Challenges to New Creation - **NOK Group**

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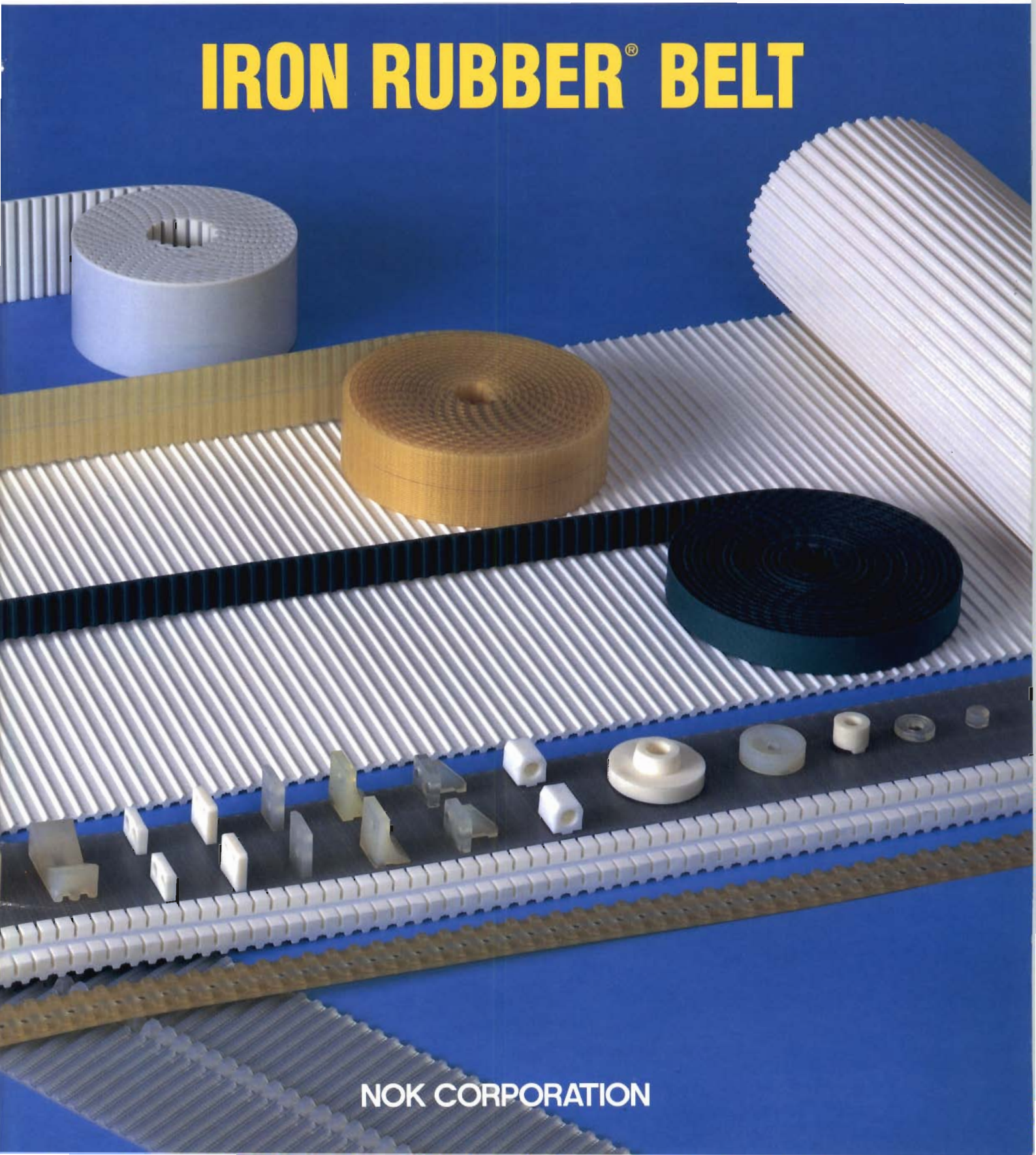
Cat. No. 183 · 10-97

