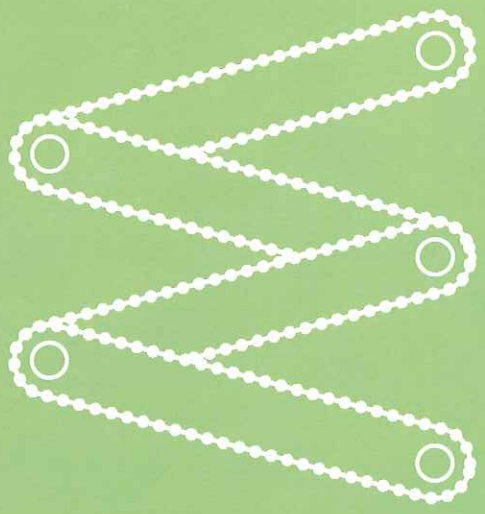
CATALOG No. CB-45

YOKOHAMA ENERGY SAVING CONVEYOR BELT

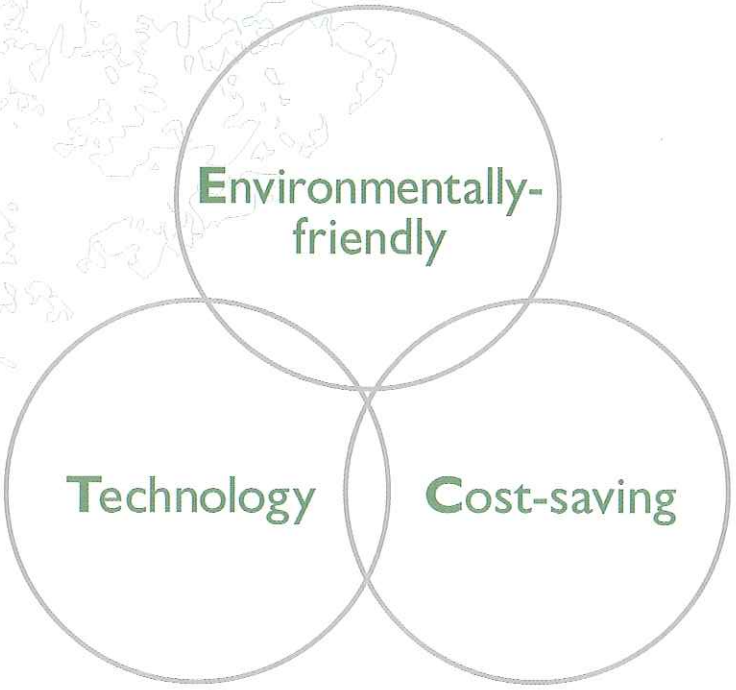


YOKOHAMA

YOKOHAMA ENERGY SAVING CONVEYOR BELT

What is Energy Saving Conveyor Belt.....

