



L/R-PC

P.C.강연선

***Low Relaxation
Prestressed Concrete***



Young Heung

인사말씀

Greeting

지난 70년대 영흥철강주식회사를 설립한 이후 오늘에 이르기까지 한국의 선재업계를 선도해 온 영흥철강은 정직, 창의, 봉사라는 사훈으로 기업의 자세를 꾸준히 지켜 왔습니다.

당사는 현재 최신식 현대설비와 뛰어난 기술인력, 고도로 축적된 기술을 바탕으로 L/R-PC를 생산, 최상의 품질을 위해 끊임없이 노력하고 있습니다.

이제 고객 여러분들의 이러한 사랑과 지도를 바탕으로 2005년 한국철강(Kisco)의 계열사로 새롭게 거듭난 영흥철강은 국내 철강업계의 선두주자로서 확고한 위치를 굳히고 있으며, 세계 유수의 종합철강회사로 도약하고자 합니다.

밝아오는 21세기를 위한 노력! 그것은 수출 한국의 주도적 역할을 담당하여 국민의 기업으로 거듭나는 약속이며, 보다 윤택한 사회건설의 주역으로서 그동안 많은 격려와 성원을 보내주신 여러분에 대한 보답입니다.

최상의 품질과 서비스로 세계와 겨루는 영흥철강의 노력을 계속 지켜봐 주시길 바랍니다.

YOUNG HEUNG IRON & STEEL CO.,LTD. leading the highest position in the field of steel wire, has been steadily retaining valuable fame under the motto of company is called HONESTY, ORIGINALITY, SERVICE since it was established in 1977. YOUNG HEUNG IRON & STEEL CO.,LTD. has been taking pains continuously to reach the highest quality on the basis of high-qualified engineers and accumulated prominent technology as it is released new product, L/R-PC.

YOUNG HEUNG IRON & STEEL CO.,LTD. newly revived as a subsidiary company of KISCO in 2005, is trying to take a further step to become an international prominent complex steel company under our valuable customers' encouragement.

Great challenge for coming 21st century that is our promise to reset up the most reliable company as a leader in the field of export. Also, we will contribute the highest quality and the most valuable service to our customers in return for our customers' encouragement.

The highest quality, service and ever-lasting respect are yours.

회사연혁

Brief History

1977. 4. 20 : 제초법인 설립 / The Company was established

1979. 9. 01 : KS 획득(와이어로프, 경강선) / Approval of Korean Industrial Standard (Wire Rope & Hard Drawn Steel Wire)

1983. 12. 27 : KS 획득(아연도강연선) / Approval of Korean Industrial Standard (Galv. Steel Wire Strands)

1989. 7. 05 : JIS 획득(와이어로프) / Approval of Japan Industrial Standard (Wire Rope)

1994. 9. 08 : ISO 품질시스템 인증 / Approval of ISO 9001 (LRQA)

1996. 11. 16 : KS 획득(이형 PC 강봉) / Approval of Korean Industrial Standard (Steel Bar for Prestressed Concrete)

1997. 5. 07 : KS 획득(PC 강연선) / Approval of Korean Industrial Standard (7-Wire PC Strand)

1999. 3. 06 : QS 9000 품질시스템 인증 / Approval of QS 9000 (LRQA)

2001. 6. 19 : KS 획득(PC 이형 3연선) / Approval of Korean Industrial Standard (3-Wire PC Strand)

2001. 8. 13 : JIS 획득(PC 강연선) / Approval of Japan Industrial Standard (7-Wire PC Strand)

2004. 4. 28 : JIS 획득(경강선 및 아연도강연선) / Approval of Japan Industrial Standard (Hard Drawn Steel Wire & Galv. Steel Wire Strands)

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Improved Straightness Good preforming for strand
Higher Breaking & Yield Strength
Low Relaxation at elevated temperatures