IRON RUBBER® BELT



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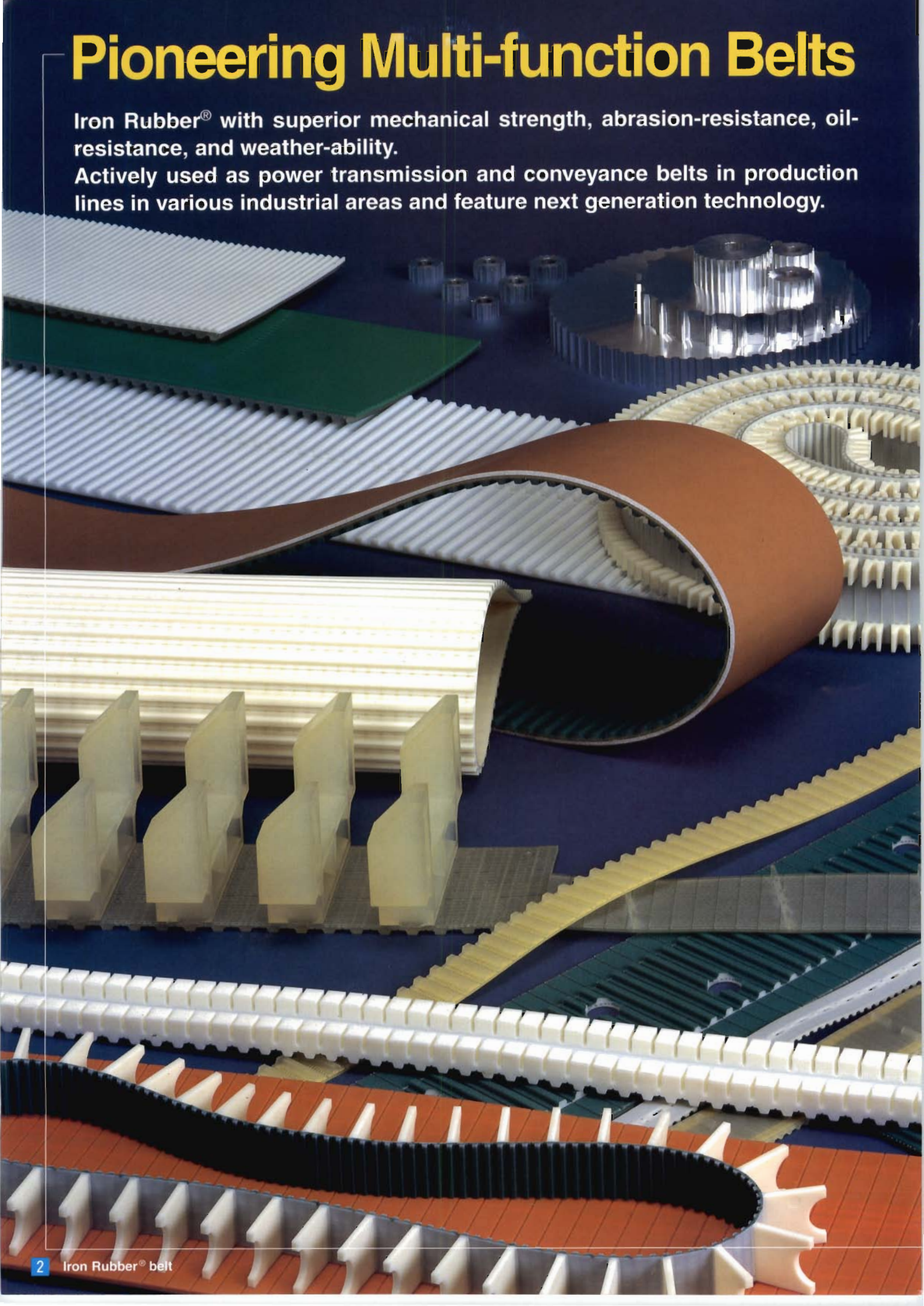
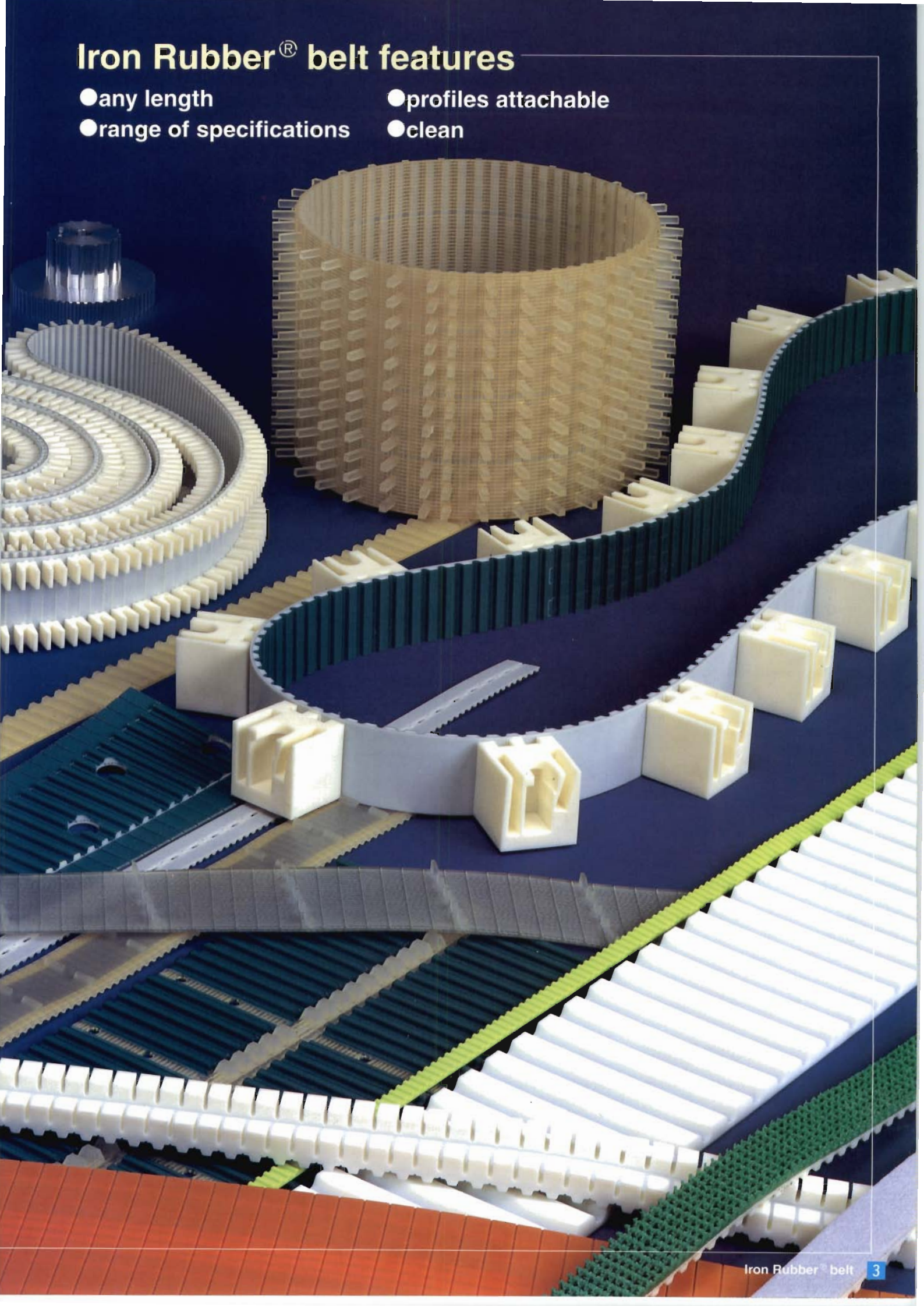
Pioneering Multi-function Belts