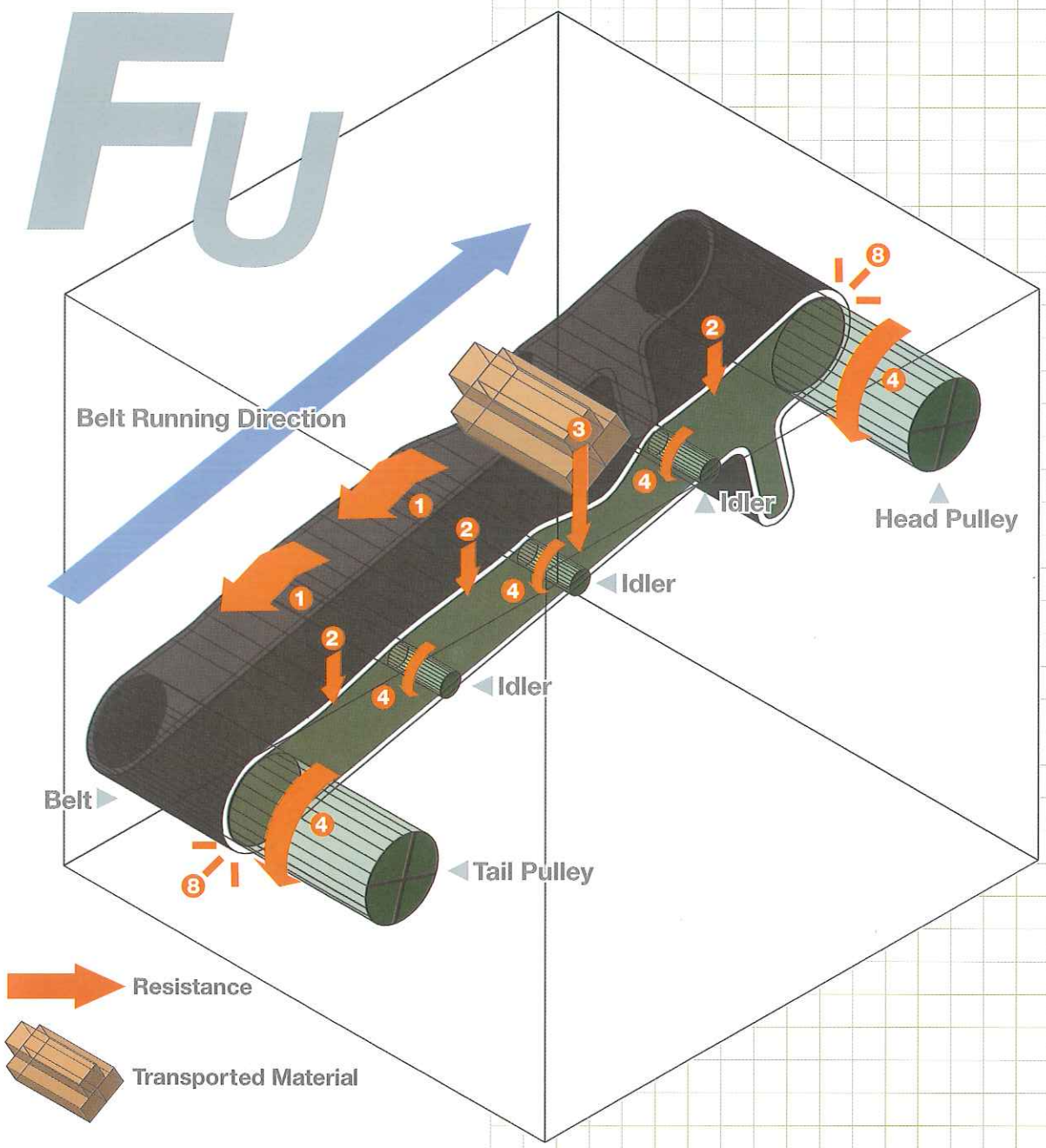
Conveyor belts have become the major tool for transporting bulk materials. Their efficiency in carrying large quantities at low cost is remarkable. Yokohama Rubber has developed Energy Saving Conveyor Belt, which extends the advantages of conveyor belts, allowing reduced power consumption and reduced operational cost of the conveyor line.



Energy Saving Conveyor Belt Characteristics

- Substantial savings in energy consumption when continuously operated. Such savings in energy consumption can yield additional returns to the plant.
- Belt operating tension may be decreased up to 20%, which could allow customers to design smaller motors when installing a new conveyor.
- Reduction of CO2 emissions, which can enhance plant environmental friendliness.

Belt Conveyor Running Resistance Mechanism



Required peripheral driving force F_U

Main resistances	F_H	① Indentation rolling resistance
		② Flexure resistance of the belt
		③ Flexure resistance of bulk material
		④ Bearing resistance of the idler
Resistance due to slope	F_{ST}	⑤ Resistance due to the lifting or lowering of the material on inclined conveyors.
Special main resistances	F_{S1}	⑥ Drag resistance due to forward tilt of the idler,etc.
Special secondary resistances	F_{S2}	⑦ Resistance from a special cause such as a tripper,etc.
Secondary resistances	F_N	⑧ Other mechanical resistances

