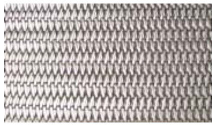
ASHWORTH ENGINEERING

Committed to on-time delivery of defect-free products and services, fit for use, exactly as promised, every time.



TECHNICAL BULLETIN

HIGH TEMPERATURE BELTS & APPLICATIONS

The strength of any metal belt varies with temperature; consideration should always be given to this fact when selecting a belt for an application. However, strength considerations are only part of the equation, when selecting materials for belts, many other factors must be taken into account such as atmosphere, temperature range and the effect of heat on surface condition of the belt. The following guidelines should be considered when selecting a material in conjunction with the 'Strength Factors Chart' for use with Balanced Weave, Double Balanced Weave and Compound Balanced Weave belts.

The following data is intended as a <u>guide only</u>.

Table 1

TYPICAL CHEMICAL COMPOSITION OF ALLOYS USED IN ASHWORTH's METAL BELTS									
Description or Trade Name	**ANSI or Type No.**	**% Nominal Analysis**							**Weight Ratio to Steel**
		Chromium	**Nickel**	**Carbon**	**Silicon**	**Manganese**	**Columbium**	**Other Elements**	
Plain Steel	C1008			0.10 Max.	0.15-0.30	0.30-0.50			1.00
High Carbon	C1040 C1065			0.37-0.44 0.60-0.70	0.15-0.30 0.15-0.30	0.60-0.90 0.60-0.90			1.00
6150 Alloy Mayari 'R*	6150	0.80-1.1 0.40-1.0†	 1.00 Max.†	0.48-0.53 120 Max.	0.20-0.35 0.20-0.90	0.70-0.90 0.50-1.00		0.15 V Min. 0.10 Zr Max.	1.00 1.00
3% Chrome		2.75-3.25		0.10-0.15	1.00-1.50	0.40-0.60		0.40-0.60 Mo	1.00
17% Chrome	T430	14.0-18.0		0.12 Max.	1.00 Max.	1.00 Max.			.98
18-8	T304	18.0-20.0	8.0-12.0	0.08 Max.	1.00 Max.	2.00 Max.			1.02
18-12 Mo.	T316	16.0-18.0	10.0-14.0	0.08 Max.	1.00 Max.	2.00 Max.		2.0-3.0 Mo	1.02
Carpenter 20Cb	#20	19.0-21.0	30.0-38.0	0.07 Max.	1.00 Max.	2.00 Max.	8 x C Min. 1.0 Max.	2.0-3.0 Mo 2.0-3.0 Cu	1.02
18-10	T347	17.0-19.0	9.0-13.0	0.08 Max.	1.00 Max.	2.00 Max.	10 x C Min.		1.02
25-12	T309	22.0-24.0	12.0-15.0	0.20 Max.	1.00 Max.	2.00 Max.			1.02
25-20	T310	24.0-26.0	19.0-22.0	0.25 Max.	1.50 Max.	2.00 Max.			1.02
25-20 Si	T314	23.0-26.0	19.0-22.0	0.25 Max.	1.50-3.00	2.00 Max.			0.98
35-19	527	19.0-20.0	34.0-36.0	0.10 Max.	1.25-1.75	1.00 Max.		Bal. Fe	1.01
35-19 Cb	520	21.0-22.0	34.0-36.0	0.10 Max.	1.50-2.50	1.00 Max.	0.75-1.25	Bal. Fe	1.01
72-16 Inconel*	600	14.0-17.0	72.0 Min.	0.15 Max.	0.50 Max.	1.00 Max.		0.50 Cu Max. 6.0-10.0 Fe	1.07
72-16 Cb Inconel*	604	14.0-17.0	Bal.	0.10 Max.	0.75	1.00 Max.	1.75-2.75	0.50 Cu Max. 6.0-10.0 Fe	1.08
80-20 Cb		19.0-20.0	Bal.	0.10 Max.	0.75-1.50	1.00 Max.	0.75-1.25	1.00 Fe Max.	1.07
Hastelloy X		20.5-23.0	Bal.	0.05-0.15	1.00 Max.	1.00 Max.		8.0-10.0 Mo .2-1.0 W 17.0-20.0 Fe .5-2.5 Co	1.05

†Cr + Ni = 1.50 Max.

*Mayari'R is a registered Trademark of Bethlehem Steel Corporation and Inconel is a registered Trademark of INCO Alloys International.