Iron Rubber® with superior mechanical strength, abrasion-resistance, oil-resistance, and weather-ability.
Actively used as power transmission and conveyance belts in production lines in various industrial areas and feature next generation technology.



Iron Rubber® belt features

- any length
- range of specifications
- profiles attachable
- clean

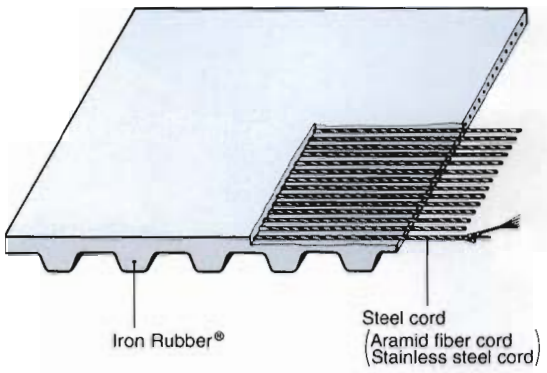


Structure and Characteristics

The Iron Rubber® belt is constructed from standard belts manufactured as per JIS/DIN, and AT belts with high torque and high tension featuring large tooth cross sections.

Structure

Our belts are constructed from Iron Rubber® which is extremely wear resistance polyurethane and high tensile steel cords (or aramid fiber cords, stainless cords.)
With these superior material and the most modern manufacturing technology, highly reliable belts are made with high dimension accuracy and limitless length.



Characteristics

Range of Variations

- Iron Rubber® belts include AT belts, standard belts (meters or inches), and flat belts. One-piece with V guides belts and wide timing belts are also available.
- AT belts have their own tooth profiles.
  - Low distortion and high torque transfer due to larger tooth cross section.
  - Belt tooth top fully contacts with pulley tooth top. Which results in no multi angles, and less tension member fatigue.
  - Optimal load distribution in teeth, and no intensive stress.
  - Low noise.
- Standard belts have tooth profiles meeting JIS/DIN.
- Flat belts with buried steel cords in a tension member, and maintenance is easy with low elongation.

With Limitless Length

- Belts suitable for your machine can be manufactured.
- Endless belts of any length can be manufactured.

With Synchronous Belt

- Synchronizing transmission and conveyance is possible.
- Little elongation
- No lubrications
- Light weight
- Saves energy

With Welded-on Profiles

- Profiles can be firmly welded on the backside of the belts by welding matching the conveying conditions.

With Various Distinctions on the Surface

- Nylon facing belts on tooth-side can improve slip with pulleys and/or guide rails.
- Nylon facing belts on the belt back can improve slip with products.
- Rough top, artificial leather or polyurethane foam pad is lined on the belt back to protect products and to provide a cushion.

With Iron Rubber®

- High abrasion resistance.
- High mechanical strength.
- Pursuant to the Japanese Food Sanitation Act.
- Some show mildewproof and antimicrobial effects.
- Excellent resistance to oils, greases and some solvents.
- High ozone resistance.

Superior Workability

We can manufacture belts suitable to your conditions as follows:

- Grinding
- Perforating
- Cutting

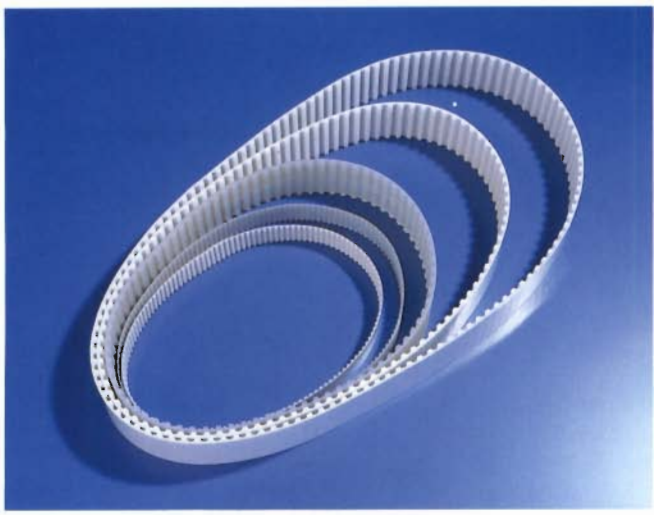
One-piece Formed with V-guides

- Self-tracking belt.
- No pulley fringe.
- High accuracy and reliability in V-guides.
- V-guides with notches can be used for small pulley diameters.

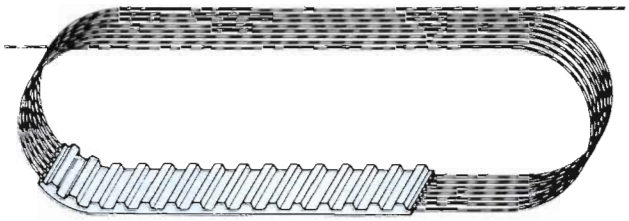
Type

Iron Rubber® belts include synchronous belts and flat belts.

