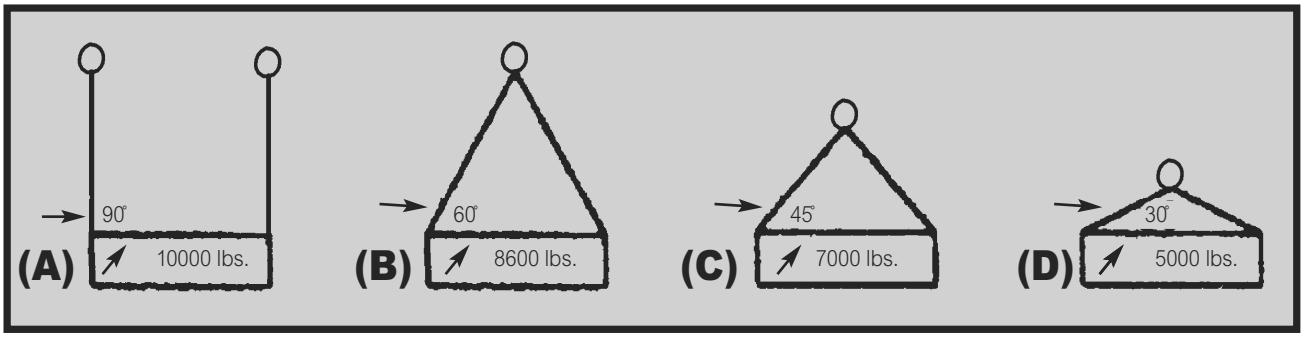
SLING TO LOAD ANGLE EFFICIENCY

1. Sling working load limits whether nylon, wire rope or chain slings are rated with their respective vertical, choker, and basket capacities. When selecting these slings, careful consideration must be made for the proper sling to load horizontal lifting angle. The greater angle to sling configuration will result in a reduction of sling efficiency and a loss of rated work load limits! - **SEE ILLUSTRATION:**



Example: Using the above reference, load lifted is 10,000 lbs.

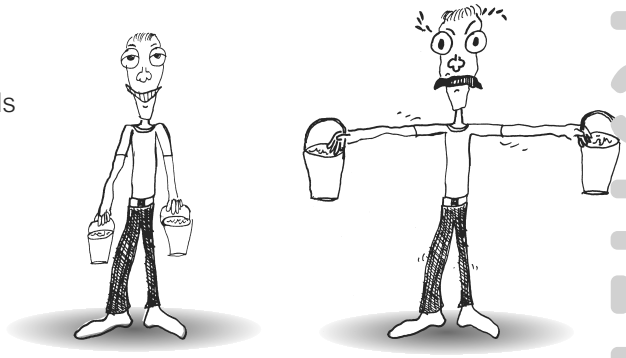
(A) at a 90° sling to load angle the sling is at 100% of the WLL.

(B) at a 60° sling to load angle a **loss of 14%** efficiency occurs and the sling is capable of lifting only 8,600 lbs.

(C) at a 45° sling to load angle a **loss of 30%** efficiency occurs and the sling is capable of lifting only 7,000 lbs.

(D) at a 30° sling to load angle the working load limit is **reduced by 50%** and the sling is capable of lifting only 5,000 lbs.

2. To further illustrate the stress to load angle perform the following experiment. Take two pails and fill each full of water. Pick them up and evenly hold at your side. You will experience very little or no stress. Now raise your arms up to shoulder height, and hold steady for as long as you can. You have just experienced a change of stress to load angle lifting!



3. <u>ALWAYS</u> use a larger angle of lift when selecting your sling.

4. <u>NEVER</u> use less than a 30° sling to load lifting angle.

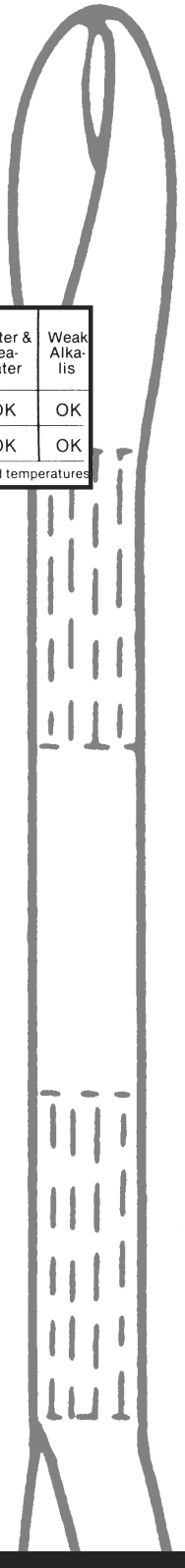
LOAD ANGLE EFFICIENCY		
HORIZONTAL LIFT ANGLE	**EFFICIENCY RATING**	**LOSS OF RATING**
90°	100%	0%
80°	98%	2%
70°	94%	6%
60°	86%	14%
50°	76%	24%
45°	70%	30%
40°	64%	36%
30°	50%	50%

