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dywidag.com



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DYWIDAG DYNA Force® System

Fields of Application

- Ground anchors
- Micropiles
- Soil nails
- Cable stayed bridges
- Post-tensioning tendons in bridges and buildings
- · Air traffic control towers
- Wind energy towers
- Repair and strengthening of post-tensioned structures



DYNA FORCE® FOR FORCE MONITORING OF GIRDE TENDONS AT LILLE STADIUM, FRANCE



Introduction of Smart System – DYNA Force®

The force measuring technique is based on the elasto-magnetic properties of ferromagnetic materials and is carried out using DYNA Force® Sensors.

The magnetic permeability of steel in a magnetic field changes as a function of the mechanic normal stress condition of the steel. By measuring the relative change in magnetic permeability, the normal stress in the steel tendon can be determined. The DYNA Force® Monitoring System is based on the principle described above and can be used for bars, strands and wires.

The hollow cylinder monitoring sensors are available in different diameters to suit various bar and strand diameters.

A readout unit measures the magnetic permeability of the steel tendon through the sensor and shows the tendon force. Each DYNA Force[®] Sensor is fitted with an integrated temperature sensor in order to automatically compensate the influence of possible temperature alterations.

The DYNA Force[®] System allows the permanent monitoring of posttensioning forces in steel tendons.

Force readings as part of inspection procedures can be done within a few minutes without the need for lift-off equipment or other cost-intensive techniques.

Key Features and Integration with INFRASTRUCTURE INTELLIGENCE

- Lifetime monitoring of the post-tensioning performance in structures
- · Manual and continuous remote readings
- Load check during stressing
- No large load cell at anchorages and no increased pocket depth
- · Quality and support from the leading industry supplier
- Easy connection with mobile devices by WiFi and (connect) download and control
 option from a remotely located laptop via WiFi or GSM connection
- Sensors and source material (strand/bar) can either be calibrated on site or at factory prior to shipping to the construction site
- Installation of sensors is either done during the production of the anchors or directly at the jobsite before stressing the steel tendon
- · Force and temperature readings by sensor via the readout unit
- Multiple readings of all sensors can be done from a central location with a single click or automatically

INFRASTRUCTURE INTELLIGENCE Main Features

- Highly scalable, robust and secure IoT system
- Sensor agnostic
- Built on Microsoft Azure
- Contextualize complex sites
 - Images
 - Maps
 - Diagrams
- Advanced graphing
- Multiple alerting options
- Data analysis toolsets
- Responsive user interface
- Azure Active Directory security that provides unique user accounts, two factor authentication and the option to integrate with other Active Directory tenants to deliver a single sign-on experience using your existing corporate account
- Multi-layered user and user group security profiles that allow administrators to customise individual user permissions to meet simple or complex requirements





DYNA Force[®] System Components





READOUT UNIT



- Bi-directional automated connectivity with in-field devices
 simplifying data transfer
- Quick and easy addition of manual data (e.g. data files, photographs, engineering drawings and reports) providing supporting information that improves understanding
- In-depth project breakdown structure reducing complexity and aiding understanding of complex sites with multiple monitoring points and high volumes of data
- Powerful and intuitive project dashboard featuring maps, rendered images and photographs of the site location, GPS sensor locations and alert status
- Visual representation of data in graphical, tabular and chart formats with integrated overlaid trigger levels that enhance understanding of site conditions
- Simple and complex triggers providing automated notification of alert and alarm situations to multiple users via email or SMS
- Zoom in to individual data points, compare readings from multiple instruments or export data into excel with the interactive charting engine











DYNA Force® Dimensions

Strand Size		Strand Grade		Sensor I.D.		Senso	or O.D.	Sensor Length		
[in]	[mm]	[ksi]	[MPa]	[in]	[mm]	[in]	[mm]	[in]	[mm]	
0.5" - 0.62"	12.7 - 15.7	270	1,860	0.79	20	1.42	36	5.2	132	
THREADE	BAR [®] Size	THREADB	AR [®] Grade	Sens	or I.D.	Sensor 0.		Sensor	Length	
[in]	[mm]	[ksi]	[MPa]	[in]	[mm]	[in]	[mm]	[in]	[mm]	
#7 - #11	16-35	75-100	517-690	1.69	43	3.15	80	7.90	180	
#14	43	80-100	552-690	2.09	53	3.90	99	7.87	200	
#18 - #20	57-63	80-100	552-690	2.87	73	5.71	145	12.20	310	
#24	75	75-100	517-690	3.35	85	6.10	155	12.99	330	
1" - 1%"	23-36	150	1,034	1.69	43	3.15	80	7.09	180	
1¾"	46	150	1,034	2.09	53	3.90	99	7.87	200	
21/2"	66	150	1,034	2.87	73	5.71	145	12.20	310	
3"	75	150	1,034	3.35	85	6.10	155	12.99	330	