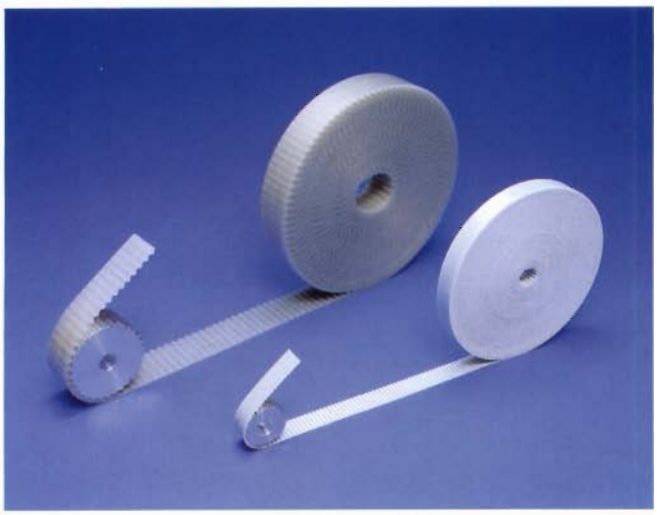
F Flex type



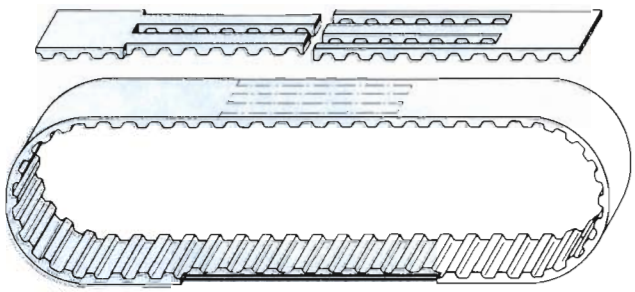
Endless belts helically wound reinforcement of steel cords or stainless steel cords. Any length belts are available to suit your desired length.



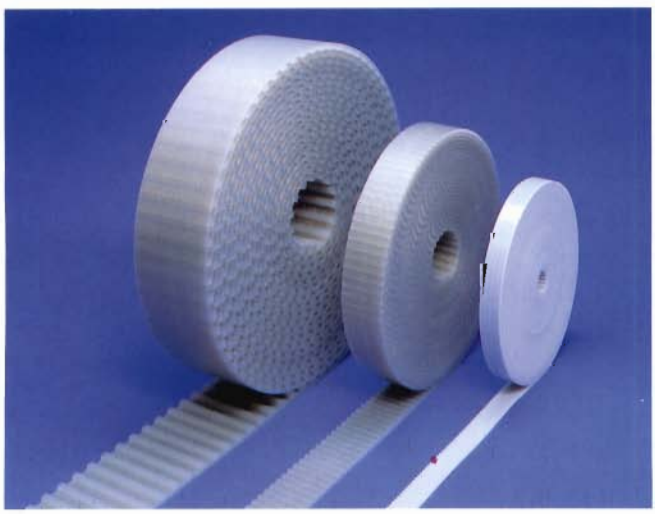
J Joint type



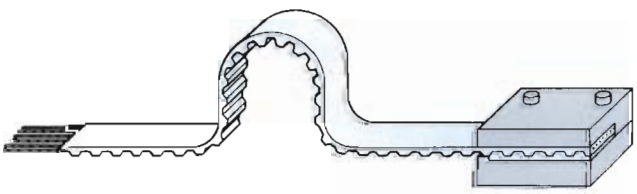
Endless belts with parallel reinforcement of steel cords or aramid fiber cords. We can weld into endless belts to your desired length.



L Linear type

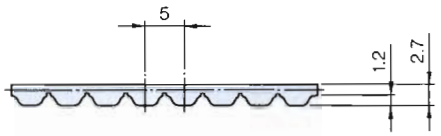
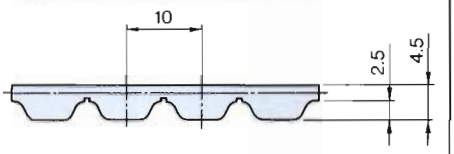
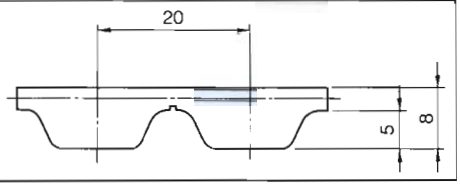


Open-end belt with parallel reinforcement of steel cords or aramid fiber cords. Stabilized synchronous power transmission can be realized due to parallel reinforcement.

