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Conveyor belt design manual

Belt conveyors are used to transfer materials from one location to another. Other components of belt conveyor systems are typically electric drives, pulleys, idle machines, and long belts. A simple conveyor system may look like: the basic of conveyor belt design parameter belt tension calculation: the conveyor belt always experiences tensile load due to the rotation of the electric drive, the weight of the transferred material and the idleness. Steady belt tension is Tb = 1.37*f*L*g*g**********2*mb+ (2*mb+ mm)* * course (δ)] + (H*g*mm). f = Friction L = Coefficient of conveyor length meter. The conveyor length is about half the length of the entire belt. g = Acceleration due to gravity = 9.81 m/sec2 mi = Kg/m. Load due to idle of mb = Kg/m. Load due to belt of mm = kg/m. δ = load due to the inclined angle of the conveyor. H = vertical height meter of conveyor. Load due to idle (mi): This can be calculated as follows: mi = (mass of idle joe) / (idle vagina) ..... eqn.1.2 Note: Idler design for article conveyor belt system has a detailed description of how to calculate idle tank intervals. Power from drive pulley: The power required for the drive pulley can be calculated from the belt tension value as follows: Pp = (Tb*V)/1000.....eqn.1.3 Where, Pp is in KW. Tb = N. v = m / belt speed at stable state belt tension. Belt tension while starting the system: At first, the tension of the belt during the start of the conveyor system will be much higher than the tension in a stable state. You can calculate with belt tension during the start: Tbs = Tb*KS,..... eqn.1.5 where, Pm is kw. Pp = Kw Kd = drive efficiency is the power from the drive pulley. Acceleration: Acceleration: Acceleration of the conveyor belt can be calculated as follows: A = (Tbs - Tbs)/ [L *(2 * (2 * mi + 2 * 2 * mb + mm)..... eqn.1.6, A is a belt tension in a stable state in the length of the conveyor of the m/sec2 Tbs = N. Tb while starting in belt tension = N. L = meter. Load due to the idle load of mi = Kg/m. mb = Kg/m. load due to the load due to the belt of kg/m = due to the transported material of kg/m. Belt breaking strength: This parameter determines the choice of the conveyor belt. Belt destruction strength can be calculated by: Bs= (Cr*Pp)/ (Cv*V)..... where eqn.1.7, Bs is in Newton. Cr = Friction Factor Cv = Destruction Strength Loss Factor Pp = Power from Newton's Drive Pulley. M/ Second V = belt speed. Examples of conveyor belt calculation input data: Conveyor capacity (Cc) = 1500 t/h = 416.67 Kg/sec belt speed (V) = 1.5 m/sec conveyor height (H) = 20 m transfer or length (L) = 250 m mass idler (mi) = 20 Kg Idler interval (I') = 25 kg / m m ramp due to ramp slant. Conveyor (δ) = 5 0 coefficient of friction (f) = 0.02 start-up factor (Ks) = 1.5 drive efficiency (Kd) = 0.9 coefficient of friction coefficient (Cr) = 15 destruction strength loss factor (Cv) = 0.75 calculation: First, we use eqn.1.2 to figure out the load caused by idle: mi = (20/1.2= 16 Kg/M steady) Use eqn.1 to find belt tension in the state: Tb = 1.37*0.02*250*9.81*[16.67+ (2*25+ (416.67/1.5)]*cos (5)] + (20*9.81 * *=416.85*416.85.77). Belt tension while starting the system can be calculated by calculating power from the drive pulley using eqn.1.4: Tbs = 1.5 * 77556.88 = 116335.32 N, and we use eqn.1.3: Pp = (77556.88 *1.5)/ 1000 = 116.335kKwe uses a motor size of 1.5. Pm = 116.35/0.9 = 129.261 Kw We can tell the acceleration of the motor using eqn.1.6: A = (116335.32 - 7755 6.88)/ [250*((2*16.67) + (2*25) + (41) 6.67/1.5)]] = 0.429 m/sec2 Last, we will use eqn.1.7 to figure out the belt destruction strength: Bs = (15 *116.35) / (0.75 *1.5) = 1551.33 N/mm Bs value is used to select conveyor belts from the manufacturer's catalog. The conveyor belt calculation methodology discussed in the conclusion document should only be used for instructions to calculate the initial conveyor design parameters. Before you can build a prototype, you should use FEA or other similar tools to validate the final design. Reference Dunlop – Conveyor Belt Technical Design and Calculation Bridgestone Conveyor Belt Design Manual Conveyor Belt Design Manual Index Introduction Dunlop Conveyor Belt Range Belt Features Additional Features SABS Specifications Conveyor Belt Design Step Belt Steps Example 1: Symbol Table 2: Material Characteristics Table 2 (a): General Fluidity Decision of Conveyor Capacity Table 3: Capta Tread Belt Table 4: Recommended Maximum Belt for General Use Table Speed 5: Recommended Idler Interval Table 6: Sagging Factor Table 7 :Sagging Table 7 (A): Recommended Percentage Sagging Table 9: Estimated Belt Mass Table 9: General Mass of Rotating Parts of Idle 10: Moving Parts