DYNA Force® over the entire tendon is custom made, and dimensions will be provided on request

Multiplexer

steel available

14,000

12.000

10,000

8,000

6,000

4,000

2,000

0

2

z

Readout Unit

Measurement range

- 0-95% yield stress level of the steel tendon
- Power supply
- AC: 90-246 V, 60/50 Hz, 150 W
- DC: 1/24 V
- Solar with DC batteries
- Operating temperature
- 32 °F 158 °F(0 °C 70 °C)
- Temperatures below 32 °F (0 °C)
- are possible using a temperature
- controled enclosure

System Accuracy

- Tests have confirmed the high measuring accuracy of the DYNA Force® Sensors
- The diagram on the right shows the anchor force of a 59-0.6" strand anchor subject to different load levels
- DYNA Force[®] Sensors correspond very closely with the jack readings during the loading stages
- Throughout the testing, the DYNA Force® Sensors were consistently more accurate than the load cells

- Standard multiplexers • 4 channels • 8 channels 12 channels • Serial connection of multiplexers via main cable possible Standard enclosure in case of outside storage: painted steel or stainless
- Cables
- Main cable • 12 pin metal connectors
- PVC jacket Extension cable
- 6 pin plastic connector
- PVC jacket
- Maximum combined cable length
- 650 ft (200 m)



4 Loading Steps

■ Hydraulic Jack/Real Force ■ DYNA Force[®] ■ Load Cell

Smart Bar Anchor with DYNA Force[®] Sensors







DYWIDAG THREADBAR® Anchors

Key Features

- Threadbars with proven coarse DYWIDAG thread along the entire length. Bar length can be adjusted on site without any problems
- Variable anchor head and angle compensation designs
- · Easy handling, tensioning, retensioning or detensioning

DYWIDAG THREADBAR® Anchor - Permanent (DCP)

• Can be utilized for fully or partially removable anchors

- Can be supplied with Double Corrosion Protection (DCP) for permanent
- applications

- **Fields of Application**
- Excavations
- Tiebacks
- · Rock and slope stabilization
- Tiedown anchors

GRADE 150 DYWIDAG THREADBAR® – Prestressing Steel per ASTM A722

THREAD Design	ADBAR [®] Maximum nation THREADBAR [®] Diameter		num DBAR® eter	Minimum Ultimate Tensile Strength (f _u)		Nominal Cross Section Area (A _s)		Minimum Ultimate Tensile Load (f _u x A _s)		Nominal Weight		
in	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m	
1	26	1.20	30	150	1,034	0.85	548	127.5	567	3.01	4.48	
1 ¼	32	1.445	37	150	1,034	1.25	806	187.5	834	4.39	6.53	
1 %	36	1.630	41	150	1,034	1.58	1,019	237.0	1,054	5.56	8.27	
1 34	46	2.08	53	150	1,034	2.58	1,665	387.0	1,721	9.37	13.94	
2 ¼ 1)	57	2.482	63	150	1,034	4.08	2,632	612.0	2,722	14.55	21.65	
2 1/2	65	2.790	71	150	1,034	5.16	3,329	774.0	3,443	18.20	27.08	
3	75	3.146	80	150	1,034	6.85	4,419	1,028	4,571	24.09	35.85	

Note: Maximum allowable temporary test tension is 80% of minimum ultimate tensile load. Mill lengths are 60 ft for 1", 1 ¼", 1 %" and 1 ¾" and 45 ft for 2 ¼", 2 ½" and 3" bars. ¹⁾Threadbar size not listed in the ASTM A 722 but its strength is in conformance with this standard. WARNING: DO NOT WELD on or near A722 prestressing bars or their anchorages.

DYWIDAG THREADBAR® Anchor - Partially Removable





DYWIDAG THREADBAR® Anchor – Temporary



DYWIDAG THREADBAR[®] Anchor – Fully Removable



DYWIDAG Strand Anchors

Permanent (DCP) Anchor - Key Features

- · Long-lasting system for permanent use
- Variable anchor head and angle compensation designs

• Double Corrosion Protection (DCP) is achieved by protecting the strands with

barrier against corrosion. It consists of a corrugated sheathing, a pipe welded to the bearing plate and a cover cap along with encasement in cement grout.

