ASHWORTH ENGINEERING

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

PRODUCT TECHNICAL BULLETIN

FATIGUE RESISTANT CLEATRAC® BELT AND DRIVE SYSTEM

A precision balanced weave wire mesh fabric consisting of alternating right and left-hand spirals joined by crimped connecting rods, with a matched positive drive system of sprockets, filler rolls, and support bearings.

Ashworth has developed a manufacturing process using a proprietary stainless steel specification to offer a belt having up to 2.5 times the working strength of our standard Cleatrac belting. Offering meshes in both 16 and 17 gage stainless steel wire, Fatigue Resistant Cleatrac can be used successfully in applications requiring longer conveyor lengths and increased belt strength.
The Ashworth Fatigue Resistant Cleatrac offers reduced belt stretch and increased belt life.

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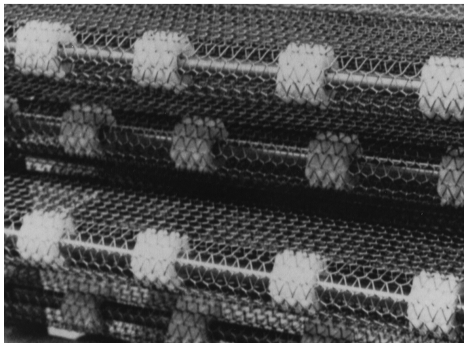


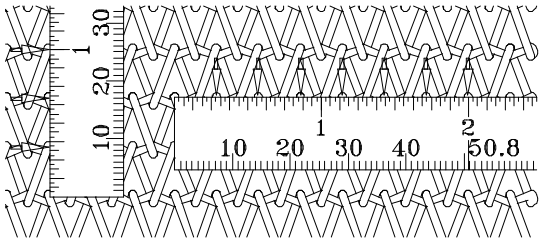
DEFINING CHARACTERISTICS

Pitch: See Cleatrac mesh chart under options.
Turn Capability: Straight run only.
Standard Belt Widths: Minimum width = sprocket width + 2 loops, Maximum width = 168 inches [4267 mm].
Maximum Allowable Tension: See chart.
Conveying Surface: Overall belt width.
Method of Drive: Positively driven by a matching minimum diameter drive system consisting of sprockets, filler rolls, and support bearings.
Basic Construction:

- Standard material stainless steel.
- Crimped connector rods

BELT SPECIFICATIONS

MESH DESIGNATION
FCTB indicates Fatigue Resistant Cleatrac Belting
First Count is # loops per foot of width
Second Count is # connectors per foot of length
Third count is the wire gauge.



CLEATRAC MESHES										
Mesh	**Thickness**		**Lateral Pitch**		**Weight**		**Opening Size (approx.)**		**Working Strength per unit of Width**	
	inches	**mm**	**inches**	**mm**	**lbs/ft²**	**kg/m²**	**inches**	**mm**	**lbs/ft**	**kg/m**
FCTB 18-16-16	.301	7.65	0.667	16.94	0.67	3.3	.60 x .69	15.2 x 17.5	250	370
FCTB 30-24-16	.287	7.29	0.400	10.16	1.19	5.8	.34 x .44	8.6 x 11.2	750	1100
FCTB 30-24-17	.263	6.68	0.400	10.16	.88	4.3	.35 x .45	8.9 x 11.4	500	740
FCTB 42-36-16	.245	6.22	0.286	7.26	1.79	8.8	.22 x .29	5.6 x 7.4	930	1400
FCTB 42-36-17	.235	5.97	0.286	7.26	1.35	6.6	.23 x .28	5.8 x 7.1	810	1200
FCTB 48-48-17	.240	6.10	0.250	6.35	1.57	7.7	.20 x .20	5.1 x 5.1	1100	1640

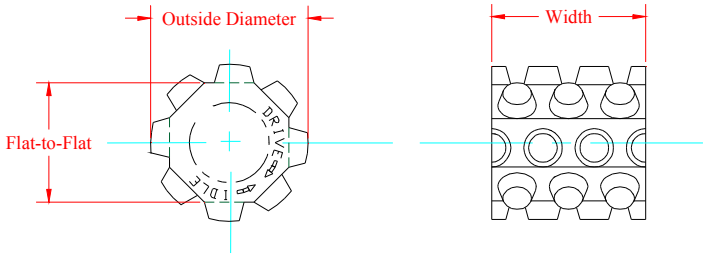
BELT OPTIONS

See "Belt Specifications".

