Selection Guide for Quarry Conveyor Belts

1. Selection Principles

The selection of quarry conveyor belts shall follow the core principles of "adapting to working conditions, ensuring safety and efficiency, balancing cost and service life", and fully consider the material characteristics, environmental conditions, conveying parameters and actual operation needs of the quarry. The selection shall not only meet the technical requirements of stable operation, but also avoid excessive configuration (resulting in cost waste) or insufficient configuration (resulting in shortened service life and frequent failures).

Key principles: 1. Adapt to the wear and impact level of materials; 2. Match the conveying distance and load; 3. Adapt to the environmental temperature and dust conditions; 4. Comply with relevant national/industrial standards; 5. Combine the actual operation and maintenance conditions of the quarry.

2. Selection Preparation and Parameter Determination

2.1 Collect Working Condition Parameters

Before selection, it is necessary to accurately collect the following key working condition parameters to provide a basis for the selection of conveyor belt type, specification and performance:

- Material Parameters: Type (granite, limestone, etc.), maximum particle size, density, humidity, whether there are sharp edges and corners, and daily conveying capacity (t/h).
- Conveying Parameters: Conveying distance (single section), conveying inclination angle, conveyor belt speed (m/s), installation form (open-air, closed corridor).
- Environmental Parameters: Maximum and minimum ambient temperature, dust concentration, whether there is corrosive dust, whether it is exposed to long-term ultraviolet radiation and rain erosion.
- Operation Requirements: Continuous operation time (h/d), maintenance cycle, joint form (hot vulcanization, cold bonding), service life expectation (months/years).

2.2 Determine Core Selection Indicators

Based on the collected working condition parameters, determine the core indicators affecting the selection, including: tensile strength, cover rubber thickness and wear resistance, core layer

type, belt width, and special performance requirements (high/low temperature resistance, flame retardancy, etc.).

3. Step-by-Step Selection Process

3.1 Step 1: Determine the Core Layer Type (Fabric Core/Steel Cord Core)

The core layer type is determined according to the conveying distance and load, which is the basis of conveyor belt selection:

- Fabric Core Conveyor Belt (EP/NN): Suitable for short-distance (<100m) and medium-distance (100～300m) conveying, medium-light load, and small impact load. Among them, EP fabric core is preferred for medium-long distance and medium-heavy load (good dimensional stability, no elongation); NN fabric core is suitable for short-distance and high-impact scenarios (good elasticity, strong impact resistance); CC fabric core is only used for small-scale, light-load and short-distance temporary conveying.
- Steel Cord Conveyor Belt (ST): Suitable for long-distance (>300m), heavy-load, high-tension conveying scenarios, especially for ultra-long distance (>1000m) and large conveying capacity. It has high tensile strength, good impact resistance and long service life, but the cost is higher than that of fabric core conveyor belts.

3.2 Step 2: Determine the Belt Width

The belt width is determined according to the daily conveying capacity, material particle size and conveyor belt speed, and the following principles shall be followed:

- The maximum particle size of the material shall not exceed 1/3 of the belt width (to avoid material leakage and belt damage);
- Under the same conveying speed, the larger the belt width, the greater the conveying capacity; the conveying capacity can be adjusted by adjusting the belt width and speed;
- Mainstream belt width specifications for quarries: 500mm, 650mm, 800mm, 1000mm, 1200mm, 1400mm+; small quarries usually choose 500～650mm, mainstream quarries choose 800～1000mm, and large aggregate lines choose 1200mm+.

3.3 Step 3: Determine the Core Layer Specification and Number of Layers (Fabric Core)

For fabric core conveyor belts, the core layer specification (EP/NN grade) and number of layers are determined according to the tensile force required for conveying, which is related to the conveying distance and load:

- EP Fabric Core: Common specifications are EP100, EP200, EP300, EP400, EP500. The larger the grade, the higher the tensile strength. For short-distance light load (500mm belt width), EP100 is selected; for medium-distance medium load (800mm belt width), EP200～EP300 is selected; for medium-long distance heavy load (1200mm belt width), EP400～EP500 is selected.
- NN Fabric Core: Common specifications are NN200, NN300, NN400. It is suitable for short-distance high-impact scenarios. For example, 650mm belt width and short-distance high-impact conveying can choose NN200～NN300.
- Number of Layers: Usually 2～6 layers. The larger the belt width, the greater the tensile force, and the more the number of layers. For example, 500mm belt width chooses 2～3 layers, 800mm belt width chooses 4～5 layers, and 1200mm belt width chooses 6 layers.

3.4 Step 4: Determine the Belt Strength Specification (Steel Cord Core)

For steel cord conveyor belts, the belt strength specification (ST grade) is determined according to the conveying distance and load, corresponding to the rated tensile strength per meter width:

- Common specifications: ST630～ST5400. The longer the conveying distance and the heavier the load, the higher the grade.
- Selection reference: Medium-long distance (1000mm belt width) chooses ST1000～ST1600; long-distance high-tension (1200mm belt width) chooses ST1600～ST2500; ultra-long distance heavy load (1400mm+ belt width) chooses ST2500～ST5400.