ANGLE EFFICIENCY

SYNTHETIC SLINGS
Nylon, Polyester Web or Polyester Round

Flexibility, weight, strength, and non-marring properties make synthetic slings the most sought after slings for contractors and riggers alike! Because of these inherent features, extreme caution as to selection, care and general use must be exercised. Observe all pertinent instruction provided by OSHA and ASME. Adhere to manufacturers warnings, recommendations and guidelines.
FAILURE TO DO SO COULD RESULT IN INJURY OR DEATH!

Unaffected by grease or oils, plus having a good resistance to chemicals such as ethers, alkalis, and alcohols, the nylon sling is the most widely used and best general purpose sling today. Refer to "Guide Only" and contact manufacturer for additional information.



CHEMICAL ENVIRONMENT DATA - "guide only"

	Acids	Alcohols	Alde-hydes	Strong Alkalis	Bleaching Agents	Dry Cleaning Solvents	Ethers	Halo genated Hydro-Carbons	Hydro-Carbons	Ketones	Oils Crude	Oils lubri-cating	Soap & Deter-gents	Water & Sea-water	Weak Alka-lis
NYLON	NO	OK	OK	OK	NO	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
POLYESTER	*	OK	NO	**	OK	OK	NO	OK	OK	OK	OK	OK	OK	OK	OK

*Disintegrated by concentrated sulfuric acid

**Degraded by strong alkalis at elevated temperatures

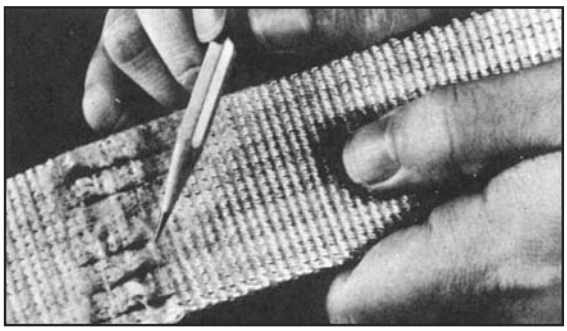
SELECTION/CONSIDERATIONS:

1. Determine the load of lift. Sling selection must be within the work load limits and proper hitches.
2. Adequate sling length must be established for proper sling to load angle consideration. (See sling efficiency chart)
3. Balanced load control not only is essential but critical in preventing slippage and maintaining center of gravity load control!
4. Prior to making lift, calculate and experiment with any sling movement. Failure to balance or control the load will result in damage, injury or death!
5. Refer to environmental chart for proper material selection or contact manufacturer for proper use.
6. Always use wear pads or sleeves to further protect and promote increased sling life.

CARE AND USE:

- Inspect daily before each use.
- Do not drag or pull sling from under load.
- Keep dry and store inside on racks.
- Do not shorten by tying knots, or twisting.
- Never use when temperatures are –40° F or exceed 194° F.
- Stand clear of load at all times.
- Avoid shock loading.
- ID tag must be legible for proper work load limits.
- Consult manufacturer for more information.

Nylon and Polyester feature the advanced process of incorporating a series of red warning markers woven into the core of the webbing. When the sling body or eyes become worn, cut or damaged the red yarn becomes exposed and affords the user the opportunity to remove the sling from service.



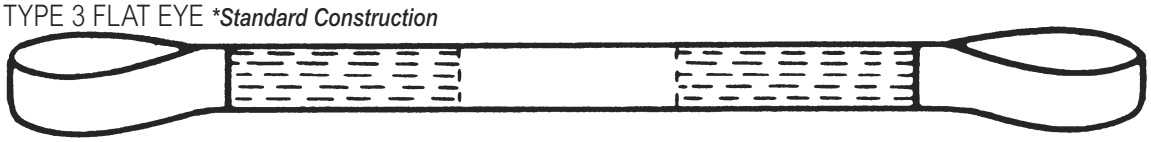
HOW TO ORDER SYNTHETIC SLINGS:

1. Select type of webbing:
   - **a.** 9 – Heavy Duty 900 **b.** 6 – Medium Duty 600
2. State sling width:
   - **a.** 1", 2", 3", etc.
3. Select sling type:
   - **a.** EE – Eye & Eye (Type 3 or 4)
   - **b.** EN – Endless (Type 5)
   - **c.** RE – Reversed Eye (Type 6)
   - **d.** TC – Triangle / Choker (Type 1)
   - **e.** TT – Triangle / Triangle (Type 2)
4. State number of ply's (thickness):
   - **a.** 1 ply, 2 ply, 3 ply, 4 ply
5. Indicate sling length:
   - **a.** In feet (6 feet, 8 feet, 10 feet, etc)

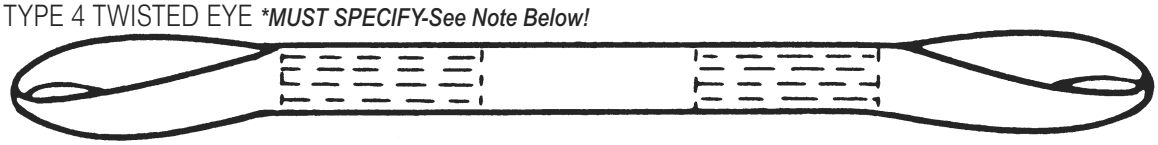
Example: 9 2 E E 1 X 10 = 2" x 10' heavy duty eye & eye single ply nylon sling
1. 2. 3. 4. 5.

EYE & EYE SLINGS

TYPE 3 FLAT EYE ***Standard Construction***



TYPE 4 TWISTED EYE ***MUST SPECIFY-See Note Below!***



MEDIUM DUTY (600 WEBBING)

WIDTH	ID CODE	PLY	RATED CAPACITY IN POUNDS VERTICAL	CHOKER	BASKET	INSIDE EYE SIZE LAYING FLAT	WEIGHT IN LBS. 5' base	add/ft
1"	61EE1	1	1200	900	2400	9"	.40	.043
1"	61EE2	2	2400	1900	4800	9"	.50	.086
1"	61EE3	3	3600	2900	7200	9"	.68	.129
1"	61EE4	4	4800	3800	9600	9"	.86	.172
1 3/4"	6175EE1	1	2100	1600	4200	9"	.53	.063
1 3/4"	6175EE2	2	4200	3200	8400	9"	.75	.128
2"	62EE1	1	2400	1900	4800	9"	.68	.084
2"	62EE2	2	4800	3800	9600	9"	.95	.168
2"	62EE3	3	7000	5600	14000	12"	1.45	.252
2"	62EE4	4	8900	7100	17800	12"	1.90	.336
3"	63EE1	1	3600	2900	7200	12"	1.14	.140
3"	63EE2	2	6500	5200	13000	12"	1.63	.280
3"	63EE3	3	10000	8000	20000	15"	2.43	.420
3"	63EE4	4	13300	10700	26600	15"	3.23	.560
4"	64EE1	1	4800	3800	9600	12"	1.40	.172
4"	64EE2	2	8600	6900	17200	12"	1.99	.344
4"	64EE3	3	13000	10400	26000	15"	3.05	.516
4"	64EE4	4	17000	13800	34000	15"	4.10	.688
6"	66EE1	1	7200	5800	14400	12"	2.13	.255
6"	66EE2	2	12200	9800	24400	15"	2.90	.510
6"	66EE3	3	18400	14700	36800	18"	4.33	.765
6"	66EE4	4	24000	19200	48000	18"	5.77	1.020

Observe rated capacity.

WARNING!

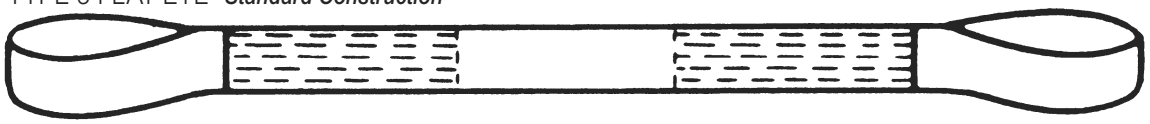
Work load limits will be reduced when less than 90° from horizontal (See Efficiency Chart) Angles of less than 30° are not to be used. Inspect before use. Additional requirements and safe operating practices are outlined in current OSHA, Federal Register Part 29, 1910.184 and ASME B30.9 c-2014. **Death or injury can occur from improper use or maintenance!**