SPROCKETS

Cleatrac Sprockets (CTS) - minimum diameter sprockets to positively drive mesh. Positive drive provides true belt travel and minimum terminal diameters allow close transfer of product onto and off belt.

- All sprockets can be manufactured in UHMW polyethylene and machined T303 stainless. Those marked with a ▲ are available in cast T303 stainless steel.
- Designation is CTS followed by number of flats around the sprocket
- American Standard keyways provided unless otherwise specified by the customer. Metric sizes are available.
- Minimum bore for all cast stainless sprockets is 11/16".
- Maximum bore sizes listed are with keyway. For sprockets without keyway, add American Standard keyway depth to listed values.
- ***Plastic Cleatrac sprockets are bored oversize to allow lateral movement on the shaft compensating for changes in belt width due to temperature. If tight bore tolerances are required they must be specified at time of order.***
- Set Screws are available upon request.

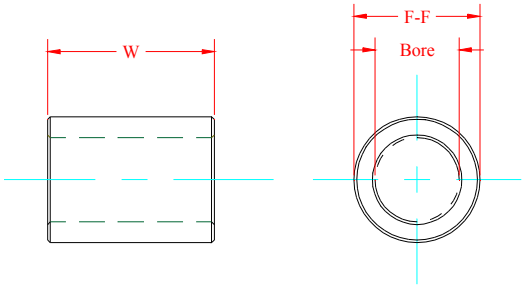


CLEATRAC SPROCKETS

Sprocket Number	No. of Teeth	Outside Diameter		Flat-to-Flat		Sprocket Width		Minimum Bore		Maximum Bore	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
CTS 18-12 ▲	12	2.976	75.59	2.500	63.50	2.00	50.8	5/8▲	15.9▲	1-3/4	44.0
CTS 18-14	14	3.462	87.93	2.952	74.98	2.00	50.8	1/2	12.7	1-15/16	54.0
CTS 18-18	18	4.430	112.52	3.954	100.43	2.00	50.8	1/2	12.7	2-3/4	70.0
CTS 30-14	14	2.347	59.61	1.912	48.56	1.58	40.0	1/2	12.7	1-1/4	30.0
CTS 30-20 ▲	20	3.333	84.66	2.887	73.33	1.20	30.5	3/4▲	19.1▲	1-7/8	50.0
CTS 30-24	24	3.966	100.74	3.524	89.51	1.20	30.5	1/2	12.7	2-1/4	60.0
CTS 30-26 ▲	26	4.286	108.86	3.844	97.64	1.20	30.5	3/4▲	19.1▲	2 -1/2	65.0
CTS 42-24 ▲	24	2.666	67.72	2.300	58.42	1.14	29.0	5/8▲	15.9▲	1-1/2	39.0
CTS 42-32 ▲	32	3.492	88.70	3.132	79.56	1.14	29.0	1/2▲	12.7▲	2-1/8	55.0
CTS 42-40	40	4.368	110.95	3.996	101.50	1.14	29.0	1/2	12.7	2½	65.0
CTS 42-56	56	6.058	153.87	5.696	144.68	1.14	29.0	1/2	12.7	4	105.0
CTS 48-24	24	2.031	51.59	1.659	42.14	1.50	38.1	3/4	19.1	1	25.0
CTS 48-32 ▲	32	2.655	67.44	2.310	58.67	1.50	38.1	15/16▲	23.8▲	1-1/2	40.0

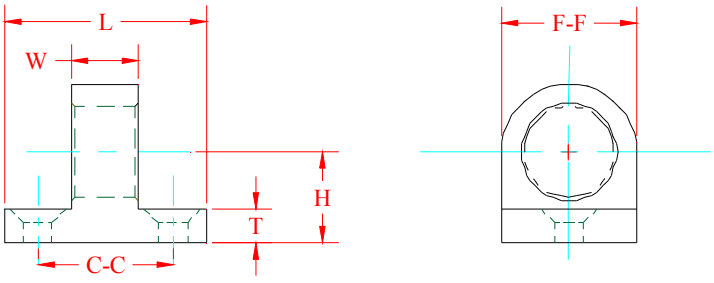
▲ *Also stocked in stainless steel with 11/16 inch [17.5mm] unfinished, pilot bore. Minimum bores shown are for UHMW sprockets.*

Cleatrac Filler Rolls (CTFR) - provide mesh support between the sprockets.
Available in UHMW polyethylene.
Designation is CTFR followed by the same numeric designation of the sprockets.
Outside diameter is equal to dimension F-F of the sprocket. Bore must match that of the sprockets.
Width is the same as the selected sprocket.
There is no keyway or set screw in filler rolls.