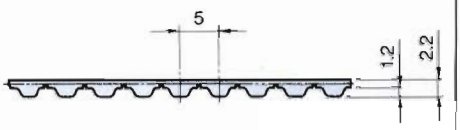
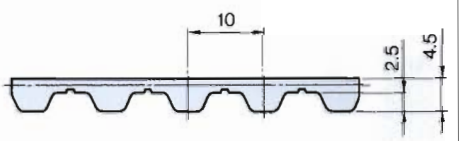
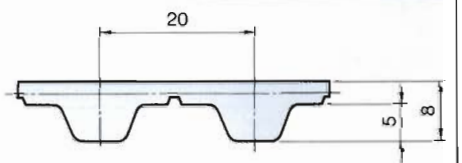
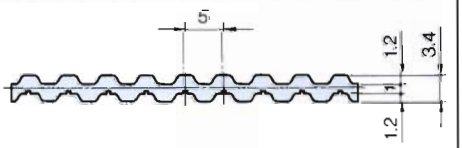
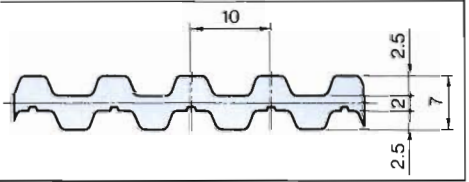


Dimension Table

AT Belt

Model	Type	Belt width/length (mm) 7	10	15	20	25	40	50	75	100	Related pages	Dimension (mm)
AT5	F	Minimum length 600 (120 teeth) Maximum length 10000(2000 teeth)									12	
	J	Minimum length 460 (92 teeth)										
	L	One roll length 60m										
AT10	F			Minimum length 600(60 teeth)					1350(135 teeth)		12	
				Maximum length 24000(2400 teeth)								
	J			Minimum length 700(70 teeth)								
	L			One roll length 40m								
AT20	F					Minimum length 1360(68 teeth) Maximum length 24000(1200 teeth)					12	
	L					One roll length 25m						

Standard Belt (meters)

Model	Type	Belt width/length (mm) 7	10	15	20	25	40	50	75	100	Related pages	Dimension (mm)
T5	F	Minimum length 600 (120 teeth) Maximum length 10000(2000 teeth)									13	
	J	Minimum length 250(50 teeth)					455(91 teeth)					
	L	One roll length 60m										
T10	F			Minimum length 600(60 teeth)					1350(135 teeth)		13	
				Maximum length 24000(2400 teeth)								
	J			Minimum length 700(70 teeth)								
	L		One roll length 50m									
T20	F					Minimum length 1360(68 teeth) Maximum length 24000(1200 teeth)					13	
	J					Minimum length 1000(50 teeth)						
	L				One roll length 30m							
DT5	F	Minimum length 1350(270 teeth) Maximum length 10000(2000 teeth)									17	
DT10	F			Minimum length 1350(135 teeth) Maximum length 24000(2400 teeth)							17	

Wide Belts

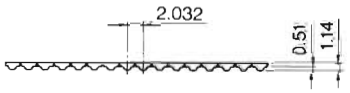
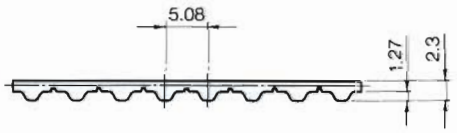
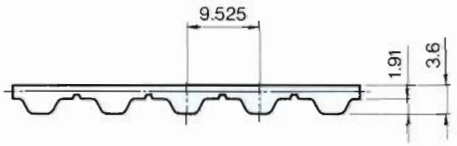
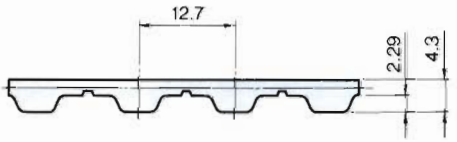
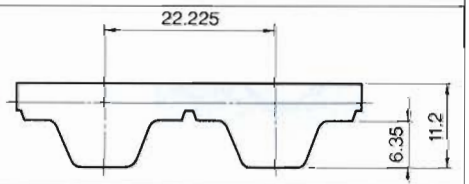
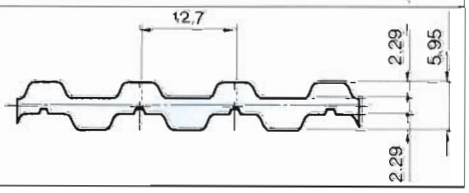
Special widths for joint type belts are available:

150-T10 (belt width 150 mm, minimum length 850 mm)
450-T10 (belt width 450 mm, minimum length 1000 mm)
600-H (belt width 152.4 mm, minimum length 850.9 mm).

