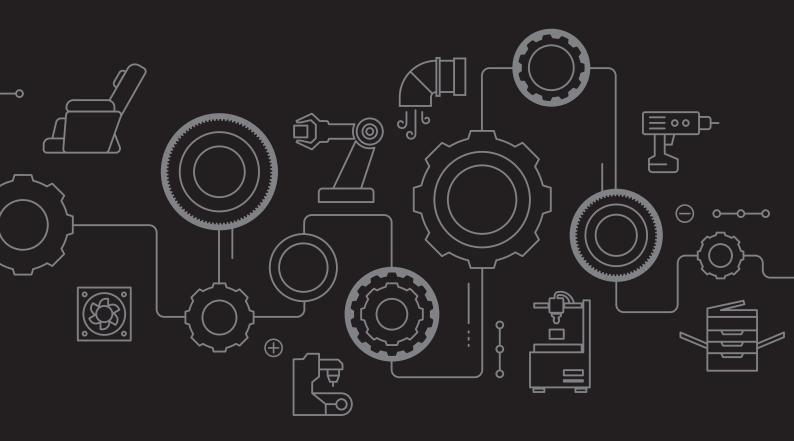


## Bando Power Transmission Belts Product Design Manual

(Latest Version for 2018)





**Bando Power Transmission Belts Product Design Manual** 

# **Greetings for the "Issuance of Bando Power Transmission Belts Product Design Manual"**

Bando Chemical Industries was founded as a power transmission belt manufacturer in Kobe in 1906 and has met expectations of users through development of new technology and new products always ahead of the times and with reliable quality. We would like to express our heartfelt gratitude to you as it is all thanks to your long-standing favor and support.

In recent years, we have met the advanced and diversified needs of industry, advanced the development of various power transmission belts and related systems, and issued guides and design materials for each product unit. We would like to announce that we have decided to combine these materials and issue the "Bando Power Transmission Belts Product Design Manual" for you to be able to choose and design most suitable power transmission belts with ease from a comprehensive point of view. We would like to ask you to keep this Manual at hand and utilize it.

Bando Chemical Industries, Ltd.

Bando Chemical Industries is aiming to become the leading company across the world in the fields of rubber and plastics, includ-

#### **Production Bases in Japan**

Nankai Plant—Power transmission belts, power transmission systems, resin products, chemical products

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- Wakayama Plant—Power transmission belts, power transmission systems, polyurethane power transmission belts, resin products
- Ashikaga Plant—OA/FA/Precision machinery and components, Rubber/polyurethane industrial products
- Kakogawa Plant—Conveyor belts, rubber/polyurethane industrial products

#### **Research Laboratories**

- R&D Center—Research of fundamental technologies and applications
- Power Transmission Technical Research Center
  - Research and development of power transmission belts and power transmission systems

16 17

#### "Worldwide Network of Trust"

Bando Chemical Industries gathers all employees' ingenuity and power to keep on taking on challenges toward the future, pursues technological and product development that is friendly to people in the world and environment at all times, and works hard to achieve them.

(China)

cia

#### North America

<ol> <li>Bando USA, Inc.</li> <li>Bando Belting de Mexico, S.A. de C.V.</li> </ol>	(U.S.A.) (Mexico)
Europe	
3 Bando Europe GmbH	(Germany)
④ Bando Iberica, S. A.	(Spain)
3 Bando Belt Manufacturing (Turkey), Inc.	(Turkey)
Asia	
6 Bando Jungkong Ltd.	(Korea)
⑦ Bando Korea Co., Ltd.	(Korea)
8 Bando Belt (Tianjin) Co., Ltd.	(China)

9 Bando (Shanghai) Management Co., Ltd.

1		
ic	Bando (Shanghai) Industry Equipment Element Co., Ltd.	(China)
Ū	BL Autotec (Shanghai), Ltd.	(China)
2	Bando Manufacturing (Dongguan) Co., Ltd.	(China)
3	Bando Siix Ltd.	(Hong Kong)
4	Sanwu Bando Inc.	(Taiwan)
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6	Bando Manufacturing (Thailand) Ltd.	(Thailand)
17	Bando Asia & Pacific Co., Ltd.	(Thailand)
18	Kee Fatt Industries Sdn. Bhd.	(Malaysia)
9	Bando (Singapore) Pte. Ltd.	(Singapore)
20	P.T. Bando Indonesia	(Indonesia)
21	Bando (India) Private Ltd.	(India)
22	Bando Manufacturing (Vietnam) Co., Ltd.	(Vietnam)