Reference Cleatrac Sprocket chart for dimensions.

Cleatrac Support Bearings (CTSB) - for intermediate shaft support when excessive shaft deflection will occur without their presence.
Available in UHMW polyethylene only
Bore must match that of the sprockets
Designation is CTSB followed by the same numeric designation of the sprockets



Bearing Number CTSB -	F-F		H		W		Base T		Base L		Flat Head Fasteners C-C (Size)	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
18-12	2.500	63.50	1.500	38.10	3/4	19.1	1/2	12.7	2.25	57.2	1.5 (5/16)	38.1 (M8)
30-20	1.444	36.66	1.885	47.88	3/4	19.1	3/8	9.5	2.25	57.2	1.5 (5/16)	38.1 (M8)
42-20	1.880	47.75	1.227	31.17	3/4	19.1	3/8	9.5	2.25	57.2	1.5 (5/16)	38.1 (M8)
42-24	2.300	58.42	1.450	36.83	3/4	19.1	3/8	9.5	2.25	57.2	1.5 (5/16)	38.1 (M8)
48-32	2.300	58.42	1.450	36.83	3/4	19.1	3/8	9.5	2.25	57.2	1.5 (5/16)	38.1 (M8)

ENGINEERING CALCULATIONS

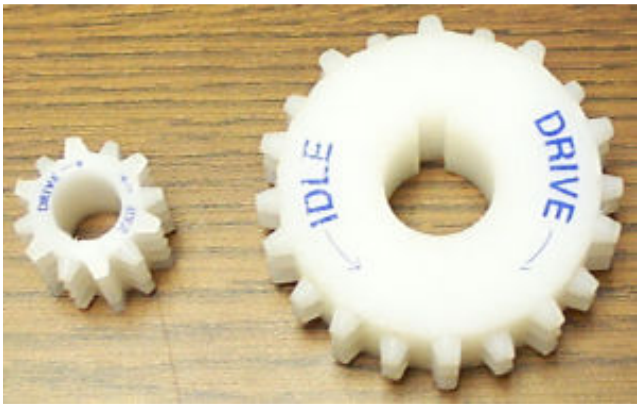
BELT TENSION

$T = (WLf_r + wLf_r + WH) \times C$

where
- T Belt Tension lb [Newton]
- W Total Weight = Belt Weight + Product Weight lb/sq ft [kg/sq m]
- L Conveyor Length feet [meters]
- w Belt Weight lb/sq ft [kg/sq m]
- H Rise of incline Conveyor (+ if incline, - if decline) feet [meter]
- f_r Coefficient of Friction Between Belt and Supporting Bed [dimensionless]
- C Force Conversion Factor
  - Imperial: 1.0
  - Metric: 9.8

Typical f_r values:

Type of Belt Support	f_r
UHMW	
with clean or packaged product	0.20
with breaded or flour based product	0.27
with greasy, fried product	0.30
with sticky, glazed, sugar based product	0.35
Stainless Steel	0.40
Free Turning Rollers	0.10



NUMBER OF SPROCKETS

Minimum number of Sprockets per shaft = Belt Width/ (A + B)

where A = Maximum allowable spacing between sprockets
B = Overall Sprocket Width

Reference table for sprocket widths

Round Calculated number to next whole number.