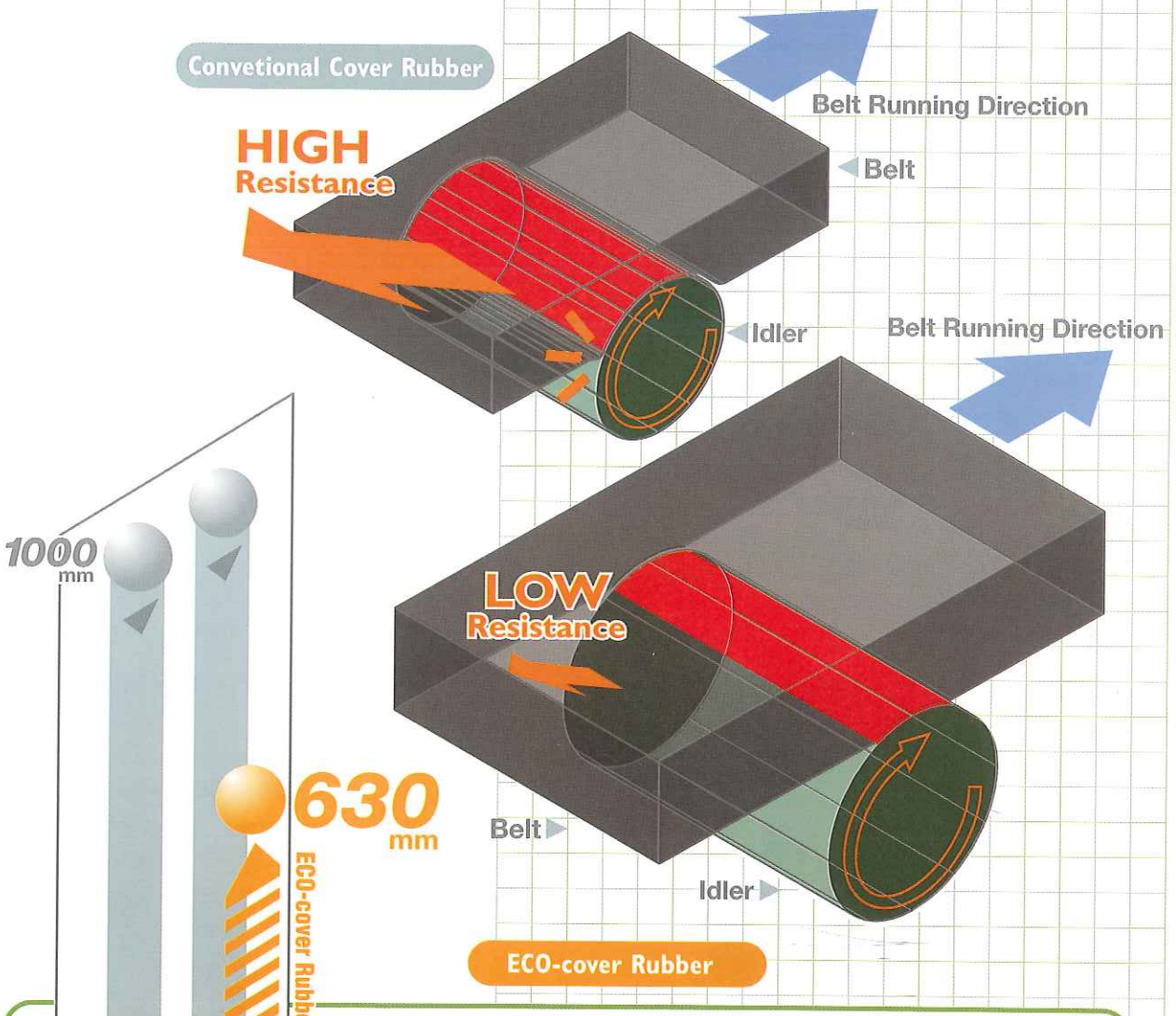
JIS-B8805 Formula

Required peripheral driving force F_U
$=F_H+F_{ST}+F_{S1}+F_{S2}+F_N$

Required Power P_A
$=F_U \times v$ (belt speed)

Effectiveness of ECO-cover Rubber

"Viscosity" and "elasticity" are properties of rubber. "ECO-cover rubber" is an optimization of both of these properties, achieved through Yokohama's original cutting-edge rubber compositing technologies.
The composite for ECO-cover rubber increases elasticity, which minimizes loss from the rubber deformation when passing the roller, and makes it possible to reduce the belt's running resistance for reduced power consumption.
Additionally, the use of ECO-cover rubber for the bottom cover while using standard type rubbers possessing superior abrasion and cut resistance for the top cover (which comes in contact with transported materials) allows power conservation, and at the same time guarantees standard durability.