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Drawing Process



Stranding Process

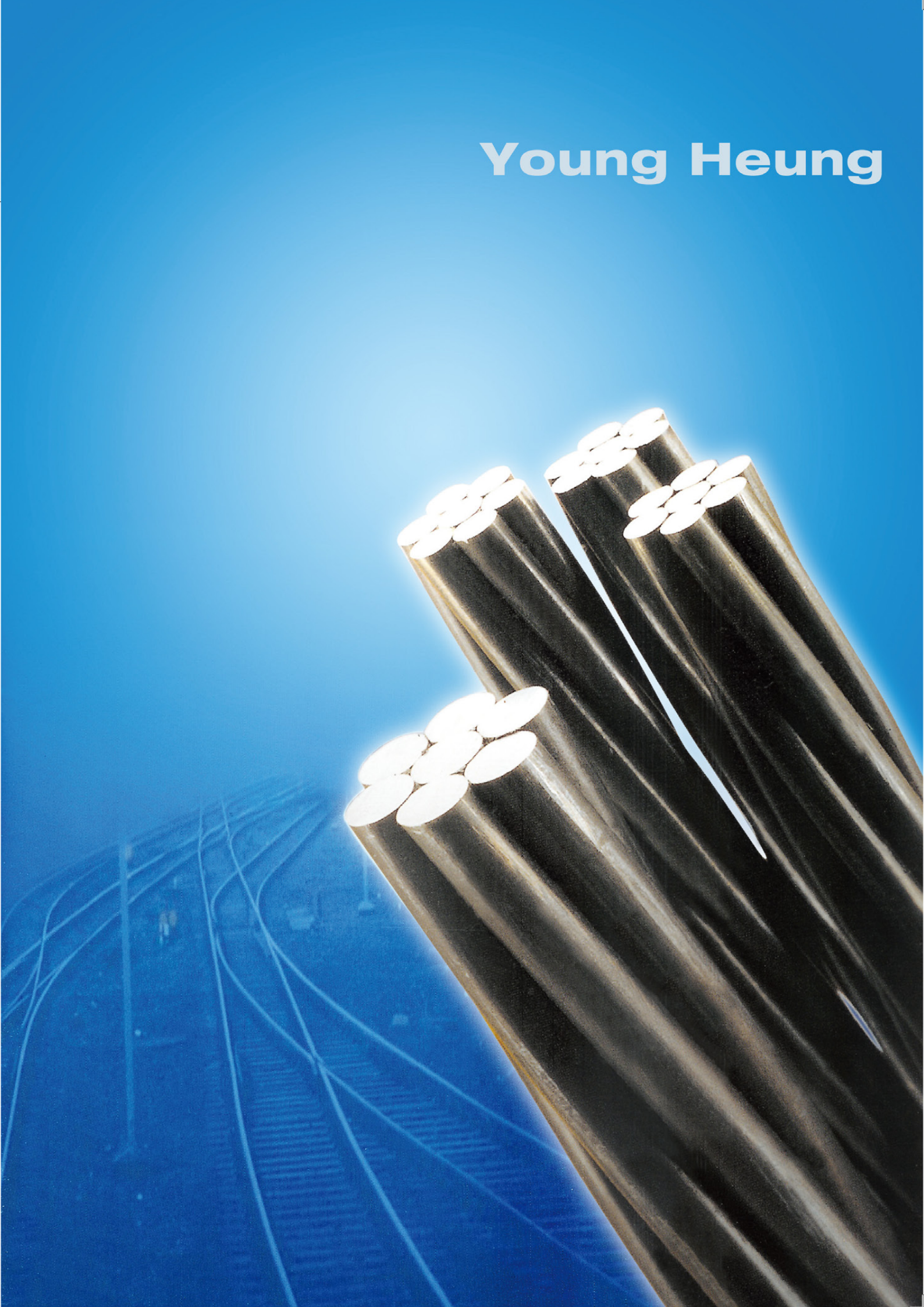


Pulling & Heat Treatment Process



Take-up Process

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USE

PRE-TENSION Pile & Pole, Concrete Slab, Prestressed Concrete Pipe & Tubes, Concrete Railway Sleepers

POST-TENSION Prestressed Concrete Structures, Roofing Structures, Concrete Storage Tank, Concrete Bridges or Viaducts, Concrete Anchor, Atomic Furnac

용도

- 원자력발전소
- 철도침목
- 다리
- 교각
- 고가도로

Low Relaxation 이란?