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ronou	Ceptor-VI HP-STS (High-Performance	44	<u>*********</u>	Double-Sided Synchronous Belt	76	
is Belts	Super-Torque Synchronous Belt) HP-HTS (High-Performance High- Torque Synchronous Belt) STS	48 52		Bancollan		
<b>t</b> s	(Super-Torque Synchronous Belt)	52		Double-Sided Synchronous Belt	76	000000000
	Synchronous Belt	64 65	44.0.0.4.0.0.0.6	Long Synchronous Belt Bancollan Long Synchronous Belt	199 200	
	Power Ace Energy-Saving Power Ace	225 224		Bancollan Polybanrope	274	
Frict	V-Belt Red Standard Energy-Saving Red	231 224		Power Ace Cog	227	
Frictional Tran	Power Scrum (Power Ace type)	228		Rib Ace 2	236	
ransmi	Power Ace Aramid Combo	229		Power Scrum (V-belt type)	234	
smission Belts	Banflescrum Banflex	279		Bancollan round belt Bancord round belt	297 302	
Belts	PS Belt	318	R	Sunrope (open end)	-	
	Bancollan V-Belt (VC-DC)	293	11/11/120000007	Double-sided V-belt	-	
Pulleys for General Purpose Power Transmission Belts	STS pulley Synchronous Pulleys (shaft-hole-machined type) (rod-shaped pulley) HTS pulley (shaft-hole- machined type)	131 167		TL-STS pulley TL synchronous pulley With BAN-LOCK	143 169	
General- Power ion Belts	Synchronous pulley (Type XL) (molded product / sintered alloy)	178		TL Power Ace pulley (bushing type) Power Ace pulley (shaft-hole-machined type)	Refer to the separate booklet.	

## **Required Quality Communication Form for Power Transmission Belt** (Information Necessary for Belt Design) When you need calculation for power transmission belt design, please check the following listed items and contact us.

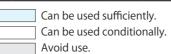
Machinery name	
Driving machine characteristics	<ol> <li>Standard motor AC motor (normal torg DC motor (shunt-wour Engine with two or more cylinders</li> <li>Special motor AC motor (high torque / DC motor (series-wound Single-cylinder engine / line shaft / clutch</li> </ol>
Driven power (If unclear, enter driving power)	Ing machine racteristics       1. Standard motor \( AC motor (normal to DC motor (shunt-we Engine with two or more cylinders         2. Special motor \( AC motor (high torque DC motor (series-woul Single-cylinder engine / line shaft / clut         ven power       Normal (kW,V Max
Driving pulley dia.	Outside dia ± Pitch dia. No. of teeth of pulley
Driving pulley revolution	rpm
Driven pulley dia.	
Driven pulley revolution	rpm ±
Allowable pulley width	mm
Center distance	mm ±
Operating time	2. Normal use (8 to 10 hours/day)
Requirement characteristics	Humidity resistance / Oil resistance (mist for Low speed / For positioning / With reciproca For high load / Multi-axis power transmission Long span (power transmission / conveyanc
Sudden stop and sudden acceleration	Deceleration from revolution n <sub>1</sub> Time to change from n1 to n <sub>2</sub> Frequency of sudden stop
Other requirements	

	Section where the belt is to be used	
que / so ind)	quirrel-cage type / synch	nronous transmission)
	-phase / series-wound) ` nt-wound)	]
, kgf•m, n, N•cm	kgf•cm	
	mm	
	mm	
rp	om	
m	m	
	Use of idler pulley	Use / Not use (inside / outside) (slack side / tight side)
illey dia	meter / Static electricity	prevention / Electrical insulation /
ating m on / Wit	uid form) / Dust particle notions / For food conve h idler pulley / Fixed cer ecial profile (back face p	yance / For conveyance hter distance
	opposite side to the bra	
	to n <sub>2</sub>	
	s _ times/day	
kgf•m²		
	to n <sub>2</sub>	
	s times/day	
	uncs/uay	