Mesh Type	Spacing Between Sprockets			
	Maximum		Minimum	
	inches	mm	inches	mm
CTB 18	3-1/2	89	.67	17.0
CTB 30	2	51	.40	10.2
CTB 42	2	51	.28	7.1
CTB 48	2	51	.25	6.4

NUMBER OF FILLER ROLLS

A = number of gaps between sprockets
B = number of sprockets per shaft
C = overall belt width
D = overall sprocket width
E = open space
F = available space per gap
G = number of filler rolls per gap
H = total number of filler rolls required per shaft

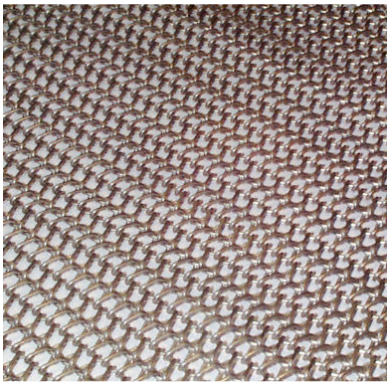
Step 1: A = B - 1
Step 2: E = C - (B x D)
Step 3: F = E/A
Step 4: G = F/D
Step 5: G x A

NUMBER OF SUPPORT BEARINGS

Number of Support Bearings = ***f (shaft length, shaft diameter)***

The number of support bearings is a function of the shaft length and shaft diameter. It is determined by iteration starting with an assumed shaft diameter, typically the maximum bore of the subject sprockets. If the calculated shaft diameter is larger than the assumed diameter, the belt width is divided by two (2) to mimic the insertion of a support bearing. If the calculated diameter is still larger than the assumed diameter, the belt width is divided by three (3) to mimic the insertion of two (2) support bearings. This procedure is continued until the assumed diameter is larger than the calculated diameter.

$d = B \times \{5.1/P \times [(C_b \times M)^2 + [(C_t \times T)^2]^{1/2}\}^{1/3}$



B = 1 for solid shafts
P = 6000 for a shaft with keyway
= 8000 for a shaft without keyway

C_b = Service Factor in Bending
C_t = Service Factor in Torsion
T = Torque in units of inch-lbs.
= Belt Tension x ½ (Pitch Diameter of Sprockets)
$M = (W_r \times L)/8$

where W_r = resultant weight in pounds of shaft, sprockets, belt, and belt tension
$W_r = [R^2 + (BT)^2]^{1/2}$
R = Weight in lbs. of (Shaft + One Linear Foot of Belt + Load/Linear Foot)
L = Length of shaft between bearings in inches

C_b	C_t	Type Loading
1.5	1.0	gradually applied on steady load
1.5-2.0	1.0-1.5	suddenly applied minor shock load
2.0-3.0	1.5-3.0	suddenly applied heavy shock load

SYSTEM REQUIREMENTS

APPLICATION NOTES
UHMWPE material type components have a 150° F [66°C] maximum operating temperature.

TUNNEL FREEZERS
Use with caution as ice and snow accumulates in mesh openings or on the drive components prohibiting sprocket teeth engagement. Install a rotary brush, or similar cleaning method, near sprocket locations to minimize debris.

SOFT DOUGH PRODUCTS
Use with caution as debris may accumulate in mesh openings or on the drive components prohibiting sprocket teeth engagement. Install a rotary brush, or similar cleaning method, near sprocket locations to minimize debris.

ELEVATED TEMPERATURES
Thermal expansion of the belt width may adversely affect sprocket engagement with the belt openings. If this is evident when belt reaches application temperature, lock only the middle third of the sprockets onto the shaft so the outer sprockets can "float" along the shaft allowing for thermal expansion and contraction of the belt. Keep in mind that shaft will have to be kept clean to allow sprockets to "float". For flour based products in elevated temperatures arrange the drive configuration such that a shield prevents debris from accumulating on the shaft and drive components.

MULTIPLE BELTS DRIVEN BY COMMON DRIVE SHAFT
When two or more belts are driven on a common drive shaft and product alignment is critical, Ashworth Bros., Inc. must be notified at time of purchase order so that the belts will be matched. Slight differences in belt pitch can affect the alignment of product over longer conveyor runs (typically 10 feet or greater). Replacement belts for these applications require that the order reference the previous order.

NOSE ROLL SIZING
The use of nose rolls are not recommended with Fatigue Resistant Cleatrac due to the higher operating tensions. If tight transfers are required Ashworth recommends using the smallest sprocket from the preceding chcart be used on both in feed and discharge shafts.

Reference: *Product Technical Bulletin "021 Conveyor Design Guidelines".*

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