Table 11: Drive Factor Conveyor Belt Selection Table 12: Drive Factor Conveyor Belt Selection Table 12: Maximum Recommended Operating Tension Table 13 : Recommended Minimum Pulley Diameter Table 14: Load Support Table 15: The maximum number of ply recommended for correct empty belt tadding tables 16: body thickness table 17: belt body table 18: Mass wearing of mass thickness speed per table 19: minimum belt top cover gauge table table 20: Belt modulator calculation sheet 1: empty belt seat 2: full load belt seat 3: non-reduced load sheet sheet 4: belt length/rolling belt diameter useful data conversion element conveyor belt design manual introduction Dunlop African industrial product for estimating loaded tension tavolator vertical curve maximum slope angle graph reduction Industrial rubber products in South Africa. In fact, our belt systems can be seen in some highly productive factories around the world. You can expect more, considering that our belts are designed and manipulated only by industry-leading engineers and the best raw materials. Using the latest technology, many components have made years of improvement to achieve this technical precision. And all belts can provide maximum performance and maximum lifespan. And with about 750 000 available in various specifications, you can expect to find the right belt for your requirements no matter how professional. This manual contains all the elements, formulas, and tables needed to specify the correct belt. It has been compiled for your benefit, as a quick reference book for easy selection. However, if you have an application that does not apply to the following page, please contact Dunlop Africa Industrial Products. We are pleased to have an experienced and helpful team of engineers to help you. Our range of excellent products, competitive prices and impeccable service has earned dunlop a reputation as the first choice of African industrial products. Dunlop Conveyor Belt Range Dunlop African Industrial Products manufactures the most comprehensive range of conveyor belts in South Africa. Multi-pleated rubber cover conveyor belt XT fiber reinforced conveyor belt Grade M cut resistance cover Phoenix heat-resistant belt Super Phoenix heat-resistant belt Delta Hete heat resistance belt resistance belt Ruff top belt ripple ripple ring gray food belt salmon pink food belt endless wood belt belt endless wood belt oil resistance belt solid weaving PVC weaving PVC belt nitrile covered PVC belt steel belt resistant steel cord steel cord steel belt cut cut cord cord resistance M The reinforced conveyor belt covers the steel cord reinforced conveyor belt, the steel cord reinforced conveyor belt, the ripple detection loop, and the steel cord reinforced conveyor belt belt belt ring characteristic XT rubber conveyor belt (SABS 1173-19777) covers the cotton fin's orifs (SABS 1173-19777) from the earliest days. Progress has been made in the manufacture of all synthetic ply that offers many advantages. With the improvement of the flexible structure, the range of strengths has been greatly increased. Modern multi-pleated belts are manufactured with synthetic fiber bodies on wide slabs and then slit slits in width as required for individual orders. A wide range of belt specifications are available with a wide range of belt structures. The standard Grade N belt incorporates a cover suitable for handling most abrasive materials with a blend of natural and synthetic rubbers. Cutting resistanceXT rubber belt grade M belt The recommended natural rubber content for belts that operate in very tough conditions where cutting and gouging of the cover occurs. The Phoenix Heat-Resistant Belt Phoenix Heat-Resistant Belt Cover is based on styrene buttadeyen and is recommended for belt handling materials with temperatures up to 1200°C. Super Phoenix heat-resistant belt Super Phoenix heat-resistant belt has chlorobutyl cover and is recommended for belt handling materials with temperatures up to 1700C. The Resistant Belting (SABS 971-1980 Compliant) Resistant XT belt is particularly suitable for shaft applications as it is manufactured with a cover containing neoprene and multi-plebisin structures to meet stringent standards for the safety of all underground mining industries. Woodmaster this belt was developed especially for the wood industry. Rubber is compounded to provide resistance to oil and resin and is non-stained. It is a rough top package belt of two or three full synthetic corpse belts with a ruffled cover with a rough top belt. This range is ideal for the packaging and warehousing industry and baggage handling facilities such as airports and train stations. The Ripple Concentrater Belt Ripple Conveyor Belt has raised the edges, is 1 500 mm wide and comes in