

Products	Building Codes		ACI 318 Type I & Type II									
	Criterion	Strength	Type 1=125% * specified yield strength; Type 2= T1+specified tensile strength.(conforming to 25.5.7) ⁴									
		Agt	6-9% contingent on bar size									
		Low Cycle (Seismic)	AC133, AC347									
		Slip	0.020" – 0.60" @ 50% specified yield									
		High Cycle Fatigue	N/A									
Certification		IAPMO UES ER-0129					IAPMO-UES ER-0188					
Reinforcing Steel	(16-20-22-25-28-32-36-38-40-43-50-57) mm			(16-20-22-25-28-32-36-38-40-43-50-57) mm			(16-20-22-25-28-32-36-38-40-43-50-57) mm			(16-20-22-25-28-32-36-38-40-43-50-57) mm		
	(#4,#5,#6,#8, #7,#9,#10, #11,#14,#18) in			(#4,#5,#6, #7,#8,#9,#10, #11,#14,#18) in			(#4,#5,#6,#8,#9,#10,#16,#18) in			(#4,#5,#6,#8,#9,#10,#16,#18) in		
	ASTM A615			ASTM A706			ASTM A615 Complying to ASTM A970 (Class A & HA)			ASTM A706 Complying to ASTM A970 (Class A & HA)		
	Grade 60 Type I,II	Grade 75 Type I,II	Grade 80 Type I, II	Grade 60 Type I, II	Grade 80 Type I, II	Grade 60	Grade 75	Grade 80	Grade 60	Grade 70	Grade 80	
Standard Coupler A2, A12*		A2, A12	A2, A12	A2, A12	A2, A12	A2, A12	N/A	N/A	N/A	N/A	N/A	N/A
Standard Transition Coupler		A2, A12	A2, A12	A2, A12	A2, A12	A2, A12	N/A	N/A	N/A	N/A	N/A	N/A
Position coupler		P9, P8 Except #4	P9, P8 Except #4	P9, P8 Except #4	P9, P8 Except #4	P9, P8 Except #4	N/A	N/A	N/A	N/A	N/A	N/A
Weldable Couplers		C2/C3J	N/A	N/A	C2/C3J	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENTON FORM SAVER(FS), +		FS Except #9 to #18	FS Except #9 to #18	N/A Except #9 to #18	FS Except #9 to #18	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENTON FORM SAVER(SA), A		SA Except #14	SA Except #14	SA Except #14	SA Except #14	SA Except #14	N/A	N/A	N/A	N/A	N/A	N/A
LENTON INTERLOCK Standard Grout-Fill Coupler		LK Except #4,#5	N/A	N/A	LK Except #4,#5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENTON LOCK S-Series		LLS1	N/A	N/A	LLS1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENTON LOCK B-Series		LLB1	LLB1	N/A	LLB1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mechanical Anchor	LENTON TERMINATOR 5X Head Size (Net Area ≥ 4Ab)		N/A	N/A	N/A	N/A	N/A	D6, D16	D6, D16	D6, D16	D6, D16	D6, D16
	LENTON TERMINATOR 10X Head Size (Net Area ≥ 9Ab)		N/A	N/A	N/A	N/A	N/A	D14	D14	D14	D14	D14



LENTON Worldwide Codes and Certifications Matrix

Rebar sizes (10-12-14-16-20-25-32-40-50-57) mm, (ASTM #4,#5,#6,#8,#9,#10,#16,#18) in.

Grade B500B & B500C, ASTM A 615 & ASTM A607 Grade 60, 75 & 80.