Fields of Application

- Retaining walls
- Rock and slope stabilization
- Tiedown anchors
- Excavations

Fields of Application

Temporary structures

Excavations



Temporary Anchor – Key Features

- Temporary system for a service life of up to two years
- Variable anchor head and angle compensation designs

Wedge Plate Wedge Individually Greased and Plastic Extruded Strands Centralizer Bare Strands Cement Grout **Bearing Plate** Grout Tube

DYWIDAG Strand Anchors Properties

DYWIDAG Strand Anchors utilize 0.6" dia. 7-wire, low relaxation 270 ksi Strand conforming to ASTM A416 (bare strand) or ASTM A882 (epoxy coated strand).

Number	Nomina	l Cross	Ultimate	Strength			Prestress	sing Force			_ Nominal Weight		
Strands	Section A	Area (A _{ps})	(F _{pu})	(A _{ps})	0.80 F,	_{pu} x A _p s	0.70 F	_{pu} x A _p s	0.60 F _r	_{ou} x A _p s	(Bare St	eel only)	
ea	in ²	mm ²	kips	kN	kips	kN	kips	kN	kips	kN	lbs/ft	kg/m	
1	0.217	140	58.6	261	46.9	208	41	182	35.2	156	0.74	1.09	
2	0.434	280	117.2	521	93.7	417	82	365	70.3	313	1.48	1.64	
3	0.651	420	175.8	782	140.6	625	123	547	105.5	469	2.22	3.27	
4	0.868	560	234.4	1,043	187.5	834	164.1	730	140.6	626	2.96	4.46	
5	1.085	700	293.0	1,303	234.4	1,043	205.1	912	175.8	782	3.70	5.51	
6	1.302	840	351.6	1,564	281.3	1,251	246.1	1,095	210.9	938	4.44	6.55	
7	1.519	980	410.2	1,825	328.2	1,460	287.2	1,277	246.2	1,095	5.18	7.74	
8	1.736	1,120	468.8	2,085	375.0	1,668	328.1	1,460	281.3	1,251	5.92	8.78	
9	1.953	1,260	527.4	2,346	421.9	1,877	369.2	1,642	316.4	1,408	6.66	9.97	
12	2.604	1,680	703.2	3,128	562.6	2,503	492.3	2,190	422.0	1,877	8.88	13.24	
15	3.255	2,100	879.0	3,910	703.2	3,128	615.3	2,737	527.4	2,346	11.10	16.52	
19	4.123	2,660	1,113.4	4,953	890.7	3,962	779.4	3,467	668.0	2,972	14.06	20.98	
27	5.859	3,780	1,582.2	7,038	1,265.8	5,631	1,107.6	4,927	949.4	4,223	19.98	29.76	
37	8.029	5,180	2,168.2	9,645	1,734.6	7,716	1,517.8	6,751	1,301.0	5,787	27.38	40.78	
48	10.416	6,720	2,812.8	12,512	2,250.2	10,009	1,968.9	8,758	1,687.7	7,507	35.52	52.83	
54	11.718	7,560	3,164.4	14,076	2,531.5	11,261	2,215.1	9,853	1,898.6	8,446	39.96	59.38	
61	13.237	8,540	3,574.6	15,901	2,859.7	12,721	2,502.2	11,131	2,144.8	9,540	45.14	67.12	

A_{ps} = Area Prestressing Steel.

Fpu = Minimum Ultimate Strength. Please consult your local sales office for systems exceeding 61 strands.

DYWIDAG DCP Strand Anchor and Wedge Plate Dimensions

Strand Range Inside Sheathing ¹⁾	HDPE	E Corrug	jated	Trump	et Pipe		Wedge Dimer	Wedge Plate Dimensions			
ea	Nom. Size in	O.D. in	O.D. mm	O.D. in	O.D. mm	ØG in	ØG mm	H in	H mm		
1-3	2	2.44	62	4.5	114	4.69	119	1.8	46		
4	2.5	2.92	74	4.5	114	4.69	119	1.8	46		
5-6	2.5	2.92	74	4.5	114	5.61	142	2.2	56		
7	3	3.60	91	4.5	114	5.61	142	2.2	56		
8-9	3	3.60	91	5.63	143	5.75	146	1.69	43		
10-12	4	4.60	117	5.63	143	6.75	171	1.95	50		
13-15	4	4.60	117	6.63	168	7.09	180	1.97	50		
16-17	4	4.60	117	8.63	219	7.87	200	2.17	55		
18-19	5	5.85	149	8.63	219	7.87	200	2.17	55		
20-24	5	5.85	149	8.63	219	9.45	240	2.95	75		
25-27	6	6.8	173	8.63	219	9.45	240	2.95	75		

1) Based on the use of a single 0.5" ID x 0.75" OD internal grout tube. Bearing plate sizes subject to project specific requirements.