endless form. This belt is uniquely applied in gold mine concentrators. Food quality belt food quality belt is ideal for food in direct contact with the belt surface. The range of these belts is made of non-toxic materials, resistant to oil, fat and dyeing and meets the stringent hygiene requirements prescribed by the food processing industry. Both types are endless belts with gray food belts and salmon pink belts, and the entire XT range is available as a factory junction endless belt. This belt is recommended for short conveyor installations. (Suitable for lengths up to 50 people.) The Flinger Belt Flinger Belt is mounted on the Flinger conveyor, and its main function is to distribute the discharge material over a large area to minimize heap accumulation under the main conveyor. The rampage effect is achieved by running the Flinger belt at high speed in the U configuration. The Flinger belt is built into and treated on drums to remove bonded bonds. Solid weaving (PVC) belting (SABS 971-1980 compliance) is commonly known as 'Vinyplast' solid weaving PVC. This construction has essentially high fastener holding qualities. The belt consists of polyester and nylon with cotton gloves, and is impregnated with PVC and has a PVC cover. This belt is resistant to shock, tears, decay and wear and has been specially developed to meet the most stringent seismic standards. The nitrile cover of the covered (PVC) belt ring solid weaving PVC belt is specifically designed to meet SABS specifications for use in mines where fire hazards exist. In general, nitrile covers have good flame retardant properties and oil, wear and tear resistance. The steel cord belting (SABS 1366-1982) is designed for very long distances that do not achieve the strength required for fiber reinforcement or have too high a height under reference load. The resistance to severe impact and excellent tensile loads is achieved by wire reinforcement wrapped between the thick top and bottom covers of the highest quality rubber. These belts are designed to comply with or exceed the requirements of strict standards and provide a long belt life. Fireproof steel cord belt (SABS 1366. 1982 Type F compliance). Fireproof quality steel cord belts are made of specially composite rubber that render self-digestion. Fireproof tonic belts offer significant advantages in maintenance-free operation and long belt life for conveyors located in fire mines. The resistant belt oil-resistant beltring provides a synthetic fabric fly with an easy-to-clean cover of nitrile or neoprene. The choice of cover provides maximum resistance to minerals and vegetable oils, allowing users to deliver a variety of ingredients including minerals and vegetable oils. Additional functional lip protector additional functional lip protection can be integrated into the belt by arranging strong nylon fibers by the inclusion of a semi-directional or electronic loop. Fiber lip protection can be built into a belt that is 2 meters long on a regular basis or over the entire length of the belt. For applications with large mass sizes and adverse load conditions of shuron breaker Ply (XT belt) transported materials, open weaving breakers can be integrated under the top cover to further protect the body. The Chevron Breaker (XT Belt) steel tire cord separates the belt length at intervals and integrates it into a 'V shape'. It is especially recommended for XT belting, which has harsh conditions such as slag transport. Belt edges many conveyor belts track at any stage of life, causing edge damage to a large or lesser extent. The belt can be supplied with a slit or molded edge. Slit Edge: All synthetically generated bodies have good resistance to edge friction, due to the modern fiber structure there is no problem in performing hot slow splices or repairs due to the minimal penetration of moisture into the body. Molded edges: Molded rubber edges can be provided to protect the body from acids, chemicals and oils. In most applications, molded edges are unnecessary because synthetic fibers do not decay or degrade by fungi. SABS Specification Dunlop African Industrial Product Conveyor It complies with the stringent standards set by The SABS. SABS 1173-1977 - Universal fiber reinforced conveyor belt. SABS 971-1980 - Fire proof fiber reinforced conveyor belt. SABS 1366-1 982- Steel cord reinforced conveyor belt. The specifications cover the requirements of various conveyor belts and are classified according to the minimum full thickness breaking strength of the finished belt in kilonewton per meter width. More information about the SABS specification is available on request. About Conveyor Belt Design Conveyor Belt design conveyor belt consists of two main components of reinforcement or body that