Notes:

1. Applicable to woven wire belts formed into a continuous fabric by inserting a connector into each pair of spirals.
   Applicable belt types:
   - Balanced (B)
   - Double balanced (DB)
   - Unilateral (U)
   - Cleatrac (CTB)
   - Compound balanced (CB)

2. Adjustments:
   - If connector gauge is two or more gauges heavier than the spiral gauge, then use the next larger wire size to estimate the maximum allowable tension.
   - Allowable tension at elevated temperatures = lbs./foot max. allowable tension at room temperature/strength factor.
   - Chart represents single belt. For compound balanced (CB) belts multiply the chart value by the number of elemental belts, the number immediately following CB in the mesh designation.

3. For CB3 and CB5 mesh use the reading from the tension chart, multiply by 3 and 5 respectively then divide by the Strength Factor (from page 3).

MAXIMUM ALLOWABLE TENSION CHART
Curve Values are for Low Carbon Steel

Other Materials	Increase
Low Chrome Alloys	0%
Types 410, 430, 304	10%
Types 309, 314, 330	20%
Nichrome 5 Inconel	20%
High Carbon Steel	33%

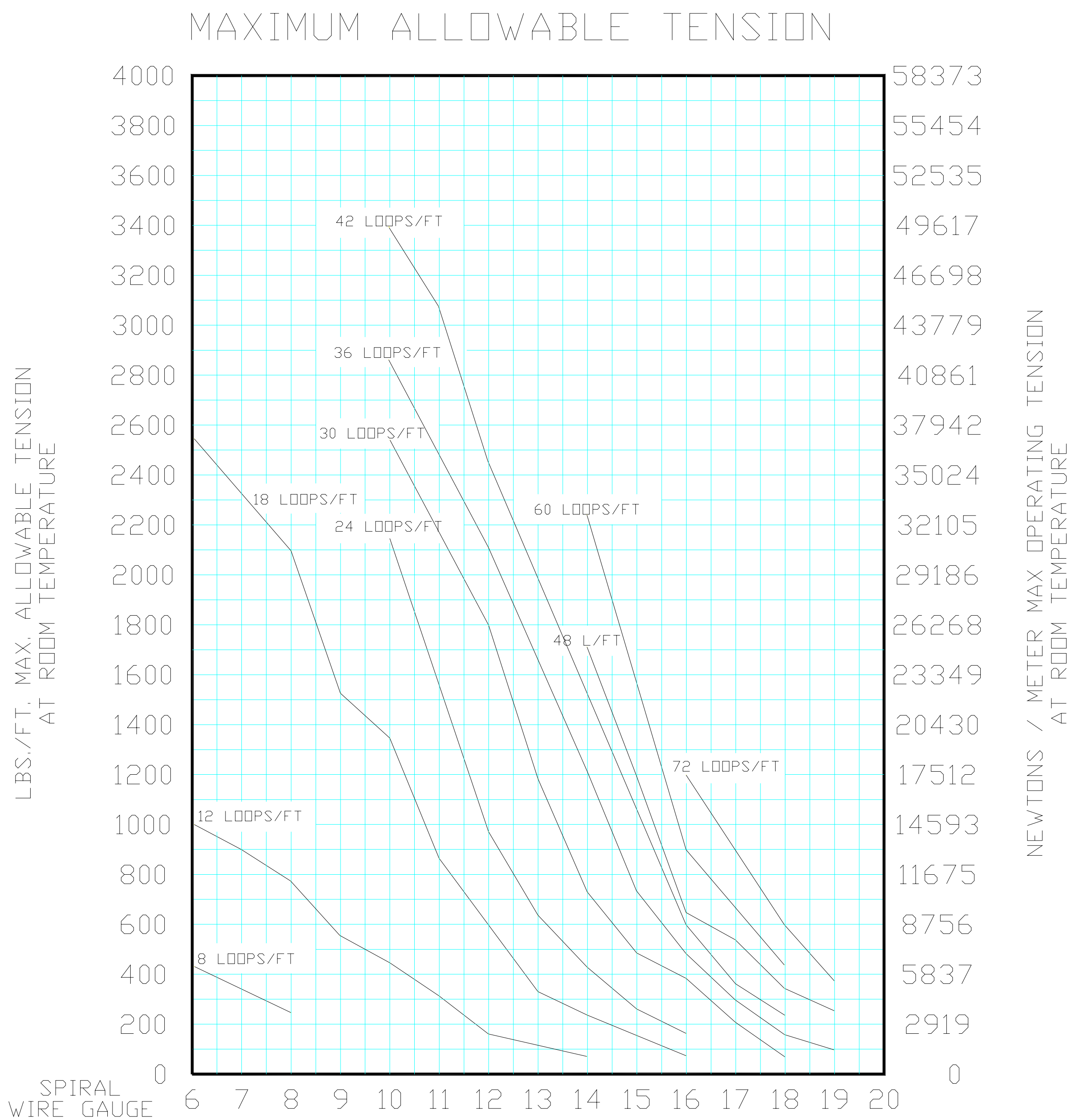


Table 2

Strength Factors for High Temperature Applications Using BW, DB, or CB belts.

	DEGREE F																			
MATERIAL	**500**	**600**	**700**	**750**	**800**	**850**	**900**	**950**	**1000**	**1050**	**1100**	**1150**	**1200**	**1250**	**1300**	**1350**	**1400**	**1425**	**1450**	**1500**
HC	1.1	1.3	1.6	1.9	2.2	2.4	2.6	2.9	3.2	4										
C1040																				
C1065																				
T304	1.8	1.9	2	2.5	**3.4**	**3.8**	**4**	**4.3**	**4.5**	**5**	**5.5**	**6**	**7**	**7.5**	**7.9**	**8**	**9**	**9.2**	**9.5**	**10**
T309											**3.6**	**3.7**	**3.9**	**4.2**	**4.3**	**4.5**	**5**	**6.3**	**7.5**	**10**
T310		**1.3**	**1.35**	**1.37**	**1.4**	**1.41**	**1.42**	**1.46**	**1.5**	**1.6**	**1.7**	**1.8**	**2**	**2.5**	**3**	**3.5**	**4**	**4.3**	**4.6**	**5**