3.5 Step 5: Determine the Cover Rubber Thickness and Performance

The cover rubber thickness and performance are determined according to the material wear degree and impact load, which directly affects the service life of the conveyor belt:

- Conventional Wear Section (non-impact area, material particle size ⩽300mm): Working surface cover rubber 6～8mm, non-working surface 3～4mm, wear loss ⩽120 mm^3 (DIN 53516 standard).
- Impact Section (crushing mouth, transfer point, material particle size 300～600mm): Working surface cover rubber 8～12mm, non-working surface 4～6mm, wear loss ⩽100 mm^3.
- High-Impact and Ultra-Sharp Material Section (material with sharp edges and corners, particle size >600mm): Working surface cover rubber 12～15mm, non-working surface 6mm, wear loss ⩽100 mm^3.

- Special Performance Requirements: For cold areas (temperature ≤-30°C), choose low-temperature resistant cover rubber (no cracking at low temperature); for closed corridors, choose flame-retardant cover rubber (comply with GB/T 10822-2021); for quarries with corrosive dust, choose corrosion-resistant cover rubber.

3.6 Step 6: Determine the Edge Rubber and Joint Form

- Edge Rubber: Uniformly adopt wear-resistant rubber of the same material as the cover rubber, thickness ≥10mm, width ≥50mm, to prevent edge wear and cracking.
- Joint Form: Hot vulcanized joint is preferred (joint efficiency: fabric core ≥90%, steel cord core ≥95%), which ensures high joint strength and long service life; cold-bonded joint is only applicable to fabric core conveyor belts (joint efficiency ≥80%) for temporary maintenance.

4. Typical Selection Examples

Combined with mainstream quarry working conditions, the following typical selection examples are provided for reference, and customized selection can be carried out according to actual parameters:

- Example 1: Small Quarry, Short-Distance Light Load
  Working Conditions: Conveying distance 50m, horizontal conveying, material: limestone (particle size 0～100mm), conveying capacity 50t/h, open-air operation, ambient temperature -10°C～+60°C.
  Selection: Fabric core conveyor belt, belt width 500mm, core layer type EP100, 2～3 layers, cover rubber thickness 6/3mm, hot vulcanized joint.
- Example 2: Mainstream Quarry, Medium-Distance Medium Load
  Working Conditions: Conveying distance 200m, inclination angle 10°, material: granite (particle size 0～300mm), conveying capacity 200t/h, open-air operation, ambient temperature -20°C～+70°C.
  Selection: Fabric core conveyor belt, belt width 800mm, core layer type EP200～EP300, 4～5 layers, cover rubber thickness 8/4mm, hot vulcanized joint.
- Example 3: Medium-Sized Mine, Medium-Long Distance Heavy Load
  Working Conditions: Conveying distance 400m, inclination angle 15°, material: basalt (particle size 0～400mm), conveying capacity 300t/h, semi-open-air operation, ambient temperature -25°C～+75°C.
  Selection: Steel cord conveyor belt, belt width 1000mm, belt strength ST1000～ST1600, steel cord diameter 3.0～4.0mm, cover rubber thickness 10/5mm, hot vulcanized joint.

- Example 4: Large Aggregate Line, Ultra-Long Distance Heavy Load
  Working Conditions: Conveying distance 1200m, inclination angle 12°, material: ore (particle size 0～600mm), conveying capacity 500t/h, closed corridor + open-air, ambient temperature -30°C～+80°C.
  Selection: Steel cord conveyor belt, belt width 1400mm, belt strength ST2500～ST3150, steel cord diameter 5.0～6.0mm, cover rubber thickness 12～15/6mm, flame-retardant cover rubber (closed corridor), hot vulcanized joint.

5. Selection Notes

- Avoid under-configuration: Do not choose a conveyor belt with insufficient tensile strength or too thin cover rubber to avoid premature wear, tearing and other failures, which will affect production efficiency.
- Avoid over-configuration: Do not choose a high-specification conveyor belt (such as steel cord conveyor belt for short-distance light load) to avoid unnecessary cost waste.
- Pay attention to environmental adaptation: For cold areas, avoid using ordinary rubber conveyor belts (easy to crack at low temperature); for closed corridors, must choose flame-retardant conveyor belts to comply with safety standards.
- Combine maintenance conditions: If the quarry has limited maintenance capacity, it is recommended to choose fabric core conveyor belts (simple maintenance, low maintenance cost); if long service life is required and maintenance conditions are good, steel cord conveyor belts can be selected.
- Refer to relevant standards: When selecting, refer to national, industrial and international standards, as well as the technical parameters of conveyor belts, to ensure that the selected products meet the technical requirements.

6. Supplementary Provisions

- This selection guide shall take effect from the date of issuance. For matters not covered herein, reference may be made to relevant national and industrial standards and the technical white paper on quarry conveyor belts.
- This selection guide shall be explained by the issuer. If there is technological upgrading or standard update, this guide will be revised in a timely manner and notified separately after revision.
- This selection guide is only applicable to the selection of special conveyor belts for quarries. Conveyor belts used in other scenarios (such as underground, chemical industry, etc.) must additionally comply with relevant special standards.