provide tensile strength of the belt, give stiffness to the load support and provide a means of binding to the belt. An elastic cover that protects the body from damage from the material being carried and provides a satisfactory surface that transmits drive power to the body. When choosing the belt that best suits a particular application, the tensile strength of the belt body should be sufficient to transmit the power needed to transmit the material at the relevant distance. The chosen belt body must have the characteristics necessary to provide load support for duty. When empty, adhere to the contours of the trudding idle and bend satisfactorily around the pulleys used in conveyor installations. The quality and gauge of the cover material must be able to withstand the physical and chemical effects of the delivered material. Belt tension maximum belt tension and therefore it is necessary to calculate the strength of the belt, it is necessary to calculate the effective tension first. The force required to move the conveyor and the load that is passed at a constant speed. Effective tension calculation is based on a constant speed conveyor, so the force required to move conveyors and materials is only the force that overcomes frictional resistance and gravity. To simplify the mass of moving parts, conveyors are considered to consist of interconnected unit length components. The mass of these units is called the mass of the moving part and is calculated by adding the total mass of the belt, the rotational mass of all hauling and returning idles, and the rotational mass of all pulleys. This sum is divided into horizontal lengths of the conveyor to obtain the average mass of all components. You cannot determine the mass for these components because the belt idle and pulleys were not initially selected. Therefore, the mass of the moving part is selected from the represented values that can be found in Table 10. As for components where the load being passed is considered to be evenly distributed according to the length of the conveyor, such as the mass of the load per unit length. Load mass per unit, given peak capacity in tons per hour Given by: Q = 0,278 v or Q = Δ S 3,600S effective tension consists of 4 components tension moving the empty belt Tx is a tension tie raise or load tz to move the load horizontally to overcome the resistance of the tu Power is standard for most conveyors with these four components Te = Tx + T + T + T + T + T + T + T + 9,8G x Fx X Lc Tz = 9,8Q x H adding resistance to various belt movements. The most common are the skirtboard and belt scrapers at the loading point. Other accessories include a removable tripper and belt plow. Skirtboard tuss = 9,8fs x Q x Ls S x b tension required to overcome the resistance of tension = scraper Tuc = X y x fc belt plow the additional tension required to overcome the resistance of each plough, tup = 1,5W moving tripper requires additional macraee in the system, so you need to add tension. If the mass of the additional pulley is contained in the mass of the moving part, no additional tension is added. However, if a separate calculation of the tension to overcome the resistance of the additional pulley is required, then the modified length Lc Short conveyor requires a relatively more force to overcome the friction resistance than the longer conveyor adjustment to the length of the conveyor used to determine the effective tension can be determined for each additional pulley, such as. The adjusted length is always greater than the actual horizontal length. The LC = L + 70 length calibration coefficient requires additional tension on the belt so that all conveyors can transfer effective tension to the belt without slipping. This tension, called slack side tension T2, is induced by the take-up system. For a simple horizontal conveyor, the maximum belt tension T1 is effective tension Te and loose side tension T2 i.e.: T1 = Te + T2 T1 is a tight side tension and 12 is inclined for a more complex conveyor profile, the additional tension is induced by the mass of the belt on the slope. This tension is called the gyeonggi 'h and increases the overall tension. Therefore, t1 = Te + T2 + Th slack side tension is determined by taking into account the two conditions that must be met on the conveyor. The first condition is that there must be enough tension on the spare side to prevent belt slipping on the drive. The second condition is that there must be sufficient tension to prevent excessive sagging between the carrying idle. The minimum tension that prevents slipping at the point where the relationship between T1 and T2 is slipping is T1 = Te + T2 Expression 1: ey - 1 is called drive factor k, and the value of T2 that should prevent slipping is