T321									2.9	3.4	3.9	4.4	4.9							
35-19Cb							2	2	2	2	2.3	2.4	2.5	2.6	2.8	2.9	3	3.2	3.3	3.4
T347				2.2	2.3	2.4	2.5	2.6	2.64	2.8	2.9	3.1	3.3	3.6	3.9	4.3	4.5	4.8	5	6
T430		1	1.1	1.15	1.2	1.8	2.4	2.5	3	4	5	6	7	9	11	15	18			
T316L		**1**	**1**	**1.05**	**1.1**	**1.12**	**1.15**	**1.23**	**1.3**	**1.35**	**1.4**	**1.6**	**1.8**	**1.9**	**2**	**2.5**	**3**	**3.5**	**4**	**4.9**
3% Cr					**2.2**	**2.4**	**2.6**	**2.7**	**2.8**	3	3.3	4	5	6	**10**					
MAYARI	1.5	2	2.2	2.3	2.5	2.7	3	3.5	3.8	4.5	5.5									
1% Cr	Not a stock Material									3.65	4	4.4								
T314													**3.7**	**3.9**	**4**	**4.2**	**4.4**	**4.7**	**4.8**	**5**
INCONNEL							1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	3	4

	DEGREE F																			
MATERIAL	**1500**	**1550**	**1575**	**1600**	**1650**	**1700**	**1750**	**1800**	**1850**	**1900**	**1925**	**1950**	**1975**	**2000**	**2025**	**2050**	**2075**	**2100**	**2125**	**2150**
T309	**10**	**15**	17.5	20	26	31														
T310	**5**	**5.5**	5.8	6	7.5	9	11	13	17	20	22.5	25	27.5	29						
T314	**5**	**5.3**	**5.5**	**5.7**	**7**	**8.4**	**10**	**12.3**	**15**	**18**	**19**	**20**	21.3	22.5	24	25	27	30	38	50
35-19Cb	3.4	3.7	3.9	4	5	6	9	10	13	16.1	17.6	19	20.5	22	23	24	**25**	**26**	**40**	**52**
Nich V					8.3	10	12	14	15	16	17.4	18.5	20	21	22	23	24	25	30	40
T347	6	7.5	9	10	11	13	13.4													
Inconnel	4	5	6	7	8	9.2	11	13	**16**	**17**	**18**	**19**	**20**	**22**	**23**	**24**	**25**	**26**	**40**	
Nich VI	5.5	7	8	9	10.5	12	14	16	18	20	21.5	23	24.5	26	28	30	33	35	38	40
T316L	4.9	7.5	8.8	10																
Hastelloy							7	8	9	10	11	12	13	14	15	16	18	21	26	36

Allowable Tension at Elevated Temperatures = Allowable Tension @ Room Temperature (CH60)/Strength Factor

See Page 4 for Notes:

- (magenta) = See note 1.
- (yellow) = See note 2.
- (green) = See note 3.
- (grey) = See note 4.
- (cyan) = See note 5.
- (red) = See note 6.