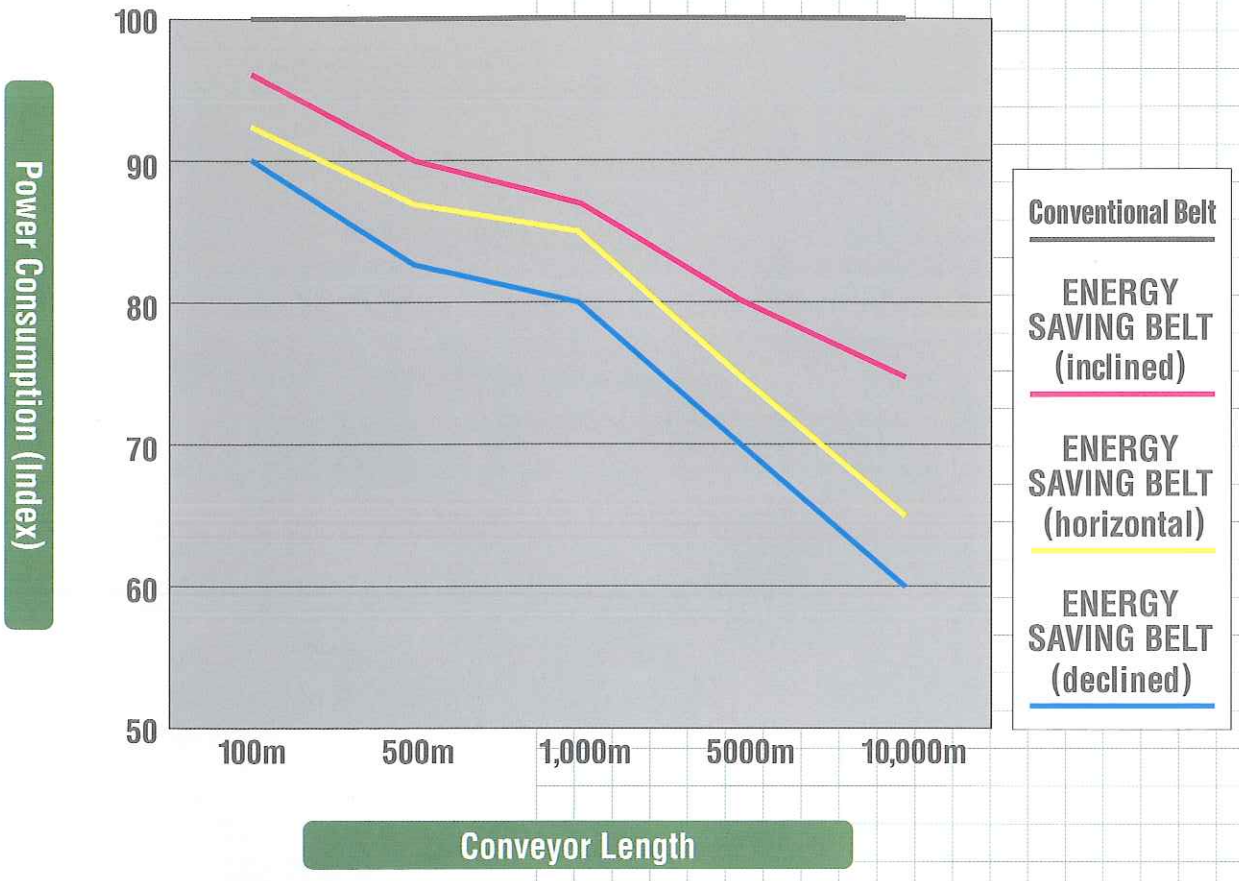


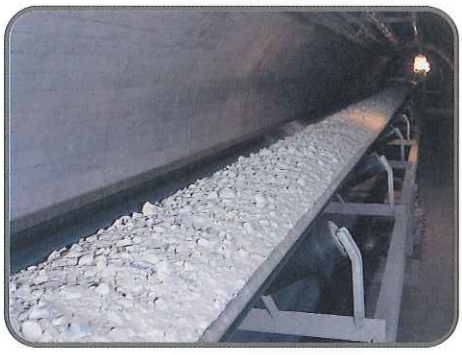
Comparison of ECO Rubber Performance (Repulsion Elasticity)

	Bounce Height (mm)	Repulsion Elasticity Index
Convetional Cover Rubber	285	100
ECO-cover Rubber	630	221

*Gravity drop of a 40mmØ rubber ball from a height of 1m.

Power Consumption Image



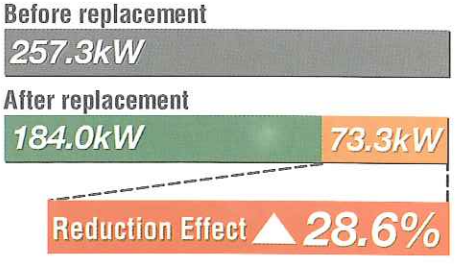


- The graph represents an index where the power consumption of standard belts is set at 100.
- The above values are target values under specific line conditions.
- Compared with the incline line, the horizontal and decline lines have greater rates of power consumption reduction. (This is because the incline resistance becomes zero or negative.)
- An even greater reduction in power consumption can be expected for steel cord belts and long distance lines.

Operation Example

Customer	Cement Manufacturer
Belt Specifications	ST-1400 900mm x 6.0mm x 5.0mm
Conveyor length	7,741m
Lift	▲140.4m (decline)
Carried material (capacity)	Limestone (1500 tons / hour)
Belt Speed	200m / min.
Drive system	300kW×2 (one unit at head and one at tail)

Reduced Power Consumption



To Use Conveyor Belts Safely

Storage and Transport

⚠ **Danger** Do not roll the belt to move it, as this can result in someone getting crushed by the belt.