called minimum to prevent slip Tm, and therefore the TM = k x Te minimum tension is the tension required to limit the belt chug. On the combined mass of the belt and load, the amount of sagging and allowed sagging of the carry idle. Ts = 9,8Sf x (B+Q) x ld slack side tension values must ensure that both conditions are met, so T2 tm or Ts. Slope tension Th incline is a product of belt weight and vertical lift and can have maximum value at the highest point of the conveyor. Th = 9,8B x H unit tension T maximum belt tension T1 has the total width of the belt reference width. Typically, this is the reference dimension for belt strength, so it is converted to tension per belt width unit. The amount of power required for the absorbent power conveyor is based on the same power definition as the product of the applied force and the speed at which the conveyor belt moves. Applied force is an effective tension, and therefore the power required for the shaft of the drive pulley/s determines an example of belt tension increase as an example of belt tension calculation as an example of P = Te x S STEP BY STEP belt tension calculation: belt width 900m conveyor length 250m 20m capacity 400 m/hr belt

speed 1,4m/hr lift 1,4m/hr lift 1,4m/200 drive pull. Take-up gravity Idler interval 1,2 m Idler roll diameter 127 mm unit length Q = 0,278 φ S = 0,278 x 400 1,4 4 4 4 = 79,4 kg/m 2. Table 10 looks up the mass value of the moving part. Applications are considered medium-sized from the diameter of the ngler roll and the characteristics of the material passed. For belts with a width of 900 mm, the mass of moving parts in Table 10 is 55 kg/m 3. Calculatethe calibrated length and length compensation coefficient. LC = L + 70 = 250 + 70 = 320 m C = LC L = 320 250 = 1,28 4. Tension moving the empty belt. TX = 9,8G x fX x LC = 9,8 x 55 x 0,022 x 320 = 3794 N 5. Tension that moves the load horizontally. TX = 9,8Q x fY x LC = 9,8 x 79,4 x 0,027 x 320 = 6723 N 6. You can lift the tension to lift the load. TZ = 9,8Q x H = 9,8 x 79,4 x 20 = 15562 N 7. Because accessories do not exist, the tension to overcome the resistance of the accessory is zero. 8. Effective stress. Te = TX + TY + TZ + TU = 3794 + 6723 + 15562 + 0 = 26079 N 9. Absorbing Power P = Te x S = 26079 x 1,4 = 36511W 10. Relax the side tension. Loosen the side tension to prevent slippage. As shown in Table 11, the drive coefficient for the 210-degree lap and the lagging pulley is 0,38. Tm = k x Te = 0,38 x 36079 = 9910 N Slack side tension limits sagging to 2%. Deflection 2% deflection meter is 6,3 and the expected belt mass with medium load and 900mm belt width, As given in Table 8, 11,1kg/m. TS = 9,8Sf (B+Q) x Id = 9,8 x 6,3 x (11,1 + 79,4) x 1,2 = 6705 N required slack side tension is greater than TM or TS and thus T2 = 9910 N 11. Slope tension using the estimated belt mass found in medium load and 900mm belt width table: Th = 9,8B x H = 9,8 x 11,1 x 20 = 2176 N 12. Maximum belt T1 = Te + T2 + Th = 26079 + 9910 + 2176 = 38165 N Maximum belt tension is converted to unit tension. Effective tension. T = T = T1 W = 38165 900 = 42,4 N/mm = 42,4 kN/m = 42,4 kN/m Table 1 Table Symbol Description Unit Description Unit Scraper Blade m2 Sf contact area sagging coefficient B belt mass unit length kg/m T unit tension kN/m b width skirt plate m T1 maximum belt tension full belt tension N Bc edge distance mm T2 slack side tension N C length correction coefficient te effective tension N D material density kg/m3 Th slope tension N Dt diameter pulley t mm Tm minimum tension is the pulley bearing mm Tf minimum tension of the sliding N-degree diameter to scraper to tension To overcome, the scraper Tf friction coefficient for scraper-to-tension is limited to overcome the tension n tension to overcome the resistance of tension N fx tension to overcome tension n tension. By moving the empty belt N G mass of the moving part kg / m tie tension to move the load N Id Idler interval (carry idlers) m W belt width mm k drive coefficient to move the high level H H change along the conveyor length m Tz tension to drive the L horizontal length to circulate the folds of the lap of the drive radian radiance radian. The length of the conveyor m is the pressure of the scraper of the belt N /m2 Ls length of the skirtboard m per hour t/hr P absorption power W β trope angle Q mass unit length kg / m α material surcharge angle S belt speed m / s table 2 material characteristics characteristics grade bulk density (t /m3) angle (max) Conv. Slope (dodo) acid phosphate MA N 0,96 10 13 alums NA N 0,80 25 22 aluminum sulfate NA N 0,90 20 17 ammonium flamer N 0,80 10 10 ammonium ammonium MA N 0,70 25 23 ammonium sulfate, sulfate Ammonium sulfate, granulated MA N 0,80 10 10 asbestos ore or rock VA /M 