High Temperature Belt & Application Notes

1. In the Carbon precipitation range, consider a higher-grade of stainless steel such as T316, or T347 particularly in ornate class Lehr applications.
2. For Lehr applications the belt of choice is predominantly 3% Chrome Carbon Steel; however, at temperatures below 1000°F it would be less expensive to use High Carbon Steel.
3. 3% Chrome is prone to oxidization at this temperature.
4. Use Inconnel in Nitrogen based atmospheres above 1800°F as it is less prone to Nitrogen imbrittlement.
5. For infrared food applications use T316L, up to 1500°F. T304 should be avoided as it oxidizes much faster.
6. This material Oxidizes at temperatures above 2050°F.

Table 3

GUIDE FOR SELECTION OF WIRE ANALYSIS FOR ASHWORTH METAL BELTS		
Trade Name	**Maximum Operating Temp. °F**	**Description and Application**
Plain Steel Low Carbon C1008	600	Used in dry atmosphere for light and moderated loads, where no severe wear is expected, and in low temperature ovens.
Galvanized C1008 C1040	350	For damp or mildly corrosive atmospheres and non-caustic washing operations. Furnished in low carbon for moderate loads and in high carbon for heavy loads.
High Carbon C1040 C1065	1050	Used in dry atmospheres for heavy loads, where severe wear is expected, and in moderate temperature furnaces, as for glass annealing, metal tempering bluing, etc.
6150 Alloy Mayari 'R*	1100	These two alloys, although varying in their chemical composition, have qualities superior to high carbon steel for Lehr belt applications at the glass annealing temperature range.
3% Chrome	1300	For temperatures above 1000°F up to 1300°F, with substantially better oxidation resistance, surface and structural stability than 1% Chrome plus a gain in strength.
17% Chrome T430	1400	For resistance to corrosion from atmosphere, fresh water, steam, food, dairy products, nitric acid and other oxidizing solutions. Type 430 has greater corrosion resistance than Type 410 and does not embrittle as readily. Although it resists progressive scaling up to 1400°F it is not commonly used in high temperature work except where sulphurous gases are present, because of its serious loss of strength above 1100°F.
18-8 T304	1500	Type 304 affords greater resistance to corrosion than Type 430 especially for marine and industrial atmospheres, polluted water, high temperature steam, food, dairy products, organic chemicals, and non-oxidizing for reducing solutions. Although it resists progressive scaling up to 1500°F, it is no commonly used in high temperature applications because it is subject to carbide precipitation and embrittlement in the 800-1500°F temperature range. For the 800-1500°F-temperature range refer to data tabulated for Type 347.
18-12 Mo T316	1500	The addition of Molybdenum (Mo) to the basic 18-8 analysis provides for greater resistance to the same chemical compounds, which are moderately corrosive to Type 304. Type 316 is particularly effective in resisting corrosion from sulfuric acid compounds. It also resists pitting corrosion that occurs in the 18-8 type with acetic and phosphoric acids, chlorides, bromides and iodides. Muriatic or hydrochloric acids will attack Type 316 and Type 304. Nitric acid, however, will attack Type 316 more readily than Type 304. For high temperature applications, Type 347 is preferred. Refer to data tabulated for Type 347.
25-20 Si T-314	2050	This alloy has been very extensively used in high temperature belt applications up to 2050°F, because of its high strength, good resistance to oxidation and moderate cost. Type 314 is widely used in copper brazing work and for sintering of powdered metals. Its high silicon content greatly increases its resistance to oxidation and carburization. Because of its moderately high carbon content, when operated for prolonged periods in the 800-1500°F, range this alloy is subject to carbide precipitation at the grain boundaries with consequent possible embrittlement and inter-granular corrosion. Carbides, when formed are readily re-dissolved by bringing the belt temperature above 1950°F, holding this temperature for at least one hour, followed by a rapid air quench.
GUIDE FOR SELECTION OF WIRE ANALYSIS FOR ASHWORTH METAL BELTS		
Trade Name	**Maximum Operating Temp. °F**	**Description and Application**

