ELEMET®

Steel elevator belts

ELETEX®

Textile elevator belts

PRODUCT DESCRIPTION

ELEMET - STEEL ELEVATOR BELTS

The structure of ELEMET elevator belts is a steel carcass composed by a strong warp of steel cord with suitable elastic modulus such to reach the best compromise between low elongation and good flexibility (see picture below). This characteristic makes the belt easier to be aligned than traditional steel cord elevator.

Furthermore, the cable elasticity allows the use of pulleys with lower diameters, depending on the requirements of clamps and buckets.

Two regular steel wefts placed on top and bottom cover give to the belt high transversal stiffness, necessary to assure the best stability during the running; at the same time, it helps the belt for the buckets holding up highly increase cutting and tear resistance.

Due to the high quality of steel cord, it is possible to design ELEMET with very low safety factors. As some cords are broken during the punching process, we recommend to use a minimum safety factor of 10 calculated considering the useful belt width (see Pag. 6 - Elevator belt calculation - for more details).

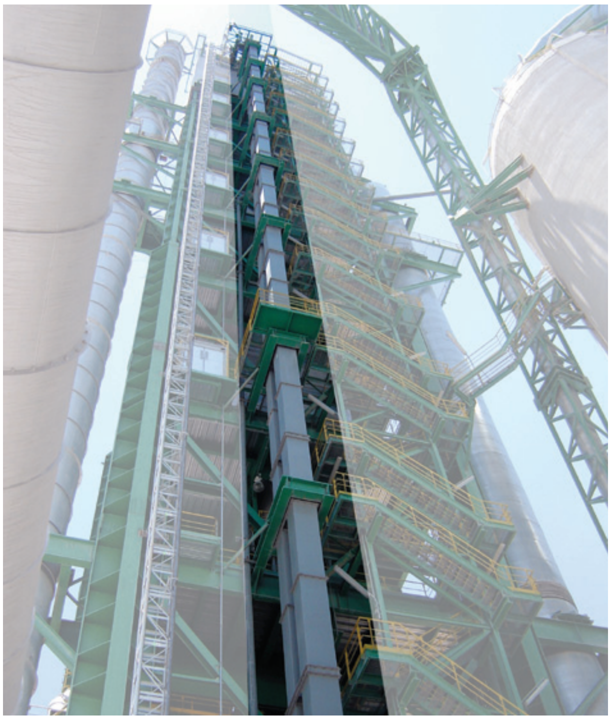
ELETEX - TEXTILE ELEVATOR BELTS

Belts designed to be used in bucket elevator plant only. The special construction of the reinforced polyester-nylon fabrics assures the use of such belts also for severe loading requirements. The result are the following:

- Polyester warp assures high resistance to heavy working conditions.
- Nylon weft guarantees transverse tearing strength and strong bolt holding.

All ELETEX are supplied with cut edges because synthetic fabrics used for their production do not need protection against humidity as they can't absorb any liquid.

The 2 mm thickness both for top and bottom cover is designed to protect the carcass and at the same time assures the best bucket support without bolt loosening.



COVERS SPECIFICATIONS

Rubber covers for elevator belts have two main functions: protection of the carcass against material and moisture aggression, assurance of the perfect bucket holding up without bolt loosening in course of time. In order to guarantee safety and longer life, under hard working conditions too, all type of rubber covers are antistatic and ozone protected.

ELEMET

SX - Medium temperature resistance

SX is a rubber compound assuring resistance against abrasion; it is formulated for maximum temperature of 100°C. It is not oil resistant.

BX - Superior temperature resistance

BX is the rubber cover that assures the maximum heat resistance for a rubber compound. It is designed to work at maximum temperature of 180°C. It is not oil resistant.

ELETEX

OX - (G grade DIN 22102) Oil resistant quality

OX is a standard rubber compound designed for elevator belts working at ambient temperature. This compound is antistatic according to ISO 284 and oil resistant too.