Strand anchors larger than 27 strand systems also available.

Dimer	sions
ØG	Н
mm	in
110	10



DYWIDAG Soil Nails

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DYWIDAG THREADBAR® Soil Nail with DCP for the Most Aggressive Soil Conditions



DYWIDAG THREADBAR® Soil Nail – Bare, Epoxy Coated or Galvanized



Key Features

 Top-down construction Lower construction costs versus tieback applications walls with soldier beams and lagging Simple components and assembly

GRADE 75, 80 & 100 DYWIDAG THREADBAR® – Reinforcing Steel per ASTM A615

THREA Design	DBAR [®] nation	Maxi THREA Dian	mum JDBAR® neter	Minimum Yield Stress (f _y)		Nominal Cross Section Area (A _s)		Minimum Yield Load (f _y x A _s)		Nominal Weight	
	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m
					Grade 75	5 and 80 1)					
#6	19	0.86	22	75	517	0.44	284	33.0	147	1.50	2.23
#7	22	0.99	25	75	517	0.60	387	45.0	200	2.04	3.04
#8	25	1.12	28	75	517	0.79	510	59.3	264	2.67	3.97
#9	29	1.26	32	75	517	1.00	645	75.0	334	3.40	5.06
#10	32	1.43	36	75	517	1.27	819	95.3	424	4.30	6.40
#11	36	1.61	41	75	517	1.56	1,006	117.0	520	5.31	7.90
#14	43	1.86	47	80	552	2.25	1,452	180.0	801	7.65	11.38
					Grad	de 100					
#6	19	0.86	22	100	689	0.44	284	44.0	196	1.50	2.23
#7	22	0.99	25	100	689	0.60	387	60.0	267	2.04	3.04
#8	25	1.12	28	100	689	0.79	510	79.0	351	2.67	3.97
#9	29	1.26	32	100	689	1.00	645	100.0	445	3.40	5.06
#10	32	1.43	36	100	689	1.27	819	127.0	565	4.30	6.40
#11	36	1.61	41	100	689	1.56	1,006	156.0	694	5.31	7.90
#14	43	1.86	47	100	689	2.25	1,452	225.0	1,001	7.65	11.38

¹⁾ Note: Maximum allowable temporary tension is 90% of minimum yield load. Mill length is 60 ft.





Can be used for temporary and permanent

- · Easy to install and test
- Durable full length threads allow for cutting and coupling the bar at any point along its length



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DYWI® Drill Hollow Bar System

Basic Concept

The DYWI® Drill Hollow Bar System consists of fully threaded steel bar sections, couplers, nuts and drill bits. It can be drilled and grouted into loose or collapsible soil without a casing. The bar sections feature a hollow center that allows for a simultaneous drilling and grouting operation.

The DYWI® Drill Hollow Bar serves as a drill rod. It is fitted with a lost drill bit at the front that can be adapted to different ground conditions. After each single bar section of 1

Shotcrete

DYWI[®] Drill Hollow Bar – Soil Nail

Hex Nut

to 6 m, the subsequent bar is coupled to the previously installed section.

During drilling, cement grout is injected into the hollow core of the bar using an injection adapter that is mounted on the drill rig. The cement grout exits at the bottom end through openings in the drill bit. The injected grout initially serves as slurry to stabilize the borehole and ensures the efficient flushing of the drill spoils. Once the grout reached strength it bonds the bar to the ground.

adjusted to job site requirements on short Once the required installation depth has been notice. reached, the hollow bar serves as a steel

DYWI Drill® Hollow Bar Drill Bit **Cement Grout Bearing Plate Bevel Washers** Coupler Key Features Fields of Application • The tendon simultaneously serves as a drill rod · Slope, embankment and rock stabilization • Extremely fast installation because borehole Shoring and excavations drilling is made redundant by simultaneous Fixation of rock fall mesh Avalanche barriers drilling and grouting • System can be installed in confined spaces Foundations

- utilizing simple and compact drilling equipment
- Variable anchorage and angle compensation designs
- Irregular grout body enhances capacity
- · Drill bits are available for various ground conditions
- · Can be used as a soil nail, rock bolt or a pile

tendon and can carry out its function as a

the grout reaching its required strength.

The comprehensive DYWI® Drill Hollow Bar

System product range offers tendons with

including all system components such as drill bits, couplers, spacers and anchor heads.