1,30 20 18 asbestos crushing MA N 0,37 30 30 ash, coal, dry MA N 0,60 25 23 ash, coal, Wet MA N 0,75 25 25 Ash, Fly MA N 0,70 30 23 Ash, Gas Producer, Wet MA N 1,20 30 28 Asphalt NA N 1,30 30 Bagase NA N/PHR 0,13 30 30 30 30 30 Bark, Wood, Rejection NA N N/GF 0,60 10 12 12 , 10 12 Barytese 10, Mit1 10, Ground, Dry VA N/M 1,10 18 Bauxite, Mine Run VA N/M 1,36 20 17 Bauxite, Grinding, 75mm VA N/M 1,30 20 20 Beans or N/GF 0,70 5 bits, Pulp, Dry N/GF 0,220, 20, 20, 20 Dry NA N/GF 0,22 30, Pulp, Wet NA N/GF 0,60 30 25 Bits, Full NA N/GF 0,76 20 Borox MA N 0,90 20 20 Brand NA N/GF 0,30 10 12 Brewers Grain, Spend, Dry NA N/GF 0,45 30 2 7 Brewers Grain, Spend, Wet NA N/GF 0,90 30 27 Brick VA N/M 1,76 30 27 Calcium Carbide MA N 1,20 20 18 Carbon Black, Pelletis MA N 0,35 5 5 Cabororundum 75mm VA N/M 1,60 15 Cashew MA N/GF 56 30 22 cement cement, Portland NA N/PHR 1,50 25 20 cement, aerated NA N/PHR 1,06 5 10 cement clinker MA N/DHR 1,36 25 18 chalk, bumpy MA N 1,30 10 15 chalk, 100 Mesh and MA N 1,10 25 28 Charcoal MA N 0,35 25 22 Chrome Ore HA /S N 2,10 10 10 10 17 Cinders Furnace MA N/M 0,90 10 18 Synder, Coal MA N 0,65 20 20 Clay, Calcine MA N 1,44 25 25 20 Clay Dry, fine MA N 1,76 20 22 clay, dry, Bumpy VA N 1,10 20 20 Coal, Prom, 3mm and NA N/PVC 0,96 20 18 Coal, Prom, Size NA N/PVC 0,90 10 16 Coal, Bituminous, Mining 50 Mesh and NA N/PVC 0,83 30 24 Coal NA N/PVC 0,80 20 16 coal, bituminous, mining, mining MA N/PVC 0,90 25 18 coal, bituminous, mining, slack 12mm and MA N/PVC 0,75 25 22 coal, lignite MA N/PVC 0,75 25 22 cocoa beans NA n/GF, 10 1010 10 M,08 oil, calcined VA N/M 0,64 20 20 20 Cola, wind, 6mm and VA N/M 0,48 20 22 concrete, 100mm lump VA N/M 2,10 18 concrete wet VA N/M 2,20 24 18 Copper ore VA N/M 2,17 20 20 Copper sulfate VA N/M 1,30 20 17 corn, ear NA N/GF 0,90 25 18 corn, peeled NA N/GF 0,70 10 10 cornmill na n/GF 0,6 5 20 20 2 2 Cotton Cake NA N/GF 0,67 20 20 Gullet HA/S M 1,60 20 20 Dolomites VA N/M 1,60 18 20 Earth , digging, drying VA N/M 1,20 20 earth, wet, clay MA N 1,70 30 23 Feldspar VA N/M 1,44 25 17 flaxseed MA O 0,70 12 flour, Mill NA N/GF 0,60 30 21 Fluerspa MA N 1,70 30 30 sand, VA M/PHR 1,36 25 20 Fuller Earth, Dry MA N N 0,50 10 15 Fuller Earth, Oily MA O 1,00 20 20 Glass Batch HA/S M 1,44 10 22 Grain, Distillery, Dry NA N/GF 0,48 10 15 Granite, Broken, 75mm Lump VA N/M 10 18 Graphite, Flake NA N 0,65 10 15 Gravel, Bank Run N 25 Drying, Sharp VA N/M 1,52 20 16 Gravel, Va N/M 1,52 10 Plaster 20 Gypsum, dust, silent MA N 1,50 Dust, dust, aerated MA N 1,04 30 23 plaster, 12mm screening MA N 1,20 25 plaster, 75mm lump MA N 1,20 10 15 Ilemenite ore MA N 2,40 18 iron ore, rough crushing VA N/M 3,00 20 18 iron ore, crushed fine VA/M 3,50 20 clay 75mm and MA N 1,00 20 19 lead ores MA N 3,80 10 15 lead oxide, heavy MA N 2,40 25 20 lead oxide, light MA N 1,20 25 20 Lignite, air drying MA N 0, 80 10 18 ground, air drying MA N 0,80 10 3mm less NA N 1,00 30 23 limes, hydration NA N 0,60 25 21 limes, pebble MA N 0,90 10 10 17 limestone , Agriculture 3mm and MA N 1,10 10 20 limestone, crushed MA N 1,40 25 18 Lynded Cake NA OR /PVC 0,80 20 15 Flaxseed Meal NA OR/PVC 0,43 20 20 Litharge, Grinding (lead oxide) MA N 3,60 10 15 magnesium chloride MAGNESIA N N 0,53 30 23 magnesium sulfate MA N 1,110 10 15 men's ore VA N/M 2,15 20 manganese sulfate MA N 1,10 10 15 marble, 12 mm and VA N/M 1,40 10 15 Mika, Ground MA N 0,22 20 20 23 Mika, Crushed MA N 0,22 10 15 Mika, Flake MA N 0,32 5 5 8 Molybdenite, Powder MA N 1,70 20 25 Mortar, Wet VA N/M 2,20 24 18 Nickel Cobalt VA N/M 1,80 10 Oats NA GF/PVC 0,42 Peanuts 10 Peanuts NA N N,27 10 8 , Shell NA GF/PVC 0,65 10 0,75 5 8 phosphates, Triple Super Ground Fertilizer MA N/OR/PVC 0,80 20 18 Phosphate Rock, Broken, Dry VA N/M 20 18 Phosphate Rock, Crushed VA N/M 2,10 25 18 Potash Ore MA N N 1,30 10 10 Pumice, 3mm and MA N 0,67 30 50 -75 mass VA N N, 20 Pys 2, 20, 20, 20, 20, Pellet VA N/M 2,00 10 15 Quartz HA / S N/M 1,36 10 15 Rice GF / PVC 0,65 5 8 Rocks, Crushing HA / S N /M 2,15 20 18 Rubber, Pelletification MA N 0,80 20 22 rubber, recovery NA N 0,45 20 18 Rina GF / PVC 0,70 10 8 salt, general drying, coarse MA N / GF / PVC 0,75 10 20 salt , Usually dry, fine MA GF/PVC 1,20 10 11 sand, bank, damp VA N/M 1,90 30 22 sand, bank, dry VA N/M 1,60 20 18 sand, casting, manufactured VA N/M 1,36 30 24 sand, casting, shake-out VA N/M/PHR/PHR 25, Shake Out VA N/M/PHR/PHR 25, ShakeOut VA N/M/PHR/PHR, 20, Dry VA N/M 1,50 10 12 Sand, Core VA N/M 1,04 25 26 Sandstone, Broken VA N/M 1,44 20 20 20 20 Top Bob na N/OR/PVC/W/20 25 20, Broken N, 10 10, Broken N1/PVC/W 25 20, Broken N, 10 0 18 shale, crushing MA N 1,40 25 22 Sinter VA N/M/PHR 1,80 10 15 slag, furnace, crushed VA M/PHR/DHR 1,36 10 10 slag , furnace, granular, dry VA M/PHR/DHR 10 15 