35-19	2050	In oxidizing atmospheres below 1950°F, and under cyclic heating conditions, Alloy 35-19 because of its high nickel content is preferred to Type 314. 35-19developes a scale that is much more adherent to the base metal than is the case with Type 314 and has greater strength, less elongation and less carbide embrittlement than Type 314. The 35Ni-19 Cr Alloy has good resistance to thermal shock.
35-19 Cb	2050	This Alloy is similar to 35-19 with Columbium added as a stabilizing agent to prevent the precipitation of carbides. In addition, it also has higher Silicon content than that of 35-19, which improves its resistance to oxidation and carburization. Recommended where there is extended exposure in the 1200° to 1700°F range and where the maximum temperature does not exceed 2050°F. It has good resistance to carburizing and carbonitriding at temperatures up to 1750°F.
Inconel* Alloy #600	2150	This standard Inconel has been appreciably improved chemically. Tests show much better scaling resistance in cyclic heating applications in an oxidizing atmosphere than the earlier Inconel analysis. In sulfur-free atmospheres, it may be used up to 2100°F. In sulphurous atmospheres, its use is limited to 1500°F oxidizing and 1000°F reducing. It has greater strength than Type 314 or 35-19 above 1800°F. Inconel has good resistance to inter-granular deterioration at high temperatures and its resistance to ammonia, nitrogen and hydrogen make it useful in nitriding work. It has good resistance to molten aluminum brazing flux.
Inconel* Alloy #604	2200	This new alloy is basically a Columbium (Cb) stabilized type of standard Inconel, free from the brittleness and loss of ductility caused by carbide precipitation. With a 78% nickel content, much greater than the 40% minimum required for elimination of sigma phase formation, it will not embrittle from this cause. It is particularly suitable for carburizing atmospheres and in installations where the belt is subject to alternate slightly reducing and slightly oxidizing conditions.
80-20 Cb	2100	This high Nickel alloy has been extensively used for many years providing good belt life at elevated temperatures. 80-20 Cb (Columbium) has excellent oxidation resistance and high strength properties for the recommended operating temperature range. The addition of Columbium as a stabilizing element renders this Alloy resistant to the so-called green rot phenomenon, which may occur, in the 1600-1900°F-temperature range. Such a condition would be encountered where the Chromium while reducing to nickel.
Hastelloy* Alloy X	2200	Exceptional strength and oxidation resistance up to 2200°F is a characteristic of this Alloy. It forms a tightly adherent oxide scale, which does not spall at high temperatures. Also has unusual resistance to reducing and neutral atmospheres. High cost has limited its use for mesh belt applications.
Tophet 30*	2200	This alloy is a 70% nickel and 30% Chrome alloy, which has food oxidation resistance in both oxidizing and exothermic atmospheres at temperatures in excess of 2150°F.

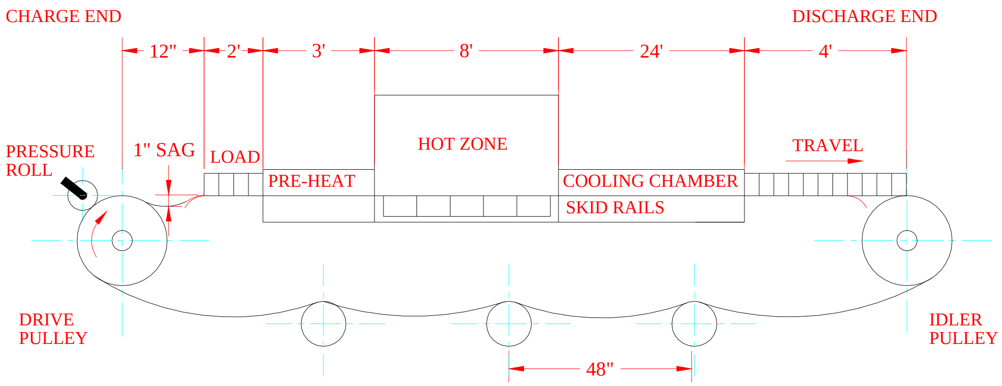
It is to be noted that strength is only one factor, in the selection of mesh and alloy for any high temperature application. Strength values reported by various reliable research laboratories show considerable variation, and analyses of mesh belt applications in the field, under presumably identical conditions, often show a wide variation in useful life.