Additional installation tools such as injection

adapters can be produced customized or

ultimate loads from 45 kips to 832 kips

soil nail, rock bolt or pile upon

VARIOUS STYLE DRILL BITS FOR DYWI® DRILL

DYWI[®] Drill Hollow Bar – Micropile





DYWI[®] Drill Hollow Bar Properties

Bar Des.	Nomina Dian	al Outer neter	Average Average Yield Ultima Strength Tensil (f _y) Streng (f _u)		rage mate nsile ength f _u)	age nate Average Cross sile Section Area ngth (A _s) ,)		Yield Load (f _y x A _s)		Ultimate Load (f _u x A _s)		Nominal Weight		
	in	mm	ksi	Мра	ksi	Мра	in²	mm²	kips	kN	kips	kN	lbs/ft	kg/m
R25N	1.00	25	90	620	120	830	0.37	240	34	150	45	200	1.28	1.90
R32N	1.26	32	94	650	116	800	0.54	350	52	230	63	280	1.81	2.70
R32S	1.26	32	94	650	120	830	0.67	430	63	280	81	360	2.28	3.40
R38N	1.50	38	97	670	122	840	0.91	590	90	400	112	500	3.16	4.70
R51L	2.00	51	87	600	107	740	1.15	740	101	450	124	550	3.97	5.90
T40N	1.57	40	99	680	123	850	1.19	770	118	525	148	660	4.03	6.00
R51N	2.00	51	97	670	123	850	1.46	940	142	630	180	800	4.97	7.40
T76N	3.00	76	83	570	110	760	3.22	2,080	270	1,200	360	1,600	10.95	16.30
T76S	3.00	76	87	600	112	770	3.81	2,460	337	1,500	427	1,900	12.97	19.30
T103N	4.00	103	81	560	103	710	4.96	3,200	405	1,800	517	2,300	16.80	25.00
T103S	4.00	103	74	510	103	710	8.06	5,200	600	2,670	832	3,700	26.88	40.00

Note: Maximum allowable temporary tension is the yield load. Cross section area is based on average internal diameter of the bar. The ultimate tensile and yield strength are calculated average values. Standard length = 9'-10" (3 m). Other lengths available on special order.



DYWIDAG Micropiles – GEWI® Piles

Basic Concept

A GEWI® Pile is a drilled and grouted micropile, with a diameter of less than 12 inches. It is centrally reinforced with either one or a group of DYWIDAG THREADBARS®. The deformations on the bar transfer the load into the surrounding grout body and friction transfers the load from the grout into the ground.

GEWI® Pile with Single **Corrosion Protection (SCP)**



Key Features

- Compact lightweight drilling equipment allows for pile installation even in areas with low headroom
- Small economic drill hole diameters
- Drill holes can be placed closely to existing walls or structures
- Vibration free drilling prevents damage to adjacent structures

GEWI® Pile with Double **Corrosion Protection (DCP)**



- Double Corrosion Protected (DCP) bars may be utilized for piles in aggressive ground
- · Multiple bars can be installed into a single borehole
- Short bar sections with couplers can be utilized in low headroom locations
- · Continuous, coarse thread allows for rough site handling and for easy on site length adjustments since cutting or coupling of the rod is possible along its entire length



DYWIDAG THREADBAR® Properties

GRADE 75, 80 DYWIDAG THREADBAR® – Reinforcing Steel per ASTM A615

THREA Desigr	THREADBAR [®] Maximum Designation Diameter		Minimum Yield Stress (f _y)		Non Cross Sec (/	ninal ction Area A _s)	Mini Yield (f _y x	mum Load (A _s)	Nominal Weight		
	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m
#6	19	0.86	22	75	517	0.44	284	33.0	147	1.50	2.23
#7	22	0.99	25	75	517	0.60	387	45.0	200	2.04	3.04
#8	25	1.12	28	75	517	0.79	510	59.3	264	2.67	3.97
#9	29	1.26	32	75	517	1.00	645	75.0	334	3.40	5.06
#10	32	1.43	36	75	517	1.27	819	95.3	424	4.30	6.40
#11	36	1.61	41	75	517	1.56	1,006	117.0	520	5.31	7.90
#14	43	1.86	47	80	552	2.25	1,452	180.0	801	7.65	11.38
#18	57	2.50	64	80	552	4.00	2,581	320.0	1,423	13.60	20.24
#20	63	2.72	69	80	552	4.91	3,168	393.0	1,748	16.70	24.85
#24 ¹⁾	75	3.18	81	75	517	7.06	4,555	529.5	2,355	24.09	35.85
#28 ¹⁾	90	3.68	94	75	517	9.62	6,206	721.5	3,209	32.79	48.80

Note: Maximum allowable temporary tension is 90% of minimum yield load. Mill length is 60 ft (#6 through #20) and 53 ft for #24 and #28. ¹⁾ Threadbar sizes not listed by ASTM A 615 but yield strength is in conformance with A615 standard.