L/R-PC는 콘크리트 보강용강재로 콘크리트 안에서 긴장시켜 콘크리트 구조물을 보강해주는 목적으로 사용된다. 응력을 받고 콘크리트에 묻혀진 prestressing 강재는 시간의 경과에 따라 적용된 응력값을 지수함수적으로 감소시킨다.

Relaxation은 일정한 길이의 PC강연선을 긴장시켰을때 생기는 응력이완의 정도를 백분율로 표시한 값을 말하며 이 값은 콘크리트 구조물 전체 응력감소량의 약 50% 정도를 차지하므로 매우 중요하다. 물론 이러한 내부응력의 손실은

Prestressed Concrete 구조물의 설계에서 미리 계산되어지지만, 만일 Relaxation에 의해 Stress의 손실이 줄어들수 있다면 이때는 많은 강점이 있을 것이다.

이러한 L/R-PC는 Tension하에서 이루어지는 Stabilizing이라는 특별한 고주파 열처리를 통해 얻어진다.

What is Low Relaxation?

L/R-PC strand is used in order to reinforce the concrete structure.

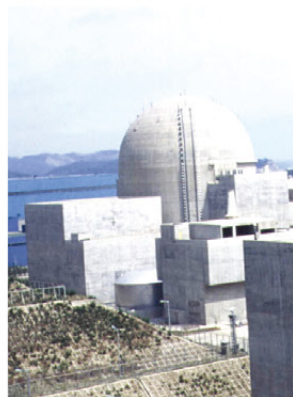
Any prestressing steel, either wire strand and bar, which are stressed and embedded in concrete lose the applied stress exponential function with time.

Relaxation is indicated percentage which is degree of stress loss as P.C strand is pulled.

This rate is the most important, because it is occupied in the design of prestressed concrete structures.

However, stress loss can be reduced due to relaxation.

An additional advantage can be anticipated when L/R-PC strand is subjected to the stabilizing by high frequency heating during the tension process.

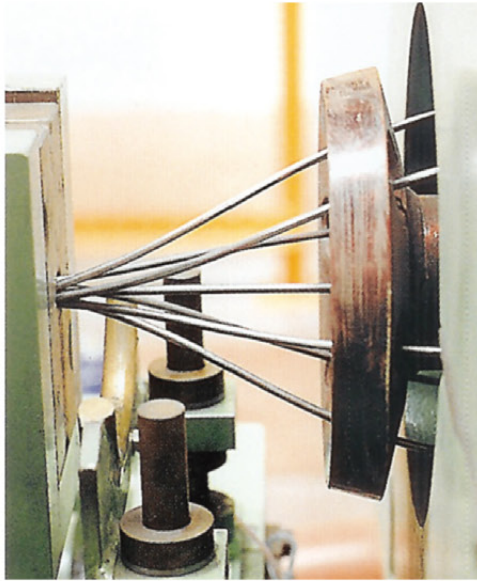


REEL-LESS STANDARD PACKING



Low Relaxation Prestressed

PRODUCT	PACKING STYLE	SIZE		INSIDE DIA APPROX.		WIDTH APPROX.		OUTSIDE DI
		in	mm	in	mm	in	mm	in
7-Wire Strand	REEL-LESS	1/4	6.35	31.5	800	29.5	750	MAX. 55.1
		~ 0.7	~ 17.8	~ 47.2	~ 1200			



Concrete

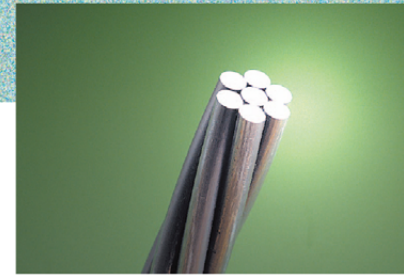
A. APPROX.	WEIGHT PER COIL APPROX.		
	mm	lbs	kgs
MAX. 1400	MAX. 8818	MAX. 4000	



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Low Relaxation Prestressed Concrete