⚠ **Warning** Beware of naked flames. Do not store near any heating equipment or devices that emit electrical sparks. Avoid steam, oil and chemicals.

⚠ **Warning** When hoisting the belt, use lifting gear appropriate to the weight of the belt.

Caution Store in a flat, dry place not exposed to direct sunlight, wind or rain. The temperature of the storage area should be -10 to 40℃.

Caution Do not store or transport the belt on its side, or in a leaning position or any other such state that subjects the belt to abnormal stress.

Caution When lifting the belt, use the protective cover and keep the belt level to avoid damaging the edges of the belt.

Daily Checks

Before starting up the belt, carry out the following checks and take appropriate action to correct any problems. If the problem still persists, Contact the agent the belt was purchased from.

Check Item	Remedy
1. Belt worn or damaged	Repair or replace
2. Splicing portion damaged or coming apart	Repair
3. Idlers not rotating properly	Adjust or replace
4. Cake and deposit around pulleys and idlers	Remove matter
5. Takeup movement	Adjust
6. Function of cleaner and skirt	Adjust
7. Chuting condition	Adjust
8. Material trapped	Remove

During Operation

⚠ **Danger** Install a protective barrier cover to reduce the risk of someone getting squeezed or caught between belt and conveyor.

⚠ **Danger** Stay outside the protective barrier.

⚠ **Danger** Avoid wearing neckties, strings, ribbons and the like that can get caught up and draw the wearer into the equipment.

⚠ **Danger** Do not ride on the belt or place a hand or any other part of the body on the belt.

⚠ **Warning** Do not place on the belt cigarette ends or anything else that can cause fire.

Caution Confirm the location of switchboard, emergency stop pull-fire and emergency exits before starting the belt.

Caution Do not exceed the maximum carrying capacity of the belt. Exceeding the maximum load may cause various troubles.

Caution Place loads properly to avoid spillage.

Caution Install appropriate devices to maintain correct operation. Examples of such devices are anti-reversing devices, belt off-center detectors, and emergency stop devices.

Caution If there are any abnormal noises, the belt runs off-center or any other such problem occurs, stop operation immediately and check the equipment.

Caution Do not walk under the conveyor or take-up portion.

Caution Do not clean up caking, deposits or spills during operation.

Shutting Down

⚠ **Danger** To avoid any error, switch off the conveyor and hang an "OFF" tag on the switch.

⚠ **Danger** Do not walk or ride on the belt unless it is necessary for repairs or the like.

⚠ **Danger** Do not stop the belt while high-temperature loads are being conveyed, as this can cause fires.

⚠ **Danger** Before restarting the conveyor, check the whole line to ensure that it is safe to do so.

Caution When getting on the belt for repair work, do not wear spikes or any other footwear that can damage the belt.

Caution Make sure that the belt is not subjected to oil, chemicals, sparks, heavy objects or anything else that can have an adverse effect.

Precautions Related to Properties

⚠ **Warning** Use the belt within the scope of application described in the catalog.

Examples: (1) Belt property

Cover rubber, tensile strength, adhesion, etc.

(2) Design criteria

Safety factor, pulley diameter, etc.

(3) Operating condition

Material carried, etc.

Caution In case of a heat resistant belt, do not use the belt to carry material that exceeds the permissible temperature described in the catalog.

A heat resistant belt does not provide fire-resistant property.

Caution Fire resistance properties are based on various fire safety standards.

There is a possibility that the belt may burn under some conditions.

Caution Do not use an ordinary belt for special purposes such as heat resistance, oil resistance, or fire resistance.

Caution Use a food handling belt for loose food.

Belt Splicing

⚠ **Danger** Naked flames are strictly prohibited at splicing site.

⚠ **Warning** While making a splice, avoid direct sunlight, moisture and dust which can lower adhesion.

⚠ **Warning** Make sure there is good ventilation while using rubber cement and solvents, which can be hazardous to health.

⚠ **Warning** Do not leave rubber cement and solvents at the splicing site, as they may cause fires.

Caution Splicing work should be done in accordance with the method and procedure specified by the manufacturer.

Caution Use the splicing kit specified by the belt manufacturer, and observe the specified shelf life.

THE YOKOHAMA RUBBER CO.,LTD.
36-11, Shimbashi 5-Chome, Minato-ku, Tokyo 105-8685, Japan
Tel: +81-3-5400-4189 Fax: +81-3-5400-4830
www.yokohamabelting.com

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