NOTE: Standard eye construction is Type 3 flat eyes
When requiring twisted eyes, must specify Type 4
Tapered eyes on all sling widths 3" and larger

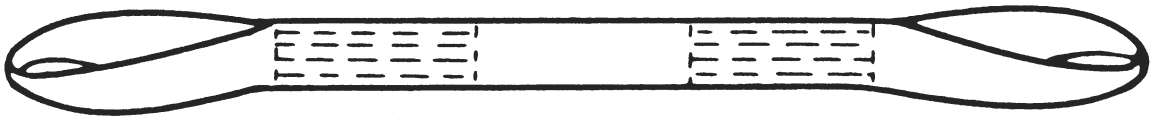
NOTE: Angles of less than 30° will not be used
REFER TO ANGLE EFFICIENCY CHART

EYE & EYE SLINGS

TYPE 3 FLAT EYE **Standard Construction*



TYPE 4 TWISTED EYE **MUST SPECIFY-See Note Below!*



HEAVY DUTY (900 WEBBING)

WIDTH	ID CODE	PLY	RATED CAPACITY IN POUNDS			INSIDE EYE SIZE LAYING FLAT	WEIGHT IN LBS.	
			VERTICAL	CHOKER	BASKET		5' base	add/ft
1”	91EE1	1	1600	1200	3200	9”	.42	.056
1”	91EE2	2	3200	2600	6400	9”	.68	.112
1”	91EE3	3	4100	3300	8200	9”	1.00	.160
1”	91EE4	4	5500	4400	11000	9”	1.30	.224
2”	92EE1	1	3200	2500	6400	9”	.84	.110
2”	92EE2	2	6400	5100	12800	9”	1.30	.220
2”	92EE3	3	8200	6600	16400	12”	1.90	.330
2”	92EE4	4	11000	8800	22000	12”	2.50	.440
3”	93EE1	1	4800	3800	9600	12”	1.40	.180
3”	93EE2	2	8900	7200	17800	12”	2.16	.350
3”	93EE3	3	12300	9900	24600	15”	3.13	.520
3”	93EE4	4	17800	14400	35600	15”	4.10	.700
4”	94EE1	1	6400	5100	12800	12”	1.75	.222
4”	94EE2	2	11500	9200	23000	12”	2.45	.444
4”	94EE3	3	15300	12200	30600	15”	3.85	.666
4”	94EE4	4	23000	18000	46000	15”	5.20	.888
5”	95EE1	1	8000	6400	16000	12”	2.46	.274
5”	95EE2	2	13600	10900	27200	15”	3.28	.548
5”	95EE3	3	19000	15000	38000	18”	4.80	.822
5”	95EE4	4	27200	20400	54400	18”	6.35	1.090
6”	96EE1	1	9600	7700	19200	12”	2.78	.330
6”	96EE2	2	16300	13000	32600	15”	3.78	.662
6”	96EE3	3	23000	18400	46000	18”	5.71	.993
6”	96EE4	4	32600	24500	65200	18”	7.65	1.320
8”	98EE1	1	12800	10200	25600	18”	4.06	.470
8”	98EE2	2	22000	17600	44000	18”	5.47	.960
8”	98EE3	3	33000	24750	66000	24”	8.18	1.410
8”	98EE4	4	44000	33000	88000	24”	10.90	1.880
10”	910EE1	1	16000	12800	32000	18”	5.23	.596
10”	910EE2	2	24000	19200	48000	18”	7.05	1.190
10”	910EE3	3	36000	28800	72000	24”	10.65	1.780
10”	910EE4	4	48000	38400	96000	24”	14.25	2.380
12”	912EE1	1	19200	15360	38400	24”	6.45	.734
12”	912EE2	2	26900	21500	53800	24”	8.67	1.470
12”	912EE3	3	40320	32250	80640	30”	13.33	2.200
12”	912EE4	4	53700	43000	107400	30”	18.00	2.930

NOTE: Standard eye construction is Type 3 flat eyes

When requiring twisted eyes, must specify Type 4
Tapered eyes on all sling widths 3” and larger

NOTE: Angles of less than 30° will not be used
REFER TO ANGLE EFFICIENCY CHART

Observe rated capacity.
WARNING!
Work load limits will be reduced when less than 90° from horizontal (See Efficiency Chart) Angles of less than 30° are not to be used. Inspect before use. Additional requirements and safe operating practices are outlined in current OSHA, Federal Register Part 29, 1910.184 and ASME B30.9 c-2014.
Death or injury can occur from improper use or maintenance!