Standard		Nominal Diameter		Tolerance of Diameter		Unit / Weight	
	Grade	inch	mm	inch	mm	lbs/1000ft	kg/km
ASTM A 416-80	250	1/4	6.35	±0.016	±0.41	122	182
		5/16	7.94	±0.016	±0.41	197	294
		3/8	9.53	±0.016	±0.41	272	405
		7/16	11.11	±0.016	±0.41	367	548
		1/2	12.70	±0.016	±0.41	490	730
		0.6	15.24	±0.016	±0.41	737	1094
	270	3/8	9.53	+0.026 -0.006	+0.66 -0.15	290	432
		7/16	11.11	+0.026 -0.006	+0.66 -0.15	390	582
		1/2	12.70	+0.026 -0.006	+0.66 -0.15	520	775
		0.6	15.24	+0.026 -0.006	+0.66 -0.15	740	1102
BS 5896-80	STANDARD	3/8	9.3	+0.012 -0.006	+0.3 -0.15	274	408
		7/16	11.0	+0.012 -0.006	+0.3 -0.15	374	557
		1/2	12.5	+0.016 -0.008	+0.4 -0.2	490	730
		0.6	15.2	+0.016 -0.008	+0.4 -0.2	732	1090
	SUPER	5/16	8.0	+0.012 -0.006	+0.3 -0.15	200	298
		3/8	9.6	+0.012 -0.006	+0.3 -0.15	290	432
		7/16	11.3	+0.012 -0.006	+0.3 -0.15	396	590
		1/2	12.9	+0.016 -0.008	+0.4 -0.2	527	785
		0.6	15.7	+0.016 -0.008	+0.4 -0.2	792	1180
KS D 7002-95 & JIS G 3536-94	SWPC 7AL (SWPR 7AL) (1720N/mm ²)	1/4	6.2	+0.016 -0.008	+0.4 -0.2	122	182
		5/16	7.9	+0.016 -0.008	+0.4 -0.2	196	293
		3/8	9.3	+0.016 -0.008	+0.4 -0.2	272	405
		7/16	10.8	+0.016 -0.008	+0.4 -0.2	366	546
		1/2	12.4	+0.016 -0.008	+0.4 -0.2	489	729
		0.6	15.2	+0.016 -0.008	+0.4 -0.2	739	1101
	SWPC 7BL (SWPR 7BL) (1860N/mm ²)	3/8	9.5	+0.016 -0.008	+0.4 -0.2	290	432
		7/16	11.1	+0.016 -0.008	+0.4 -0.2	389	580
		1/2	12.7	+0.016 -0.008	+0.4 -0.2	520	774
		0.6	15.2	+0.016 -0.008	+0.4 -0.2	739	1101
	SWPC 7CL (2160N/mm ²)	1/2	12.7	+0.016 -0.008	+0.4 -0.2	520	774
		0.6	15.2	+0.016 -0.008	+0.4 -0.2	739	1101



