof support. Brand: J-CRIB®.

FLEXLINE PERFORMANCE DUCTING®: A range of flexible ducting and accessories for supply, return and exhaust air applications using Hi-Strength fabric material and construction, low-leakage couplings and safe installation solutions. Brands: MineVent®,TwinDuct™, MineDuct®.

HARDLINE PERFORMANCE DUCTING®: A range of low-leakage, low-resistance semi-rigid polymer tubing and accessories for supply, return and exhaust air applications. Brands: HardLine-MAX™, HardLine-COAL™, HardLine-Oval™.

INFLATABLE AIRSTOP: Inflatable and rapidly deployable underground ventilation control, air-stopping and sealing systems and overhead safety solutions. Brands: AirStop™, AirStop-EPASS™, AirStop-OPS™.

Joint Ventures

ROCBOLT Resins

ROCBOLT Resins, a joint venture between SANDVIK and Jennmar, supplies a large proportion of the Australian and SE Asian mining & tunnelling markets with J-LOK Resin and Fasloc resin capsules.

ROCBOLT Resins manufactures a vast portfolio of resin capsules and is extremely flexible in meeting customer requirements in lead time and diversity of product range; ROCBOLT manufacture 6 different speeds, 7 diameters, lengths varying from 300 mm up to 3400 mm in total, with multiple packaging options.

ROCBOLT™ RESINS AUSTRALIA

ROCBOLT™ TECHNOLOGIES CHINA

ROCBOLT™ TECHNOLOGIES SOUTH AFRICA

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