AX - High temperature resistance

AX is a rubber compound especially designed for textile elevator belts to guarantee good performances with abrasive and hot materials up to 150°C. This compound is antistatic according to ISO 284 but not oil resistant.

BX - Superior temperature resistance

BX is the rubber cover that assures the maximum heat resistance for a rubber compound. It is designed to work at maximum temperature of 180°C. It is not oil resistant.

AG - (K+G grade DIN 22102, class 2A EN 12882) Self extinguish and oil resistant compound

AG is a nitrile compound typically designed for bucket elevator systems used in cereal silos. It provides superior resistances to vegetable oils and animal fats; it is also selfextinguishing and antistatic according to ISO 340 and ISO 284 or equivalent in order to guarantee high safety into the conveyor plant. The maximum allowed temperature of the conveyed material is 100°C.

For different cover characteristics or particular applications, please contact to our commercial department.

RECOMMENDED PULLEY DIAMETERS [mm]

ELEMET

Belt style	N/mm	800	1000	1250	1600	2000	2250	2500	2750	3000	3200	3500
Drive pulley	mm	500	500	630	630	800	800	800	800	800	800	800
Lower pulley	mm	400	400	500	500	630	630	630	630	630	630	630

ELETEX

Belt style	N/mm	400/3	500/4	630/4	800/5	1000/5	1250/5	1600/5
Drive pulley	mm	400	500	500	630	800	1000	1000
Lower pulley	mm	315	400	400	500	630	800	800

According to the OEM experience, different choices in the joining system or in the bucket bolts could need higher pulley diameters.

TECHNICAL SPECIFICATIONS

ELEMET

Belt style N/mm	800	1000	1250	1600	LE2000	LE2250	LE2500	LE2750	LE3000	LE3200	LE3500
HEAT RESISTANT COVER SX (100°C)											
Cover thick. mm	3+3	3+3	3+3	3+3	–	–	–	–	–	–	–
Belt thick. mm	11,4	11,4	12,3	12,3	–	–	–	–	–	–	–
Belt weight kg/m^2	17,6	18,2	20,1	21,4	–	–	–	–	–	–	–
SUPER HEAT RESISTANT COVER BX (180°C)											
Cover thick. mm	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4
Belt thick. mm	13,4	13,4	14,3	14,3	15,0	15,0	15,0	15,0	15,8	15,8	15,8
Belt weight kg/m^2	19,2	19,9	22,0	23,1	24,4	25,5	26,0	27,0	29,1	29,9	31,2

Maximum elongation at working tension (for safety factor ≥ 10)
Elemet with Standard Elongation (up to belt style 1600 kN/m) ≤ 0,40 %
Elemet LE with Low Elongation (from 2000 up to 3500 kN/m) ≤ 0,25 %

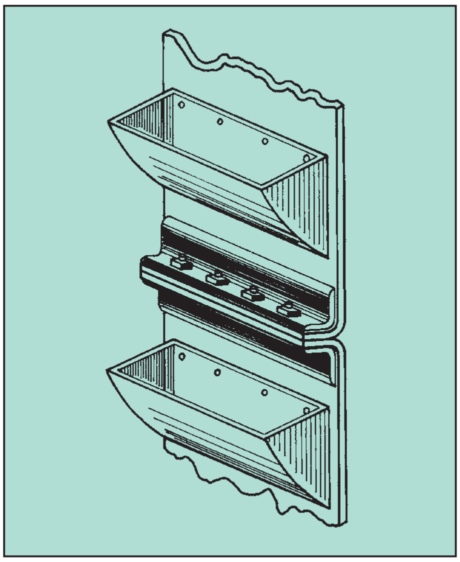
Available special constructions on demand and under technical approval.