slag, furnace, granules, wet VA N/M 1,50 30 22 slate MA N 1,36 20 18 soaps, beads or granules NA N/PVC 0,32 10 12 soaps, NA N/PVC 0,32 10 18 ash soda, MA carbon 70, 70, 70, Heavy MA 20, 00 Lite MA N 0,43 25 22 Sodium N 1,20 10 11 Sodium Phosphate MA N 0,90 10 16 Beams, Cracked GF / PVC 0,56 20 18 Soya Beans, Full NA GF / PVC 0,77 10 14 Starch NA GF 0,60 10 12 steel trimming HA/S M 2,40 20 18 sugar, granule NA GF 0,83 10 15 sugar, raw, cane MA N 0,96 20 22 sulfate salt powder MA N 0,90 10 21 Talc , Powder NA N 0,90 10 10 Titanium Ore VA N/M 2,40 10 18 Titanium Sponge MA N 1,04 30 25 Traplock VA N/M 1,60 20 18 Triple Super Phosphoric acid MA N/OR/PVC 0,80 20 18 Vermiculite, Ma 20, N 20, 20 Crushed NA GF 0,65 20 20 20 Mil NA N /GF /PVC 0,77 10 12 Wood chip NA OR /W 0,32 30 27 zinc ore, crushed HA/S M 2,60 25 22 zinc ore, baked HA/SPHR/DHR 1,76 25 25 25 Features Key: HA/SPHR/DHR 1,76 25 25 Features Key: HA/SPHR Polishing /Sharp MA - Mild Abrasive NA - Non-Abrasive VA - Very Abrasive Cover Grade Code : N - SASS 1173 NH Polyysophin M - High natural rubber content SASS 1173 or - oil-resistant GF - gray food PHR - Phoenix resistant SPHR - Super Phoenix heat-resistant SPHR - Super Phoenix heat resistant W - Master DHR resistant W - Master DHR - Delta Het Heat-resistant PVC - Poly chloride FR - Fireproof SASS 971 Table 2 (a) Typical liquidity angle surcharge α angle of material properties 5° 0 ° - 19 ° uniform size 10 ° 20 ° - 29° round, dry, Medium weight 20 ° 30° - 34° subdivision mass (coal, clay) 25° 35° - 39° coal, The capacity of the crystal valley belt of stone, ore 30 ° 40 ° - 45° conveyor capacity is a function of: the capacity of the low-light belt is a cross-sectional area of the load that can be carried without spill. Belt speed. Material density. Section areas are affected by many factors, including the flow ability of . Angle and inclination angle of additional charge at the load point of the conveyor. To achieve optimal load areas, the loading chute must be designed to ensure the most favorable initial load shape, which can only be achieved if the load is centered on the belt. The material approaches the speed of the belt in the direction of belt movement. In the load area, the angle of inclination should be less than 1 to O, and to ensure that the optimal load geometry remains along the entire belt length: the idler pitch should be as limited to acceptable sagging. The belt should be properly trained. The size of the lump associated with the belt width should be within the recommended limits. The belt must support the load appropriately. Under ideal conditions, the cross-sectional load area is: in = (Ab +As) / 106 Where Ab = (0,371W + 6,3+ M x cosβ) (M x sinβ) As = (0,186W + 3,2 + M x cosβ) 2 (γα - sinΣα) sinα 180 2 M = 34 - 34 mm (mm) Edge distance (mm) β - ironing angle (degree) α - material surcharge angle (degree) - cross-section load area (m2) tone / time belt capacity capacity = 3,6At x D X S position D - Material density (kg/m3) S - belt speed (m/m3) S - Belt speed (m/m3) S- Belt speed (m/s) table 3ROUGH Time mass size trough angle area 0,5 0,8 1,2 1,2,2,2,2,600 1200 125 200 0,033 59 95 192 190 236 297 35 7 27 0,037 66 106 160 213 266 333 400 300 000 000 038 69 110 164 218 274 342 410 35 0,040 72 115 173 230 288 360 432 0,042 76 121 181 242 303 378 436 750 150 250 200 0,054 97 156 233 311 389 486 583 27 0,060 109 173 259 346 432 540 648 30 0,062 112 179 268 357 446 558 670 35 0,065 117 187 281 375 468 585 702 45 0,068 122 196 294 392 490 612 734 900 175 300 20 0,080 144 230 346 461 576 720 864 27 0,090 162 259 389 518 648 810 972 30 0,092 166 265 397 530 662 828 994 35 0,096 173 276 415 553 691 864 1037 45 0,101 182 291 436 582 727 909 1091 1050 200 350 20 0,111 200 320 480 639 799 1000 1199 27 0,124 223 357 536 714 839 1116 1339 30 0,128 230 369 553 737 922 1152 1382 35 0,134 241 386 579 772 965 1206 1447 45 0,140 252 403 605 806 1008 1260 1512 1200 250 400 20 0,147 265 423 635 847 1058 1323 1588 27 0,165 297 475 713 950 1188 1485 1782 30 0,170 306 490 734 979 1224 1530 1836 35 0,178 320 513 769 1025 1282 1602 1922 45 0,186 335 536 804 1071 1339 1674 2009 1350 275 500 20 0,189 340 544 816 1089 1361 1701 2041 27 0,211 380 608 912 1215 1519 1899 2279 30 0,217 391 625 937 1250 1562 1953 2344 35 0,227 409 654 981 1308 1634 2043 2452 45 0,238 428 685 1028 1371 1714 2142 2570 1500 300 600 20 0,235 423 676 1015 1357 1692 2115 2538 27 0,263 473 757 1136 1515 1894 2367 2840 30 0,271 488 780 1171 1561 1951 2439 2927 35 0,283 509 815 1223 1630 2038 2547 3056 45 0,296 533 852 1279 1905 2131 2664 3197 1650 350 700 20 0,286 515 824 1236 1649 2059 2574 3089 27 0,321 578 924 1387 1849 2311 2889 3467 30 0,330 594 950 1426 1901 2367 2970 35 0,345 621 994 1490 1987 2484 3105 3726 45 0,361 650 1040 