A power-saving conduction belt with an improvement in conduction efficiency.

Energy-saving Conduction Belt (Energy-saving Red)

Feature

- Saves a maximum of 6% of energy, thus contributing to CO_2 reduction.
- No pulley replacement is required.
- A compact product with a long life.

Overview (Technical principles, actions, etc.)

Conventional installations, such as fans, use many classical belts. Classical belts are M-, A-, B-, C-, D-, and E-type V-belts, and the perimeter of each of these belts is covered with canvas.

Among them, standard belts made of crude rubber are inexpensive and easy to acquire. Therefore, a large number of machines use standard belts. The Energy-saving Red uses synthetic rubber to ensure higher load durability and a longer life compared with conventional belts. The bottom rubber part of the Energy-saving Red is notched to reduce loss of power transmission resulting from the bending of the belt, which promises an energy-saving effect. The Energy-saving Red has the cross-sectional form of a classical belt. It is a merit of the Energy-saving Red to provide the energy-saving effect without replacing the pulley. **Figure 1** shows the structure of a classical belt and the Energy-saving Red.

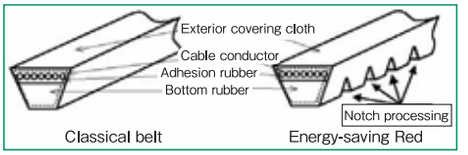

Fig. 1 Structures of Classical Belt and Energy-saving Red

Principles of Energy Loss Reduction

The following factors mainly cause energy loss in belt transmission.

①Loss resulting elastic sliding of the belt
②Loss resulting from the belt coiling around the pulley (bending loss)
③Loss resulting from air resistance
④Loss resulting from bearing friction
⑤Loss resulting belt vibration

The above items ① and ④ are inescapable in the friction conduction of the V-belt. Item ③ or ⑤ does not cause great energy loss. The reduction of item ② will make it possible to mitigate energy loss. **Figure 2** shows each power rate in a motor and the factors of energy loss caused by the motor-driven belt.

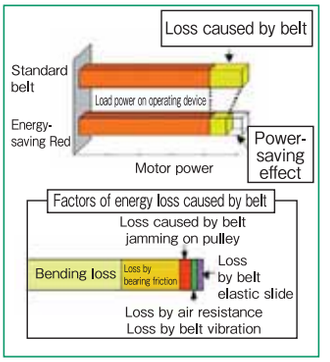

Fig. 2 Each Power Rate in Motor Power and Factors of Energy Loss Caused by Motor-driven Belt

The bottom rubber of the Energy-saving Red is notched. Compared with standard belts, therefore, the bending rigidity of the Energy-saving Red is half that of standard belts, i.e., the Energy-saving Red can be bent with much easier. This serves as a basis of reducing energy loss. **Figure 3** shows the comparison of the bending rigidity of belts.

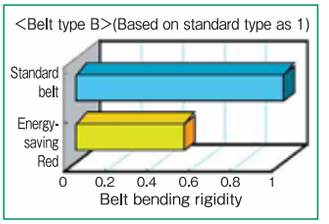

Fig. 3 Comparison of Belt Bending Rigidity

Belt Performance

① Transmission Performance

The transmission capability of the Energy-saving Red is 60% higher than that of standard belts. An increase in the transmission capability makes it possible to reduce the number of belts applied. **Figure 4** shows the transmission capacity comparison.

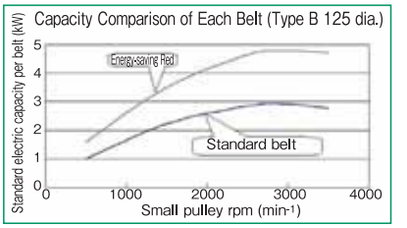

Fig. 4 Transmission Capacity Comparison

② Durability

The bottom rubber part of the Energy-saving Red is notched. Therefore, the distortion level and heat generation of the Energy-saving Red are both low when the Energy-saving Red is bent, which mitigates the degradation of the rubber and the durability of the Energy-saving Red is 10 times as high as that of standard belts.

With the high power transmission performance of the Energy-saving Red, its high-load durability is approximately 10 times as high as that of standard belts as well. Refer to **Fig. 5**. Results of Crack Durability and High-load Durability Performance.

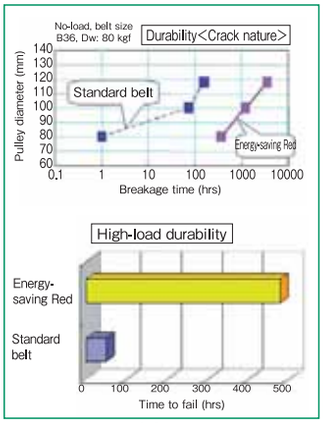

Fig. 5 Results of Crack Durability and High-load Durability Performance

Introductory Track Record

- **Factory air-conditioning equipment of company T (automaker)**
- **Factory air-conditioning equipment of company M (household appliance manufacturer)**
- **Air-conditioning equipment of airport K**
- **Many other introductory track records on other buildings and station facilities.**

Effects

◎Examples of Energy Loss Reduction

The effect of energy loss reduction was checked on the Energy-saving Red and standard belts under the evaluation conditions shown in **Fig. 6**. **Fig. 7** shows the measurement result of the reduction of electric power. Furthermore, the performance of the Energy-saving Red was evaluated on actual machines, such as fans. As a result, a power-saving level of 4.3% on average was obtained. **Fig. 8** shows the results of other energy-saving effects checked on actual machines.

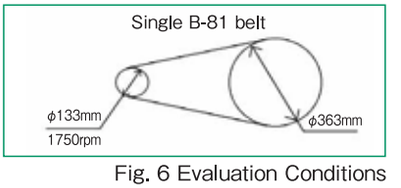

Fig. 6 Evaluation Conditions

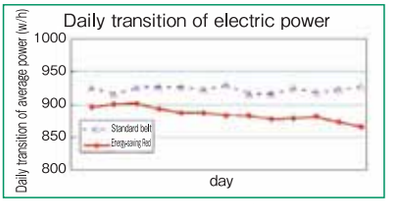

Fig. 7 Measurement Result of Electric Power

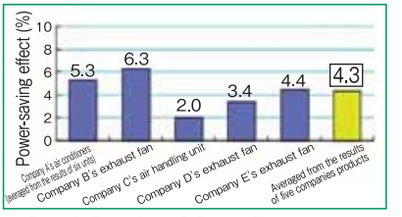

Fig. 8 Results of Other Energy-saving Effects Checked on Actual Machines

Applicable field
Air-conditioning Machines including Fans and General Industrial Machines

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