ELETEX

Belt style N/mm	400/3	500/4	630/4	800/5	1000/5	1250/5	1600/5
HEAT RESISTANT COVER AX (150°C)							
Cover thick. mm	2+2	2+2	2+2	2+2	2+2	2+2	3+3
Belt thick. mm	6,8	7,8	8,4	9,5	10,7	11,7	14,7
Belt weight kg/m^2	8,4	9,6	10,2	11,5	13,2	14,5	18,6
SUPER HEAT RESISTANT COVER BX (180°C)							
Cover thick. mm	–	–	–	3+3	3+3	3+3	3+3
Belt thick. mm	–	–	–	11,5	12,7	13,7	14,7
Belt weight kg/m^2	–	–	–	13,2	14,9	16,1	17,8
OIL RESISTANT COVER OX							
Cover thick. mm	2+2	2+2	2+2	2+2	2+2	2+2	3+3
Belt thick. mm	6,8	7,8	8,4	9,5	10,7	11,7	14,7
Belt weight kg/m^2	8,6	9,7	10,4	11,7	13,4	14,7	19,0
SELF EXTINGUISH AND OIL RESISTANT AG							
Cover thick. mm	2+2	2+2	2+2	2+2	2+2	2+2	3+3
Belt thick. mm	6,8	7,8	8,4	9,5	10,7	11,7	14,7
Belt weight kg/m^2	9,1	10,2	10,9	12,2	13,9	15,2	19,7

Available special constructions on demand and under technical approval.

FASTENING



Metal clamps are the most common method for elevator joining. Typical application is shown on the left. Vulcanized splicing are possible too; the efficiency is very high but the vulcanization in vertical position needs special procedures, tools and skilled people.

Metal clamps for ELETEX

Steel clamps with M14 bolts at 50 mm centre distance are available for Eletex belts up to 800 N/mm. For higher classes, it is preferable to adopt customized clamps characterized by a third internal metal element isolating the two belts ends for better clamping efficiency.

Metal clamps for ELEMET

There is not a general purpose clamp suitable for all steel elevator belts as it must be designed in accordance with the tensile strength of the belt, the diameter and the construction of the steel cables, the pulleys diameter, the holes pattern for bucket fixation. Although ELEMET are realized with very thin and elastic steel cables in order to minimize the effort in the joint bending area, two particulars of these clamps are fundamental for the right performances without breaking of the cords or tearing of the belt:

a) sufficient radius of curvature in order to distribute the tensions along the cords reducing the possibility of cord breaking due to steel fatigue;

b) suitable bolts distribution, steel plates robustness and clamp surface with high friction coefficient to assure perfect clamping with a minimum number of cord breaking.

ELEVATOR BELT CALCULATION

In this section our method of calculation for elevator belts is described. Various tensions T [daN] in the belt must be taken into consideration:

1. $T_1=g \cdot P_1 \cdot H$ due to belt weight P_1
2. $T_2=g \cdot P_2 H/p$ due to bucket weight P_2
3. $T_3=g \cdot P_3 H/p$ due to material weight P_3
   Capacity Q and weight of the handled material for each bucket P_3 are connected by $P_{3calc} = Q \frac{p}{3{,}6v}$. If there are inconsistency between P_3 and P_{3calc} use in the calculation of T_3 the greatest value between the data P_3 and the value P_{3calc} coming from the capacity calculation. An investigation on this conflict is suggested.
4. $T_4=DJT_3/H$ due to friction at the loading point.
5. $T_5=MAX(K(T_3+T_4)-(T_1+T_2), g \cdot F_v/2)$ to guarantee motion transmission.
   The therm $K(T_3+T_4)-(T_1+T_2)$ represents half of the minimum take-up value that must be applied. Negative values mean that buckets and belt weight are sufficient to assure the minimum required pretension.

The maximum tension in the belt is the sum of these a.m. values $T=T_1+T_2+T_3+T_4+T_5$.

For the calculation of the minimum tensile strength a useful belt width $B_u=B-d_f n_f$ lower than the real belt width must be considered because of the presence of the hole necessary for the bucket holding.