GRADE 100 DYWIDAG THREADBAR® Reinforcing Steel per ASTM A615

THREA Desigi	THREADBAR [®] Maximum Designation THREADBAR [®] Diameter		Minimum Yield Stress (f _y)		Nominal Cross Section Area (A _s)		Minimum Yield Load (f _y x A _s)		Nominal Weight		
	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m
#6	19	0.86	22	100	689	0.44	284	44.0	196	1.50	2.23
#7	22	0.99	25	100	689	0.60	387	60.0	267	2.04	3.04
#8	25	1.12	28	100	689	0.79	510	79.0	351	2.67	3.97
#9	29	1.26	32	100	689	1.00	645	100.0	445	3.40	5.06
#10	32	1.43	36	100	689	1.27	819	127.0	565	4.30	6.40
#11	36	1.61	41	100	689	1.56	1,006	156.0	694	5.31	7.90
#14	43	1.86	47	100	689	2.25	1,452	225.0	1,001	7.65	11.38
#18	57	2.50	64	100	689	4.00	2,581	400.0	1,779	13.60	20.24
#20	63	2.72	69	100	689	4.91	3,168	491.0	2,184	16.70	24.85

Note: Maximum allowable temporary tension is 90% of minimum yield load. Mill length is 60 ft.

GRADE 150 DYWIDAG THREADBAR® – Prestressing Steel per ASTM A722

THREADBAR [®] Designation		Maximum THREADBAR [®] Diameter		Minimum Ultimate Tensile Strength (f _u)		Nominal Cross Section Area (A _s)		Minimum Tensile (f _u x	Ultimate e Load (A _s)	Nominal Weight		
in	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m	
1	26	1.20	30	150	1,034	0.85	548	127.5	567	3.01	4.48	
1 1⁄4	32	1.445	37	150	1,034	1.25	806	187.5	834	4.39	6.53	
1 %	36	1.630	41	150	1,034	1.58	1,019	237.0	1,054	5.56	8.27	
1 34	46	2.08	53	150	1,034	2.58	1,665	387.0	1,721	9.37	13.94	
2 ¼ 1)	57	2.482	63	150	1,034	4.08	2,632	612.0	2,722	14.55	21.65	
2 1/2	65	2.790	71	150	1,034	5.16	3,329	774.0	3,443	18.20	27.08	
3	75	3.146	80	150	1,034	6.85	4,419	1,028	4,571	24.09	35.85	

Note: Maximum allowable temporary test tension is 80% of minimum ultimate tensile load. Mill lengths are 60 ft for 1", 1 ¼", 1 ¾" and 1 ¾" and 45 ft for 2 ¼", 2 ½" and 3" bars. ¹⁾ Threadbar size not listed in the ASTM A 722 but its strength is in conformance with this standard. WARNING: DO NOT WELD on or near A722 prestressing bars or their anchorages

DYWIDAG Tie Rods

Key Features

Tie Rods produced from DYWIDAG THREADBAR® are used for marine bulkheads, docking facilities, barge and ship docks as well as offshore platforms. They are a cost effective alternative to large diameter A36 Tie Rods with upset threads.

DYWIDAG Tie Rod with Double Corrosion Protection (DCP)

Recommended for permanent applications in agressive enviroments



Continuous, coarse thread allows for rough

adjustments since cutting or coupling of the

site handling and for easy on site length

rod is possible along its entire length.

Waler Connection

Short bolts are needed to connect a standard sheet pile wall or a modular sheet pile wall to a load distributing double channel beam. This can be done with Grade 75 or Grade 80 DYWIDAG THREADBAR®.

The required length of the bar depends on the depth of the sheet pile profile, the width of the beam, the plate thickness and the nut length.



Tie Rod	Connections
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Features

Anchorages in different variations Articulated

- for steel and concrete structures
- Clevis connection
- Eye anchor connection
- Welded connection
- Embedded connection
- Plate-nut connection
- Angle compensating
- Self-aligning under load Tensionable