Allowances must by made for commercial variations in chemical composition and mechanical properties of wire, different types of mesh construction, type of corrosion, influence of atmosphere, time at the critical temperature, thermal shock, mechanical abuse, non-uniform loading, pulley sizes and various other conditions.

No specific factors can be given for these variables. The data tabulated can serve as a valuable guide.

HIGH TEMPERATURE FURNANCE – DRIVE AT CHARGE END

The drive pulley is usually of a large diameter and rubber covered, and located at the charge end of the furnace. Minimum tension, approaching zero can be obtained by the use of a pressure roll. The pressure roll is of a small diameter, preferably rubber-covered, and should be located as close as possible to the point where the belt leaves the drive pulley. Minimum tension in the belt is obtained by adjusting the spring force or counterweighted arm on the pressure roll so that sufficient pressure is exerted on the belt to produce a slack condition as the belt leaves the drive pulley. If a short unsupported length of belt, 1 foot or longer, is provided at this point, a substantial sag in the belt will be readily apparent, indicating low tension.



EXAMPLE (assume the following):

Belt weight 3.5-lbs./sq. ft.
Work load 5.0 lbs./sq. Ft.
Temperature 2000°F

W = Load weight, lbs/linear ft.
w = Belt weight, lbs/linear ft.
a = Span in inches between transverse supports
d = Sag of belt in inches

Determine the critical tension in the belt. This will be at the exit end of the hot zone. All calculations are worked out for a belt 1-ft. wide
Critical tension = Initial tension in belt off the drive pulley plus friction overcome in passing through the loading, preheat and hot zones.

Initial tension-Catenary tension

T_I (Initial tension) = 96

For 1” sag = $\frac{(W + w) \times (a)^2}{96d}$

For 1” sag = $\frac{3.5 \text{ lbs.} \times (12”)^2}{96 \times 1”}$ = 5.2 lbs.

Loading zone friction = 2 ft. x (3.5 + 5.0 lbs.) x (.35) = 5.9 lbs.
Preheat zone friction = 3 ft. x (3.5 + 5.0 lbs.) x (.37) = 5.9 lbs.
Hot zone friction = 8 ft. x (3.5 + 5.0 lbs.) x (.55) = 37.4 lbs.
Critical tension Total = 5.2 + 5.9 + 9.4 + 37.4 = 57.9 lbs. per ft. of width minimum

Allowable stress for Type 314 = 240 psi (Working Stress for Type 314 at 2000°F) See Table 4
Approx. cross sectional area required for belt = $\frac{57.9}{240}$ = .241 sq. in. (for 11 Ga. in Type 314)

HIGH TEMPERATURE BELTS & APPLICATIONS

Tabulation and data of several meshes that may be satisfactory are shown below:

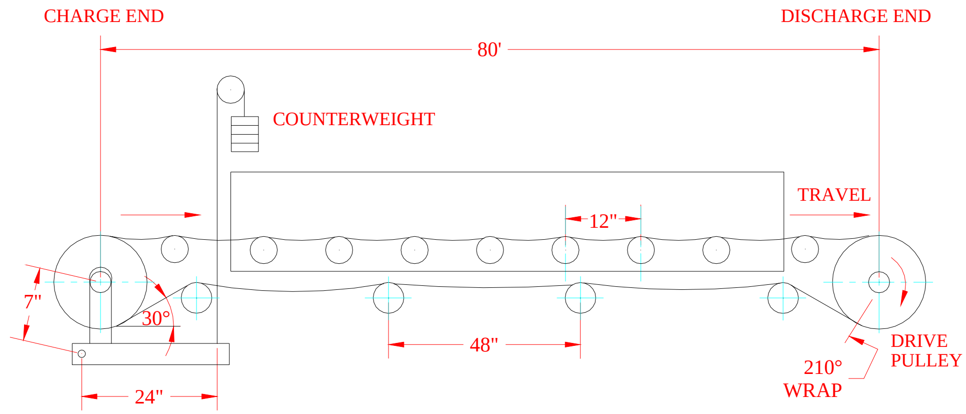
MESH	ALLOY	CROSS-SECTIONAL AREA PER FT. OF WIDTH	WIRE GA. FACTOR	ALLOWABLE STRESS PSI	BELT STRENGTH PER FT. OF WIDTH
R12-11-11	T-314	.271	1.00	240	65
R31-35-14	T-314	.312	0.87	240	65
R45-54-16	Inconel	.276	0.80	285	63