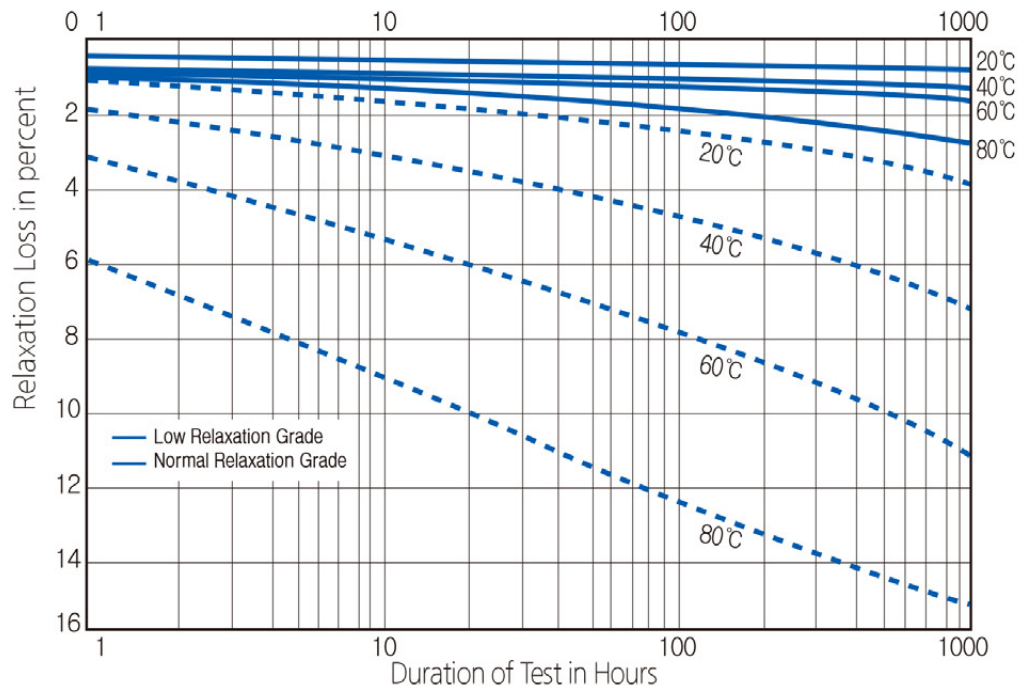
Min. Breaking Load		Min. Load at 0.2% Extension		Min. Elongation in 24 inches	Pitch	Relaxation
lbs	kgs	lbs	kgs	%		
9,000	4,080	7,650	3,470	3.5	12-16D	Max. 2.5% Per 1000 Hr(B.L.* × 0.70)
14,500	6,580	12,300	5,580	3.5	12-16D	
20,000	9,070	17,000	7,710	3.5	12-16D	
27,000	12,250	23,000	10,430	3.5	12-16D	
30,600	16,330	30,600	13,880	3.5	12-16D	
54,000	24,490	45,900	20,820	3.5	12-16D	
23,000	10,430	19,550	8,870	3.5	12-16D	Max. 3.5% Per 1000 Hr(B.L.* × 0.80)
31,000	14,060	26,350	11,950	3.5	12-16D	
41,300	18,370	35,100	15,920	3.5	12-16D	
58,600	26,580	49,800	22,590	3.5	12-16D	
20,680	9,380	18,120	8,260	3.5	12-16D	Max. 2.5% Per 1000 Hr(B.L.* × 0.70)
28,100	12,740	24,730	11,210	3.5	12-16D	
36,870	16,720	32,370	14,680	3.5	12-16D	
52,150	23,650	45,860	20,800	3.5	12-16D	
15,730	7,140	13,170	6,220	3.5	12-16D	Max. 4.5% Per 1000 Hr(B.L.* × 0.80)
22,930	10,400	20,230	9,180	3.5	12-16D	
31,250	14,170	27,420	12,440	3.5	12-16D	
41,810	18,970	36,640	16,620	3.5	12-16D	
59,570	27,020	52,380	23,760	3.5	12-16D	
9,040	4,100	7,600	3,450	3.5	12-16D(18D)	Max. 2.5% Per 1000 Hr(B.L.* × 0.70)
14,550	6,600	12,340	5,600	3.5	12-16D(18D)	
19,950	9,050	16,970	7,700	3.5	12-16D(18D)	
26,890	12,200	22,390	10,400	3.5	12-16D(18D)	
35,390	16,300	30,640	13,900	3.5	12-16D(18D)	
54,010	24,500	45,850	20,800	3.5	12-16D(18D)	
22,930	10,400	19,510	8,850	3.5	12-16D(18D)	
31,080	14,100	26,450	12,000	3.5	12-16D(18D)	
41,220	18,700	35,050	15,900	3.5	12-16D(18D)	
58,640	26,600	49,820	22,600	3.5	12-16D(18D)	
48,000	21,800	40,700	18,500	3.5	12-16D(18D)	
67,400	30,600	57,300	26,000	3.5	12-16D(18D)	