GRADE 75, 80 & 100 DYWIDAG THREADBAR® - Reinforcing Steel per ASTM A615

THREADBAR [®] Designation		Maximum THREADBAR [®] Diameter		Minimum Yield Stress (f _y)		Nominal Cross Section Area (A _s)		Minimum Yield Load (f _y x A _s)		Nominal Weight	
	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m
					GRADE	75 and 80					
#6	19	0.86	22	75	517	0.44	284	33.0	147	1.50	2.23
#7	22	0.99	25	75	517	0.60	387	45.0	200	2.04	3.04
#8	25	1.12	28	75	517	0.79	510	59.3	264	2.67	3.97
#9	29	1.26	32	75	517	1.00	645	75.0	334	3.40	5.06
#10	32	1.43	36	75	517	1.27	819	95.3	424	4.30	6.40
#11	36	1.61	41	75	517	1.56	1,006	117.0	520	5.31	7.90
#14	43	1.86	47	80	552	2.25	1,452	180.0	801	7.65	11.38
#18	57	2.50	64	80	552	4.00	2,581	320.0	1,423	13.60	20.24
#20	63	2.72	69	80	552	4.91	3,168	393.0	1,748	16.70	24.85
#24 ¹⁾	75	3.18	81	75	517	7.06	4,555	529.5	2,355	24.09	35.85
#28 ¹⁾	90	3.68	94	75	517	9.62	6,206	721.5	3,209	32.79	48.80
					GRA	DE 100					
#6	19	0.86	22	100	689	0.44	284	44.0	196	1.50	2.23
#7	22	0.99	25	100	689	0.60	387	60.0	267	2.04	3.04
#8	25	1.12	28	100	689	0.79	510	79.0	351	2.67	3.97
#9	29	1.26	32	100	689	1.00	645	100.0	445	3.40	5.06
#10	32	1.43	36	100	689	1.27	819	127.0	565	4.30	6.40
#11	36	1.61	41	100	689	1.56	1,006	156.0	694	5.31	7.90
#14	43	1.86	47	100	689	2.25	1,452	225.0	1,001	7.65	11.38
#18	57	2.50	64	100	689	4.00	2,581	400.0	1,779	13.60	20.24
#20	63	2.72	69	100	689	4.91	3,168	491.0	2,184	16.70	24.85

Note: Maximum allowable temporary tension is 90% of yield load. Mill length is 60 ft (#6 through #20) and 53 ft for #24 and #28. ¹⁾ Threadbar sizes not listed by ASTM A 615 but yield strength is in conformance with A615 standard.

Corrosion Protection Options

Double Corrosion Protection (DCP) Hot dip galvanizing Epoxy coating Tape coating

Couplers and Connections

Coupler



Turnbuckle



Double Eye Anchor Connection





Articulated Connection at Sheet Pile Wall using a Welded Plate and Clevis

²⁰ DYWIDAG THREADBAR[®] Reinforcing Systems

Introduction

DYWIDAG THREADBAR® Reinforcing Steel is available in Grades 75, 80, 100 for sizes #6 through #20, and Grade 75 to #24 and #28. Threadbars conform to the requirements of ASTM A615, except in markings. Threadbars may be shipped to the job in mill lengths or fabricated to specifications.

DYWIDAG THREADBAR® Reinforcing Steel has a continous rolled-in

Advantages of High-Strength THREADBAR® Reinforcement

- Fewer bars to handle
- Less congestion
- Lighter reinforcement assemblies
- Faster construction
- Easy to install coupler system
- Can replace rebar terminator with a bearing
- plate with top and bottom nuts
- installation simpler and faster. And, less congestion results in higher quality concrete placement with reduced risk of consolidation issues. All these advantages result in a reduced volume of steel and shorter
- construction time leading to a lower overall cost of the reinforced concrete structure.

Having to hoist, handle and place a

lower volume of reinforcing steel makes

DYWIDAG THREADBAR[®] Properties – Reinforcing Steel per ASTM A615

THREA Desigr	DBAR [®] nation	Maxi THREA Dian	mum ADBAR® neter	Mini Yield (imum Stress f _y)	Nor Cross Se (/	ninal ction Area A _s)	Mini Yield (f _y)	mum Load k A _s)	Nomina	l Weight
	mm	in	mm	ksi	MPa	in²	mm²	kips	kN	lbs/ft	kg/m
				GR	ADE 75, 80	O THREADE	BAR [®]				
#6	19	0.86	22	75	517	0.44	284	33.0	147	1.50	2.23
#7	22	0.99	25	75	517	0.60	387	45.0	200	2.04	3.04
#8	25	1.12	28	75	517	0.79	510	59.3	264	2.67	3.97
#9	29	1.26	32	75	517	1.00	645	75.0	334	3.40	5.06
#10	32	1.43	36	75	517	1.27	819	95.3	424	4.30	6.40
#11	36	1.61	41	75	517	1.56	1,006	117.0	520	5.31	7.90
#14	43	1.86	47	80	552	2.25	1,452	180.0	801	7.65	11.38
#18	57	2.50	64	80	552	4.00	2,581	320.0	1,423	13.60	20.24
#20	63	2.72	69	80	552	4.91	3,168	393.0	1,748	16.70	24.85
#24 ¹⁾	75	3.18	81	75	517	7.06	4,555	529.5	2,355	24.09	35.85
#28 ¹⁾	90	3.68	94	75	517	9.62	6,206	721.5	3,209	32.79	48.80