Products	Codes	BS8110, EN1992 and national guideline TA1B TA1A and TA1C						NF a -35-020-1		DIN EN 1992				
	Criterion	Strength	TA1A and TA1B ≥ Specified Yield Strength(fy) *(Specified Tensile/Yield Ratio)						Strength	≥ 95%* Actual Tensile Strength(fu)		Strength	≥ 95%*Actual Tensile Strength (fu)and >1.1 specified yield strength (fy).	
		Agt	2%						Agt	Minimum Specified Agt* of Spliced Bar.		Agt	3% Actual Agt of spliced bar.	
		Low Cycle (Seismic)	TA1C 100 cycles @ 5%-90% fyk						Low Cycle (Seismic)	Optional per NF a-35-020-1		Low Cycle (Seismic)	N/A	
		Slip	0.1mm@ 65% specified Yield, 1 cycle						Slip	0.1mm@ 60% Specified yield, 3cycle.		Slip	0.1mm@60% Specified Yield measured under load	
		High Cycle Fatigue	TA1-A						High Cycle Fatigue	optional fatigue curve (static application includes 60MPa @ 2 10^6)		High Cycle Fatigue	optional fatigue curve (static application includes 60MPa @ 2 10^6)	
	Certification	CARES TA1B; Static application, applicable for reinforcing bar grade B&C TA1A; Dynamic applications (bridge), applicable for reinforcing bar grade B & C TA1C class A & B; Nuclear applications, applicable for reinforcing grade C. bar break is required, not required respectively						AFCAB		DIBt				
	Reinforcing Steel	Complying with the Requirements of BS4449 Grade B500C(10-12-14-16-20-25-32-40-50)mm			Complying with the Requirements of BS4449 Grade B500B & B500C (10-12-14-16-20-25-32-40-50)mm			NF A 35-080-1 grade B500B (10-12-14-16-20-25-32-40)		DIN 488 Grade B500B (10-12-14-16-20-25-28 - 32-40)				
Approval Number	TA1C-5057	TA1C-5003	TA1C-5009	TA1B-5027	TA1B-5029	TA1-A, B&C5025								
Standard Coupler		A12 all sizes except 10, 50mm	A12	A12	A12	A12N	N/A	A12		A12N				
Standard Transition Coupler		A12 all sizes except 10, 50mm	N/A	N/A	N/A	A12N (all sizes except 50mm)	N/A	A12N		A12N				
Position coupler		P13LN P14LN all sizes except 10, 50mm	P13LN P14LN	P13 P14 (all sizes except 10, 50mm)	P13, P14 (all sizes except 10, 50mm)	P13, P14 (all sizes except 10, 50mm)	N/A	P13, P14, P15		P13LN, P14LN, P15				
Position Transition Coupler		P13LN Only sizes 10, 40, 50 mm	N/A	N/A	N/A	N/A	N/A	P13N, P14N, P15N		N/A				
Mechanical Anchor		D14N all sizes except 40, 50mm	N/A	N/A	N/A	N/A	N/A	D14N, D14		D14LN				
Metric Parallel Bolt, Plain WW Design		S13N	N/A	N/A	N/A	N/A	N/A	N/A		S13				
LENTON-LOCK B-S series Shear Bolt Coupler LLB1, LLs1		N/A	N/A	N/A	N/A	N/A	LLB1	LLB1 (Only sizes 10-12-16-20 & 25mm)		N/A				
Weldable Couplers		N/A	N/A	N/A	N/A	N/A	N/A	C12N		N/A				

ISO 15835 International Standard:	
Strength Criterion	Specified Yield Strength (fy)* (Specified Tensile/Yield Ratio)
Agt Criterion	70% Specified Agt.
Low Cycle (Seismic) Criterion	2*106 cycles @60MPa. S1x - u20 ≤0.3mm. S2x -u4 ≤ 0.3mm, u8≤ 0.3mm.
Slip Criterion	100% fu, 70% Ag Rebar, 0.1 mm @ 60% of fy,1 cycle.
High Cycle Fatigue Criterion	60% of Yield Strength (fy) 2 million (MM) cycles @ stress range = 60MPa, upper stress being 300MPa 3.5 MM cycles @ 50MPa, 1MM cycles @ 75MPa, 0.5 MM cycles @ 95MPa Defined S-N curve*

Symbol / Abbreviation Reference		
Symbol	Unit	Designation
A_{gt}^*	%	Percentage total elongation at maximum tensile force, F_{max}
$^*u_4, u_8, u_{20}$	mm	Residual elongation after 4, 8, 20 cycles, respectively
$^*F_{yk}$	MPa	The Specified yield strength
$F_{uk} \& F_u$	MPa	The Specified ultimate tensile strength & The actual tensile strength respectively
$^*S_1, S_2$	N/A	Moderate Scale Earthquake, Violent Earthquake respectively
S-N Curve	N/A	Graphical representation which shows the expected number of cycles a coupler can endure until failure at a specific stress range

ACI 318 Notes & Definitions

Definitions:

Type 1, ACI 318, Section 18.2.7(a) – A Type 1 mechanical splice shall develop in tension or compression, as required, at least 1.25fy of the spliced bar.(1.25fy=125% of the specified yield strength).