B.L*:Breaking Load

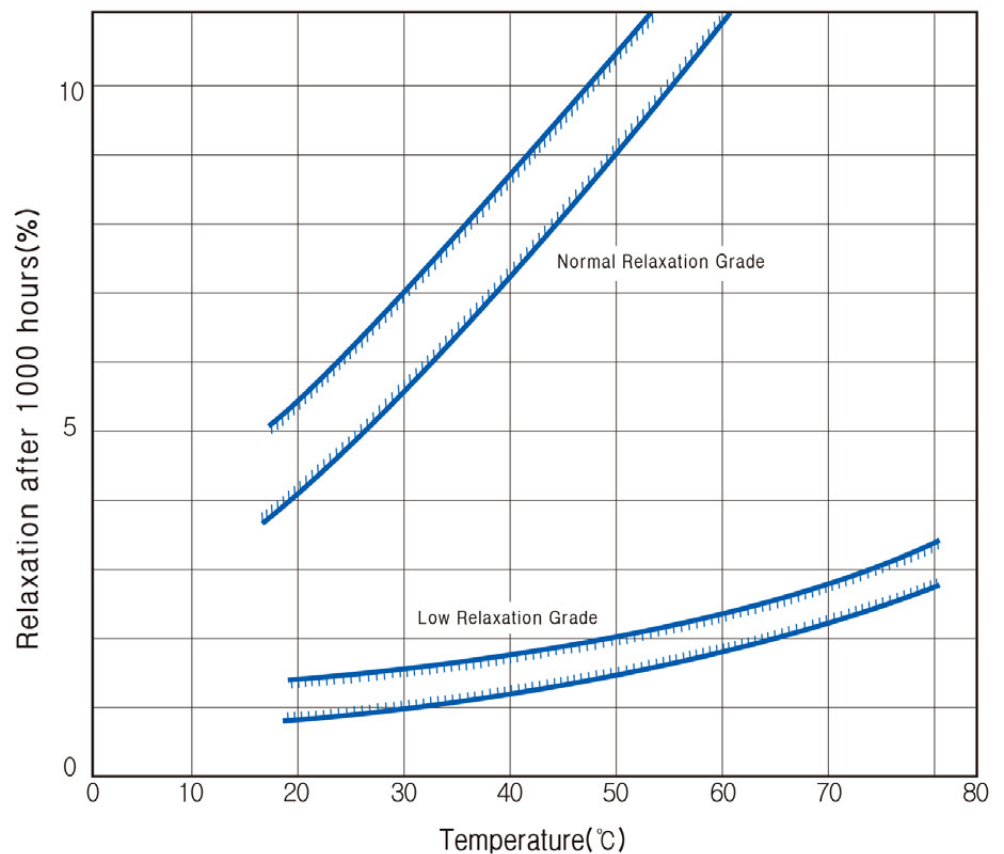
Relaxation의 특징

Relaxation Properties

◎ Examples of Stress Relaxation Curves



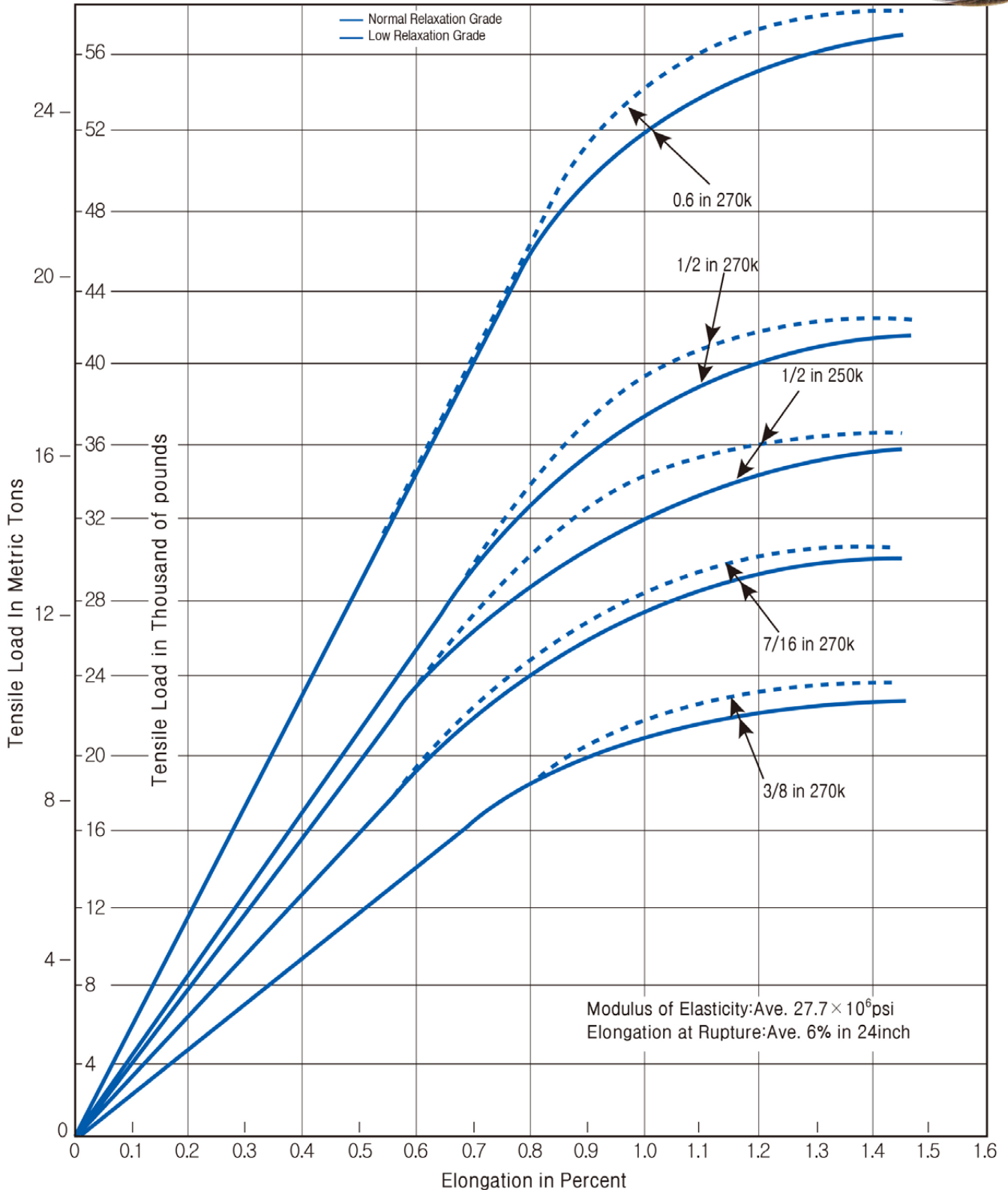
◎ Relation Between Relaxation and Temperature