GRADE 100 THREADBAR®

_												
	#6	19	0.86	22	100	689	0.44	284	44.0	196	1.50	2.23
	#7	22	0.99	25	100	689	0.60	387	60.0	267	2.04	3.04
	#8	25	1.12	28	100	689	0.79	510	79.0	351	2.67	3.97
	#9	29	1.26	32	100	689	1.00	645	100.0	445	3.40	5.06
	#10	32	1.43	36	100	689	1.27	819	127.0	565	4.30	6.40
	#11 ²⁾	36	1.61	41	100	689	1.56	1,006	156.0	694	5.31	7.90
	#14 ²⁾	43	1.86	47	100	689	2.25	1,452	225.0	1,001	7.65	11.38
	#18 ²⁾	57	2.50	64	100	689	4.00	2,581	400.0	1,779	13.60	20.24
	#20 ²⁾	63	2.72	69	100	689	4.91	3,168	491.0	2,184	16.70	24.85

Note: Mill length is 60 ft (#6 through #20) and 53 ft for #24 and #28.

¹⁾ Threadbar sizes not listed by ASTM A 615 but yield strength is in conformance with A615 standard.

²⁾ #11, #14, #18 and #20 Threadbars and their Couplers have ICC-ES Evaluation Report Approval ESR-3367.

durable than machined threads, the deformations allow nuts couplers to thread onto a Threadbar at any point along its length. Threadbars may be epoxy coated in accordance with ASTM A775 or galvanized in accordance to ASTM A123. Threaded accessories for coated bars thread over the coating.

pattern of thread-like deformations along its entire length. More

Fields of Application

- · Concrete reinforcement
- Micropiles
 - Auger cast piles
- Caissons
 - Drilled shafts

Coupler System

DYWIDAG Couplers and hex nuts develop the full ultimate load of the Threadbar. Slippage of the coupler under stress is controlled by torquing opposing Threadbars together or by using nuts. The magnitude of the torgue required varies with the allowable slip and Threadbar size.

The DYWIDAG THREADBAR® reinforcing system offers a simple, reliable and economical splice. A DYWIDAG splice requires less crane time and less labor time for assembly than required for other splices.





DYWIDAG THREADBAR® - Reinforcing Steel Hardware Dimensions

THREADBAR [®] Designation	Hexnut Length H		Coupler E	Length	Coupler Outer Diameter ØC		
	in	mm	in	mm	in	mm	
	GR	ADE 75, 80	THREADB	AR [®]			
#6	1.43	36	3.12	79	1.22	31	
#7	1.71	43	3.73	95	1.41	36	
#8	1.84	47	4.03	102	1.59	40	
#9	2.30	58	5.02	128	1.79	45	
#10	2.56	65	5.70	145	2.02	51	
#11	2.89	73	6.37	162	2.25	57	
#14	3.55	90	7.82	199	2.65	67	
#18	4.23	107	9.35	237	3.50	89	
#20	4.85	123	10.38	264	3.86	98	
#24	4.10	104	9.20	234	4.75	121	
#28	4.80	122	10.61	269	5.38	137	
	GF	RADE 100 ⁻	THREADBA	R®			
#6	2.88	73	6.25	159	1.25	32	
#7	3.13	80	7.00	178	1.50	38	
#8	3.38	86	7.13	181	1.75	44	
#9	3.50	89	7.25	184	1.88	48	
#10	3.75	95	7.50	191	2.13	54	
#11	3.88	99	8.00	203	2.38	60	
#14	4.50	114	8.25	210	2.75	70	
#18	5.25	133	10.50	267	3.63	92	
#20	6.00	152	12.25	311	4.00	102	

Unlike some splices, the DYWIDAG splice may be installed in adverse weather conditiions and does not create a fire hazard. Opposing Threadbars need only to be chalk marked before assembly to assure proper engagement, supervision and quality control requirements are minimized.

When opposing threadbars are not torqued together, hex nuts will be used on each end of the coupler and tightened against the coupler.

The splice will develop the full ultimate load of the bar in tension and compression.

Coupler with Locknuts

Locknuts can also be used each side end of the coupler similar to hex nuts. The splice will develop the full load ultimate load of the bar in tension and about half the ultimate load in compression.















Get in touch.

For local contact details, please visit our website.



dywidag.com/contact

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