#### **Functional Selection Table**

		Characteristics		Load	(kW)		Be	lt speed (m	ı/s)		machine teristics	Perma-	Cent	ter distance	e (m)	Speed	d ratio
	Belt type		0.75 or less	0.75 to 7.5	7.5 to 75	75 or more	20 or less	20 to 30	30 or more	*1 Standard driving	*2 Special driving	nent elon- gation (%)	0.5 or less	0.5 to 2	2 or more	1:5 or less	1:5 to 1:10
	KPSII	Synchronous Belt)			[S8M]	[S14M]		30		machine	machine	0.1 or less					1:10
Synchronous Belts	Ceptor-X Ceptor-VI HP-STS (High per-Torque S STS (Super-To Double-Sideo	-Performance Su- ynchronous Belt) orque Synchronous Belt) d STS -Performance High-	[S1.5M] [S2M]	[S3M] [S4.5M] [S5M]	[S8M] [8M]	[S14M]			33			0.15 or less					1:10
	Synchronous Double-Sideo	i Belt d Synchronous Belt	[MXL] [XL]	[L]	[H] [XH]	[XXH]			30			0.15 or less					1:10
	Bancollan Syı Bancollan Do Belt	nchronous Belt uble-Sided Synchronous	[XL] [T5] [TN15]	[L] [T10]			20					0.25 or less					1:10
	Bancollan ST	S	[S2M]	[S3M]			20					0.25 or less					1:10
	Long Synchro	onous Belt					10					0.15 or less					1:10
	Bancollan Lo	ng Synchronous Belt					10					0.25 or less					1:10
		Red Scrum	[M]	[A]	[B,C]	[D,E]	[M]15	[A~E] 30				1.5~2		[M]	[A~E]		
	V-belt	Standard		[A]	[B,C]	[D,E]		[A~E] 30				1.5~2			[A~E]		
		Red S II		[SA]	[SB,SC]			30				1.5~2					
	Power Ace Scrum Power Ace Aramid Combo				[3V]	[5V,8V] [5VK,8VK]			40			1.0 or less		[3V]	[5V,8V] [5VK,8VK]		1:10
	Power Ace Cog				[3VX]	[5VX]			40			1.0 or less		[3VX] [5VX]			1:10
	Sunrope (open-ended)		[M]	[A,B,C]			[M]15 [A~C]20					2~3					
Frict	Double-sided V-belt			[AA]	[BB] [CC]			30				1.5~2		[AA]	[BB] [CC]		
tional Ti	Banflescrum			[5MS]	[7MS]	[11MS]			60			0.8 or less					1:10
ransmis	Bancollan V-E	Belt	[1]				10					1.5~2					
ional Transmission Belts	Rib Ace 2 (for	general industry)	[PJ]	[PK] [PL]					50			1~1.5					
lts	Bancollan Po	lybanrope	[H]	[J]				25				2~2.5					
	Bancollan rou	und belt	φ2 ~φ5				10					0.5~1					
	Bancord rour	nd belt	φ1.5 ~φ12				10					3~5					
	PS Belt		A series B series C series E series				[C series] 20	[B series] 30	[A series] 60			2.0 or less		A series B series C series E series			1:10
	Flat belt (cott	con)			San Special San Atlas		20					2~3					
	Banbelt			[Light]	[Medium] [Heavy]			30				1.5~2					

Values in the table indicate general allowable values of belt characteristics.
However, the permanent elongation indicates a normal range.
The brackets [ ] indicate belt type.