If at least one of these data are unknown, we suggest to use a safety factor $f_s \geq 15$ in the calculation of minimum tensile strength instead of the standard safety factor (f_s=12 for ELETEX and f_s=10 for ELEMET).

So, the minimum tensile strength is $CR_{min}=\frac{T}{B_u} f_s$.
Chosen a tensile strength CR greater or equal to the here above calculated value CR_{min}, it is possible to verify the effective safety factor $f_s'=\frac{CR \cdot B_u}{T}$.

The motor power necessary to move the belt loaded with the material must balance T_3+T_4 because the tensions T_1+T_2 produces auto-compensative effects along the whole length of the conveyor: $P_a=\frac{T_3+T_4}{1000}v$.

Introducing the mechanical efficiency of the transmission and a power surplus of 20%, the minimum motor to apply to the conveyor belt must be $P_m=1{,}2P_a/\eta$.

LEGEND

P_1 [kg/m] = Belt weight
P_2 [kg/each] = Bucket weight
P_3 [kg/each] = Material weight for each bucket
P_{3calc} [kg/each] = Material weight of each bucket necessary to guarantee the capacity Q
Q [Ton/h] = Elevator capacity
v [m/sec] = belt speed
H [m] = Elevation
p [m] = Buckets pitch
D [m] = Lower pulley diameter
J = friction factor on the carter: generally 8, for big lump size 12
K = Friction factor on drive pulley (typically 0,5)
F_v [kg] = Applied counterweight (including the lower pulley weight)
$T, T_{1..5}$ [N] = Tensions in the belt
CR_{min} [kN/m] = Minimum tensile strength
B [mm] = Belt width
B_u [mm] = Useful belt width
d_f [mm] = hole diameter
n_f [mm] = hole number for each bucket
f_s = Safety factor
f_s' = Effective safety factor
P_a [kW] = Theoretical motor power
P_m [kW] = Minimum required motor power
η = Drive efficiency
g [m/sec^2]= Gravity acceleration

TECHNICAL DATA SHEET

CUSTOMER: .... DATE: ....
BELT TYPE: .... REF: ....

MATERIAL CHARACTERISTICS

Material: ....
Density: .... Ton/m^3
Lump size: .... mm

Temperature
Avarage: .... °C
Max: .... °C

CONVEYOR DATA

Elevation: .... m
Width: .... mm
Design capacity: .... Ton/h
Average capacity: .... Ton/h
Speed: .... m/sec
Max tension: .... kN/m

DRIVE UNIT

Drive pulley surface   Steel ❍   Rubber ❍   Applied power: . . . . kW

PULLEY DIAMETER

Drive pulley
.... mm

Tail pulley
.... mm

BUCKETS

Material
Steel ❍ Plastic ❍

Volume
.... dm^3

Weight (empty)
.... kg/each

TAKE-UP

Screw ❍
Counterweight ❍

Take-up travel: .... m
Applied counterweight .... kg

SPLICING

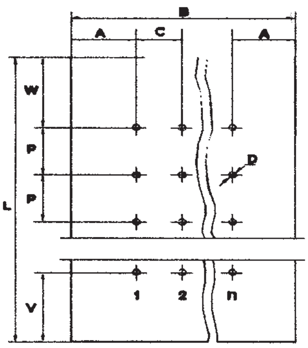
Vulcanized ❍   Mechanical fasteners ❍   Type: ....

EXISTING BELT

Type	Belt style	Cover thickness	Quality	Width
Eletex ❍ Elemet ❍	.... kN/m	.... + ... mm	....	.... mm

Producer: .... Lifetime: ....
Cause of failure: ....

DRILLING LAYOUT



L (total belt length) = ... mm
W (top terminal area) = ... mm
V (bottom terminal area) = ... mm
P (bucket pitch) = ... mm
A (free lateral space) = ... mm
C (distance between holes) = ... mm
N (hole number for each bucket) = ...
D (hole diameter) = ... mm

Drawing is only for reference, if different please enclose your own layout.

SIG

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