For 8” diameter drive pulley - prefer $\frac{180}{8}$ = 22 spirals/ft. or more in mesh.
R31-35-14 or R45-54-16 would be suitable.
For 18” diameter pulley – prefer $\frac{180}{18}$ = 10 spirals/ft. or more in mesh.
Can use R12-11-11 as well as the other two meshes.

Table 4

Guide for Working Stress------lbs. per sq. inch of Cross Sectional Area

	DEGREE F															
MATERIAL	**800**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1050**	**1800**	**1900**	**2000**	**2050**	**2100**	**2200**
C1008 (Low Carbon Steel)	1940															
C1040-C1065 (High Carbon Steel)	2650	1870														
1% Chrome	2210	1780	1500													
2% Chrome	2460	1870	1580	1230												
3% Chrome	2725	2120	1840	1230	675											
T430 17 Chrome	2725	2040	1500	965	540	295										
T304 18 CR.—8 Ni.	1430	1180	1090	925	750	575	510									
T316 18 Cr.—12 Ni.—Mo.	2020	1870	1760	1530	1290	1040	870									
T347 18 Cr.—10 Ni.—Cb.	2725	2540	2300	1960	1505	1225	965									
T309 25 Cr.—12 Ni.	2380	2030	1920	1690	1425	1160	980	805	600							
T314 25 Cr.—20 Ni.	2725	2305	2045	1785	1505	1225	980	735	545	425	310	240	205			
35 Ni.— 19 Cr. Chromax D.H. 527				2320	2100	1830	1320	1100	710	470	310	215	200			
35 Ni.—19 Cr. (stabilized) D.H. 520				2320	2100	1830	1320	1100	710	470	310	215	200			
78 Ni.—14 Cr. Inconel						1100	870	645	600	470	410	285	235	210		
80 Ni.—20Cr. Nichrome V						1710	1050	645	545	470	400	285	245	210		
Hastelloy X										745	525	370	306	220	160	



LOW TEMPERATURE OVEN – DRIVE AT DISCHARGE END

The drive pulley is normally located at the discharge end. If load is light and the conveyor is short, a steel face pulley of moderate diameter with a 180° of belt wrap may be sufficient to pull the belt. However, if heavily loaded or the belt is long, a rubber faced pulley of large diameter with a provision for snubbing to greater than 180° is preferable. A take-up to compensate for belt stretch must be provided. The take-up may be located at the charge end or on the return side. A manually operated screw take-up can be used for mesh belt conveyors at room temperature. For conveyors subject to heating and cooling, the use of an automatic type take-up, to take care of expansion and contraction of the belt, is recommended. Counter-weighted or air cylinder types are extensively used. In the following example, a counter –weighted type with a lever arm, which reduces the amount of width required, is assumed.

EXAMPLE: (assume the following):

Belt weight 3.0-lbs./sq. ft.
Work load 6.0 lbs./sq. ft.
Temperature 300°F

Belt support – Rollers on 12-inch centers on loaded side, 48” on the return side.
Minimum belt tension = Total friction to be overcome on the bottom and top pass of the belt plus initial or back tension required on the drive pulley to pull without slipping.

Bottom friction = 80 ft. x 3.0 lbs. x .10 x = 24.0
Top friction = 80 ft. x (3.0 lbs. + 6.0 lbs.) x .10 = 72.0
Total friction = 24.0 lbs. + 72.0 lbs. = 96.0 lbs.
Back tension for 210° wrap, steel faced pulley = .50 x 96 lbs. = 48.0 lbs. (see Table 4 for Drive Tension Factors)
Minimum belt tension = 96 + 48 = 144 lbs./ft. at discharge end.