$\sim$		Characteristics		Minimum pu	Illey diameter (mm)			_	S	δ	pow V	പ		Вас
			50 or less	50 to 100	100 to 200	200 or more	*3 Back face tension	Low initial tension	Miniaturized	Sudden stop	Vertical-shaft power transmission	Cross application	Back face tension	Back face drive
	Belt type KPSII		[S8M] 18 teeth	[S14M] 22 teeth			Pulley dia.		<u> </u>	0	ion			/e
Synchronous Belts	Ceptor-X Ceptor-VI HP-STS (High- per-Torque Sy STS (Super-To Double-Sided	ynchronous Belt) Performance Su- rnchronous Belt) rque Synchronous Belt) STS -Performance High- ronous Belt)	[51.5M] 16 teeth [52M] 14 teeth [53M] 14 teeth [54.5M] 12 teeth [55M] 14 teeth [55M] 14 teeth [58M] 22 teeth [8M] 22 teeth		HP-STS S14M STS S14M 34 teeth		1.2x							
Synchrone	Synchronous Double-Sided	Belt Synchronous Belt	[MXL] 12 teeth [XL] 10 teeth [L] 12 teeth	[H] 14 teeth	[XH] 22 teeth [XXH] 22 teeth		1.2x							
ous Belts	Bancollan Syn Bancollan Dor Belt	chronous Belt uble-Sided Synchronous	[TN15] 20 teeth [XL,L,T5] 10 teeth [T10] 12 teeth				1.2x							
	Bancollan STS	,	[S2M] 14 teeth [S3M] 14 teeth				1.4x							
	Long Synchro	nous Belt	MXL,XL,L S4.5M,S5M	S8M H	XH S14M	ХХН	1.2x							
	Bancollan Lor	ng Synchronous Belt	S2M,S3M XL,L T5,T10	S8M H			1.4x							
		Red Scrum	[M] 40	[A] 67	[B] 118 [C] 180	[D] 300 [E] 450	1.3x							
	V-belt	Standard		[A] 67	[B] 118 [C] 180	[D] 300 [E] 450	1.3x							
		Red S II		[SA] 60 [SB] 80	[SC] 100		[SA] 35 [SB] 45 [SC] 60							
	Power Ace Sc Power Ace Ar			[3V] 67	[5V] 150 [5VK] 150	[8V] 300 [8VK] 300	1.3x							
	Power Ace Co	g		[3VX] 56	[5VX] 112		1.3x							
	Sunrope (ope	n-ended)		[M80]	[A] 100 [B] 150	[C] 250								
Fric	Double-Sided	V-Belt			[AA] 100 [BB] 180	[CC] 260	-							
<b>Frictional Transmission Belts</b>	Banflescrum		[5MS] 26 [7MS] 40	[11MS] 63										
ansmis	Bancollan V-B	elt	16				1.3x							
sion Belt	Rib Ace 2 (for	general industry)	[PJ] 20	[PK] 50 [PL] 70			1.5x							
S	Bancollan Pol	ybanrope	[H] 14 [J] 24											
	Bancollan rou	nd belt	[3φ] 18 [5φ] 30				-							
	Bancord roun	d belt	[3 <i>φ</i> ] 23	[10 <i>φ</i> ] 80			-							
	PS Belt		[A] 5 [B] 11 [C] 5											
	Flat belt (cotto	on)		[3P] 80	[4P] 130 [5P] 180		-							
	Banbelt				[Spinning] 150	[Light] 225 [Medium] 375 [Heavy] 500	-							

\*1 Standard driving machines refer to AC motors (normal torque, squirrel-cage type, synchronous power transmission), DC motors (shuntwound), and engines with two or more cylinders.

\*2 Special driving machines refer to AC motors (high torque, single-phase series-wound), DC motors (series-wound, compound-wound), singlecylinder engines, line shafts, and clutches.

\*3 Back face tension pulley diameters are expressed by multiples of minimum pulley diameters.