Type 2, ACI 318, Section 18.2.7 (b)- A Type 2 mechanical splice shall meet the requirements of Type 1 AND shall be capable of developing the specified tensile strength of the spliced bar (fu).

1Ksi=1,000psi.

ACI 349/359 (Nuclear Requirements), Static – 125%fyk, 100%fuk. Σavg

ACI 349/359 (Nuclear Requirements), Static – 125%fyv, 100%fuk. $\Sigma avg \geq 90\% fu$, Cold Temperature (20oF,-7oC).

Cyclic Performance – 100 cycles @ 90%-5% f_{uk}

Notes:

*ACI 318 has not yet fully defined the performance requirements for this type and grade of reinforcing steel.

+ LENTON FROM SAVER (FS) is a friction forged reinforcing steel assembly. These assemblies are only available through Pentair Regional Manufacturing Center(RMC)

Δ LENTON FORM SAVER (SA) is a standard coupler with a mounting plate.

*LENTON Mechanical Couplers may be used on epoxy-coated or galvanized bars in accordance with ASTM A775 or A934 as long as the coating or galvanizing process is conducted prior to rebar threading. All threads of rebar are to be free of

LENTON TERMINATOR Notes

Notes:

LENTON TERMINATOR headed bar systems comply with the requirements of 2009, 2012 and 2015 editions of ASTM A970 Class A.

The D6, D14, and D16 families of LENTON TERMINATOR meeting all requirements of ASTM A970 Class HA, including head dimensions and tensile requirements.

LENTON TERMINATOR headed bar systems also comply with the requirements of the 2005, 2008, 2011 and 2014 editions of ACI 318 and the 2006, 2009, 2012 and 2015 editions of IBC.

Definitions:

Ab= Area of the bar (rebar), Net Area= The full area of the LENTON TERMINATOR head minus the area of the bar.

ASTM A970/A070M Tensile Requirements:

Class A and HA - Develop the minimum specified tensile strength of the reinforcing bar.

Class B - Develop the minimum specified tensile strength and the minimum specified elongation of the reinforcing bar. Contact your Pentair representative to discuss the correct product/process to meet ASTM A970 Class B

ASTM A970/A070M - 15 Class HA Head Dimensions:

The net bearing area of the head shall not be less than four times the nominal cross-sectional area of the bar.

Project Specifications:

Headed Bars shall be of the LENTON type, taper-threaded and positive locking. Headed bars shall be classified as Class HA per ASTM A970, Appendix A1, shall be capable of developing 100% of the specified tensile strength (f_u) of the reinforcing bar, and shall be manufactured to conform to the specifications of Appendix A1.

Design to meet. (Please see LENTON Mechanical Splice Performance Matrix for ASTM Reinforcing Steel).

The A32K family of LENTON Standard Coupler meeting all requirements of ASTM A1035 type I,II for grade 100 & 120.

The A22 family of LENTON Standard Coupler meeting all the requirements of ASTM A615 & ASTM 706 type I,II.

The P13L, P14L & P24L families of LENTON Position Coupler all the requirements of ASTM A615 & A706 Grade 60,75 , 80 and 100.

25.5.7 Mechanical and welded splices of deformed bars in tension or compression

25.5.7.1 A mechanical or welded splice shall develop in tension or compression, as required, at least 1.25fy of the bar.

25.5.7.3 Mechanical or welded splices need not be staggered except as required by 25.5.7.4.

25.5.7.4 Splices in tension tie members shall be made with mechanical or welded splice in accordance with 25.5.7.1. Splices in adjacent bars shall be staggered at least 30 in.