Initial tension of 48 lbs. will give a belt sag of:

$$\frac{3.0 \text{ x } (48'')^2}{96 \text{ x } 48 \text{ lbs./ft.}} = 1\text{-}1/2'' \text{ Max.}$$

Tension at charge end = 48 + 24 = 72 lbs./ft.
Catenary sag of belt at charge end =

$$\frac{(3.0 + 6.0 \text{ lbs.}) \text{ x } (12'')^2}{96 \text{ x } 72 \text{ lbs./ft.}} = .187'' \text{ or } 3/16''$$

If the product carried on the belt is such that a 3/16” sag is excessive, it can be reduced either by spacing the supporting rolls closer than 12”, or the tension in the belt can be increased by means of the take-up.

If the roll spacing is reduced to 6”, then sag is reduced to one-fourth of 3/16” or 3/64” for the calculated 72 lbs./ft. tension at the charge end.
If the belt tension is tripled, and the 12” spacing of the rolls unchanged, the sag will be reduced to one-third of 3/16”, or 1/16” for 216-lbs./ft. tension. Assuming that increasing the tension in the belt is preferred; the take-up must have enough counter-weight to counterbalance the 216-lbs./ft. tension and the belt tension throughout the conveyor will be increased by (216-72) or 144 lbs./ft.
Revised sag on return side = 48/192 x 1-1/2” = 3/8”
Revised discharge end tension = 144 + 144 = 288 lbs./ft. This is maximum tension in the belt and is usually not critical even with low temperature ovens at 300°F. However, if the temperature is higher or the total loading is much greater than in this example, the belt strength may become a factor in selecting the proper mesh.
For room temperature conveyors or low temperature furnace applications, the balanced weave construction is generally used.

Counterweight Calculations

The determination of counterweight value is made as follows:
For 180° wrap and simple cable arrangement, Counterweight = (216 + 216) x Belt width in feet

For 3 foot wide belt, weight = 1296 lbs.
For snub of 30° beyond 180° with simple cable, Counterweight = (216 + 216 Cos30°) x 3ft. wide = 1209 lbs.
For the lever arm arrangement: Counterweight = 7"/24" x 1209 = 352 lbs.

Mesh selection

The factors considered in determining mesh and wire gauge specifications are: Product or parts to be conveyed or processed, shape, size, consistency, weight of the heaviest part, size of the smallest part, abrasive wear and longitudinal pitch of the spirals to insure retention of flexibility for articulation around the smallest size pulley over which the belt must operate. The prevention of marking of the product carried or the ability of the mesh to provide for live backlogging or automatic transfer or discharge, may be the prime consideration.

RELATION OF BELT TENSION TO DEFLECTION

Belt tension may be governed by that required to sustain the belt and load between supports with a definite limit of deflection. If transverse supports are at 90° angle to the direction of belt travel the following formulas may be used.
t_1 = Belt tension required at transverse supports to give a definite deflection.
W = Load weight, lbs. per linear ft.
w = Belt width, lbs. per linear ft.
a = Span in inches between transverse supports
d = Sag of belt in inches

$$t_1 = \frac{(W \times w)\, a^2}{24} \times (1 + a^2/16d^2)^{-1/2}$$

Table 5

DRIVE TENSION FACTORS		
BELT WRAP ON DRIVE PULLEY IN DEGREES	**METAL FACED PULLEY**	**LAGGED PULLEY**
135	.98	.32
150	.84	.26
165	.73	.22
180	.64	.20
195	.56	.15
210	.50	.13
225	.44	.11
240	.40	.09
255	.36	.08
270	.32	.06

For average conveyor installations where the deflection is less than one-sixteenth of span, the above formula can be simplified to:

$$t_1 = \frac{(W \times w)a^2}{96d}$$

If the tension of the belt is known, then the other factors can be determined from the following:

$$d = \frac{(W \times w)a^2}{96t_1} \quad a, = (96dt_1/W \times w)W + w = 96d\, t_1/a^2$$

If the tension required at any point on the loaded side to sustain the belt and load with a definite deflection is greater than the minimum tension at the same point, then the initial tension and the tension at any point in the belt must be increased by the difference.

Ashworth Jonge Poerink bv
Borne, The Netherlands
Tel: +31-74-265-6565
Fax: +31-74-266-1134
Email: ashworth@ashworth.nl

Ashworth Bros., Inc.
Winchester, VA U.S.A.
Phone: 540-662-3494
Fax: 800-532-1730
Email: ashworth@ashworth.com
Website: www.ashworth.com

Ashworth Europe Ltd.
Kingswinford, United Kingdom
Tel: +44-1384-355000
Fax: +44-1384-355001
Email:
ashworth@ashwortheurope.co.uk