#### **Characteristics Selection Table (Reference)**

Belt type       40       -30       -20       -10       0       10       20       30       40       50       60       70       80       90       100         KPSII (King Power Synchronous Belt)       Ceptor-X       Ceptor-X       Ceptor-VI       1	specification)
(King Power Synchronous Belt)       Ceptor-X         Ceptor-V       HP-STS (High-Performance Super-Torque Synchronous Belt)       STS (Super-Torque Synchronous Belt)         STS (Super-Torque Synchronous Belt)       Double-Sided STS         HP-HTS (High-Performance High- Torque Synchronous Belt)       (Heat-resistant Bancollan Synchronous Belt         Synchronous Belt       (Heat-resistant Bancollan STS         Long Synchronous Belt       (Heat-resistant Bancollan Long Synchronous Belt	.peçification)
Vertor       Ceptor-VI HP-STS (High-Performance Super-Torque Synchronous Belt)       Image: Ceptor-VI HP-STS (Logue-Torque Synchronous Belt)         Double-Sided STS HP-HTS (High-Performance High- Torque Synchronous Belt)       Image: Ceptor-VI HP-HTS (High-Performance High- Torque Synchronous Belt)         Synchronous Belt Double-Sided Synchronous Belt       Image: Ceptor-VI HP-HTS (High-Performance High- Torque Synchronous Belt)         Synchronous Belt Double-Sided Synchronous Belt Bancollan Double-Sided Synchronous Belt       Image: Ceptor-VI HP-HTS (High-Performance High- Torque Synchronous Belt         Bancollan STS       Image: Ceptor-VI HP-HTS (High-Performance High- Torque Synchronous Belt       Image: Ceptor-VI HP-HTS (High-Performance High- Torque Synchronous Belt         Bancollan Long Synchronous Belt       Image: Ceptor-VI HP-HTS (Humidity- and heat-resistant specification)	pecification)
Bancollan Synchronous Belt Bancollan Double-Sided Synchronous Belt Bancollan STS Long Synchronous Belt Bancollan Long Synchronous Belt	pecification)
Bancollan Synchronous Belt Bancollan Double-Sided Synchronous Belt Bancollan STS Long Synchronous Belt Bancollan Long Synchronous Belt	
Long Synchronous Belt     Image: Constraint of the second se	
Bancollan Long Synchronous Belt	
(Humiqity- and neat-resistant specification)	
Red Scrum	
V-belt Standard	
Red S II	
Power Ace Scrum     Image: Comparison of the scrum of the scrumof of the scrum of the scrumof of the scrumof of the scrumo	
Power Ace Cog	
Sunrope (open-ended)	
Tricing of the sector of th	
a Ta Banflescrum	
Banflescrum     Image: Constraint of the second secon	
Rib Ace 2 (for general industry)	
Bancollan Polybanrope	
Bancollan round belt	
Bancord round belt	
PS Belt	
Flat belt (cotton)     Image: Cotton in the second se	
Banbelt	

	Belt type	Characteristics	*2 Oil resistance	Acid resistance	Alkali resistance	Weather resistance	Water and humidity resistance	Flame resistance	Noise	Vibratior
	KPSII	r Synchronous Belt)					resistance			
Synchronous Belts	Ceptor-X Ceptor-VI HP-STS (Hig Super-Tor Belt) STS (Super- Belt) Double-Sid HP-HTS (Hig	gh-Performance rque Synchronous Torque Synchronous								
	Synchrono Double-Sid	us Belt ed Synchronous Belt	*3	*4			*4		*5	
S	Bancollan S Bancollan E Synchron	Synchronous Belt Double-Sided ous Belt								
	Bancollan S	STS								
	Long Synch	nronous Belt								
	Bancollan Long Synchronous Belt									
		Red Scrum								
	V-belt	Standard								
		Red S II								
	Power Ace Power Ace	Scrum Aramid Combo								
	Power Ace	Cog								
Ŧ	Sunrope (o	pen-ended)								
riction	Double-Sid	ed V-Belt								
Frictional Transmission Belts	Banflescrur	n								
smiss	Bancollan V-Belt									
ion Be	Rib Ace 2 (f	or general industry)								
lts	Bancollan F	Polybanrope								
	Bancollan r	ound belt								
	Bancord ro	und belt								
	PS Belt									
	Flat belt (co	otton)								
	Banbelt									

Very high High

Slightly problematic

Better not to use

\*2 For material quality, oil resistance evaluation takes belt slip into consideration. \*3 Very high with oil-resistant specification products.

\*4 Low-noise specification products should not be used.

\*5 High with low-noise specification products.