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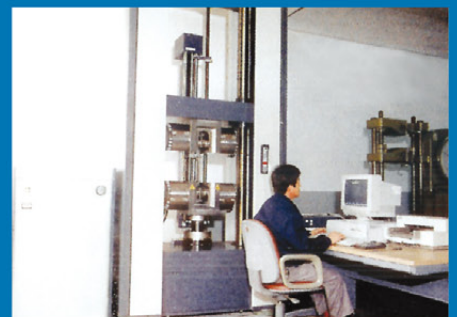
Seven Wire Strand



기술제일주의, 고객제일주의를 향하여!

21세기! 보다 나은 생활, 더욱 윤택한 생활을 위하여 영흥철강은 최첨단 기술과 끊임없는 도전정신으로
기술제일주의, 고객제일주의를 실현하기위해 앞장서고 있습니다.

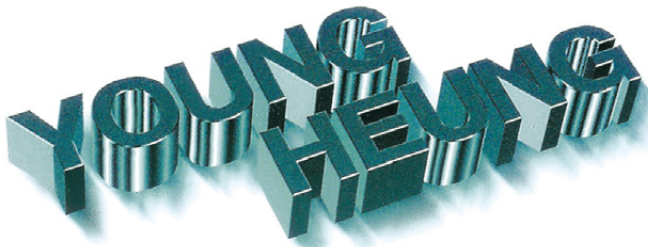
풍요로운 미래를 여는 철강회사의 주역으로 더욱 발전되는 영흥의 모습을 주목해 주십시오.



YOUNG HEUNG IRON & STEEL CO., LTD.



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영흥철강(주) 주요생산품목

- PC 강연선(KS D 7002)/Strands for Prestressed Concrete
- 와이어로프(KS D 3514)/Wire Rope
- 경강선(KS D 3510)/Hard Drawn Steel Wire
- 아연도강연선(KS D 7007)/Galvanized Steel Wire Strands
- 아연도금강선/Galvanized Steel Wire
- Inner Cable & Control Cable
- 항공기용 와이어로프(KS D 7010)/Galvanized Aircraft Cable
- 마봉강(KS D 3561)/Cold Drawn Steel Bar
- IT WIRE / Induction Heated, Quenched & Tempered Wire
- 이형 PC강봉(KS D 3505)/Prestressed Concrete Steel Bar



영흥철강주식회사
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