1560 2079 2599 3249 3899 1800 350 700 20 0,343 617 988 1482 1976 2470 3087 3704 27 0,384 691 1106 1659 2212 2765 3456 4147 30 0,395 711 1138 1706 2275 2844 3555 4266 35 0,413 743 1189 1784 2379 2976 3717 4460 45 0,432 778 1244 1866 2488 3110 3888 4666 2100 350 700 20 0,472 850 1359 2039 2719 3398 4248 5098 27 0,528 950 1521 2281 3041 3802 4752 5702 30 0,543 977 1564 2346 3128 3910 4887 5864 35 0,568 1022 1636 2454 3272 4090 5112 6134 45 0,594 1069 1711 2566 3421 4277 5346 6415 2200 350 700 20 0,519 934 1495 2245 2989 3737 4671 6505 27 0,581 1046 1673 2510 3347 4183 5229 6275 30 0,598 1076 1722 2583 3444 4306 5382 6458 35 0,625 1125 1800 2700 3600 4500 5625 6750 45 0,654 1161 1858 2786 3715 4644 5805 6966 Table 4 Maximum Belt Speed Recommended for General Use (meters per second)* Belt width (mm) grain or mine coal and earth + hard ores and other free flowing materials of stone run - basic grinding ++ 300 2,5 1,5 1,5 400 2,5 2,5 0 1,800 3,0 20,0 60,0,0,0 0,0 0 0,0 0,00 40,0 0 0 0 3 3 3 3 3,0 1050 4,0 3,0 1200 4,6 3,3 1350 5,0 3,3 1500 5,0 3,3 3,3 3 3 3 3,0 3,0 3,0 3,8 2000 over 4,0 3,800 and 4,0 3,800 4,0 3,800 * + Moderately polished material. ++ Very abrasive material. Note: For belts loaded on more than 100 slopes, you may need to reduce the speed above to achieve maximum capacity. Table 5 Recommended IDLER SPACING Belt Width (mm) Tareing Idler (t/m3) Material Mass Density (t/m3) 0,5 0,8 1,2 1,6 2,0 2,0 2,0 2,0 2,0 3,0 450 1,5 1,5 1,5 1,5 1,5 1,5 1,4,1,1,155 1,5 1,5 5 1,5 4 1,4 1,4 1,00 1,5 51,5 1,4 1,4 1,4 1,2 1,2 1,2 1,2 1,2 1,0 3 1050 1,2 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 0 0 0,000 0,9 000 0,9,9,9,000,000 1,0,9 0,000 1,2650 1,2650 1,000 1,000 1,000 0,9 0,9 0,9 0,9 0,9 0,010 1,000 0,900 0,900 0,900 0,900 0,9,8 3 table 6 friction factor symbol technical friction factor normal description conditions maximum horizontal value of 25 meters. Normal operating conditions. Horizontal length of more than 250 meters. A very well-aligned structure with no slanted idle lights. Horizontal length of more than 500 meters. Play conveyor. fC friction coefficient 0,600 0,600 0,600 0,600 fS friction coefficient 0,650 0,650 0,650 fX friction coefficient 0,022 0,022 0,022 0,020 0,028 fY friction coefficient 0,027 0,0,000 22 0,020 0,020 0,018 TABLE 7 SAG FACTOR Ratio Chug Factor SF 3% 4,2% 6,3 1,5% 8,4 Table 7 (7 a) Recommended Percentage SAG Trough Angle (also) Maximum Chunk Size Max Mass Up To Fine Material Mass 20 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 3% 2% 2% 2 % 2% 45 3% 2% 1,5% Table 8 Estimated belt mass B belt width (mm) operating conditions light duty (kg/m) heavy duty (kg/m) heavy duty (kg/m) heavy duty (kg/m) intermediate (kg/m) heavy duty (kg/m) intermediate (kg/m) heavy load (kg/m) heavy equipment (kg/m) 500 4,1 6,2 10,3 600 5,0 7,4 12,3 750 6,2 9,3 15,5 900 7,4 11,18,5 1050 8,6 21,6 1200 9,8 14,8 24,7 1350 11,0 16,7 27,8 1500 12,3 18,6,6 30,9 1650 13,5 20,5 33,9 1 800 14 22,337,0 2100 17,2200 43,3 2200 18,0 27,3 45,3 Notes: The value given to the table is an estimate for use in the maximum belt operating tension calculation required to make the correct belt selection. Once the belt specification is determined, you should more accurately check the mass in Table 17. If the actual mass of the specification is significantly different from the approximate value obtained from the table, the tension calculation should be reconfirmed using a more accurate belt mass. TABLE 9 TYPICAL MASS OF ROTATING PARTS OF IDLERS (kg/m) Belt Width 3 Roll Carry Idlers Return Idlers 3 Roll Impact Idlers Roll Dia Roll Dia Roll Dia 102 127 152 102 127 152 133 159 450 8,0 10,5 13,1 6,0 7,7 9,4 8,8 11,5 500 8,5 11,1 13,9 6,5 8,4 10,1 9,3 12,2 600 9,5 12,4 15,4 7,5 9,6 11,6 10,4 13,6 750 11,0 14,2 17,6 9,0 11,4 13,9 12,1 15,6 900 12,5 16,1 19,9 10,6 13,3 16,1 13,8 17,7 1050 14,0 18,0 22,2 12,1 15,2 18,4 15,4 18,8 1200 15,5 19,9 24,4 13,6 17,1 20,6 17,1 21,9 1350 17,0 21,8 26,6 15,1 19,0 22,9 18,7 24,0 1500 18,5 23,6 28,9 16,6 20,8 25,1 20,3 26,0 1650 20,0 25,5 31,2 18,1 22,7 27,4 22,0 28,9 1800 21,6 27,4 33,4 19,6 25,6 29,6 23,8 30,1 2100 24,6 31,2 37,9 22,6 28,4 34,2 27,1 34,3 2200 25,6 32,4 39,4 23,6 29,6 35,7 28,2 35,6 2400 27,6 34,9 42,4 25,7 32,1 38,7 30,4 38,4 table 10 mass of moving parts G belt width (mm) mass of moving parts (kg /m) thin ball 102mm Idlers light belt lightweight belt heavy dew 127mm Idlers middle belt heavy duty 152mm Idlers Heavy Belt Extra Heavy Duty 152mm Idlers Steel Cord Belt 450 23 25 33 600 29 36 45 49 750 37 46 57 63 900 45 55 70 79 10 50 52 62 62 94 1200 63 71 95 110 1350 70 82 107 127 1500 91 121 121 143 1650 100 10 0 132 160 14 14 178 21000 168 2100 168 2100 168 210 -200 -2020 > > -200 -200 -200 -200

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