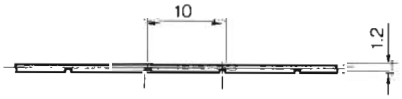
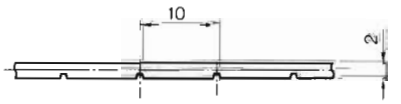
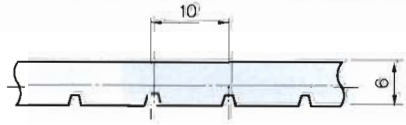
F : Flex type
J : Joint type (No limit for the maximum length)
L : Linear type (Any length are available)

: shows available.

Standard Belt (inches)

Model (Pitch)	Type	Belt width/length (mm) 013 (3.2)	019 (4.8)	025 (6.4)	031 (7.9)	037 (9.5)	050 (12.7)	075 (19.1)	100 (25.4)	150 (38.1)	200 (50.8)	300 (76.2)	400 (101.6)	Related pages	Dimension (mm)
MXL (2.032)	L	One roll length 100m												14	
XL (5.08)	F	Minimum length 609.6(120 teeth) Maximum length 10007.6(1970 teeth)												14	
	J	Minimum length 254(50 teeth)								457.2(90 teeth)					
	L	One roll length 60m													
L (9.525)	F	Minimum length 600.08(63 teeth)										1352.55 (142 teeth)		14	
		Maximum length 10001.25(1050 teeth)													
	J	Minimum length 666.75(70 teeth)													
	L	One roll length 60m													
H (12.7)	F	Minimum length 609.6(48 teeth)										1358.9 (107 teeth)		15	
		Maximum length 24003(1890 teeth)													
	J	Minimum length 711.2(56 teeth)													
	L	One roll length 50m													
XH (22.225)	F	Minimum length 1355.73(61 teeth)												15	
		Maximum length 24003(1080 teeth)													
	J	Minimum length 1000.13(45 teeth)													
	L	One roll length 25m													
DH (12.7)	F	Minimum length 1358.9(107 teeth) Maximum length 24003(1890 teeth)												17	

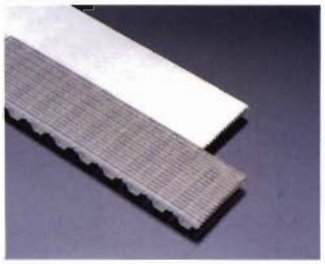
Flat Belt

Model	Type	Belt width/length (mm) 10	15	20	25	40	50	75	100	Related pages	Dimension (mm)
F12	F	Minimum length 1500 Maximum length 10000								16	
F20	F	Minimum length 1500 Maximum length 24000								16	
	J	Minimum length 800									
	L	One roll length 50m									
F60	F	Minimum length 1500 Maximum length 24000								16	

Variety of Specifications

A number of variations enable us to respond to a wide range applications. Iron Rubber® belts are changing the trend in conveyor and power transmission belts.

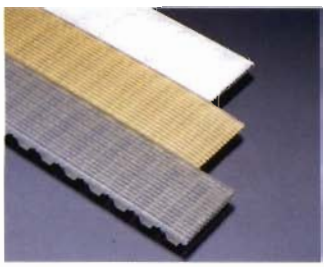
Rubber Material



High-strength polyurethane rubber is used as rubber material, with translucent (A), white(E),low-hardness translucent (D).
Mildewproof and antibacterial finishes (G) are also available.

For more information, please refer to P11.

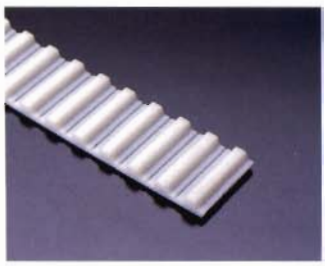
Tension Member Specifications



High-tension steel cord, aramid fiber cord, and stainless steel cord are adopted for tension members.

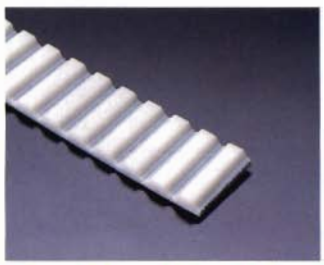
For more information, please refer to P11.

Standard Belts



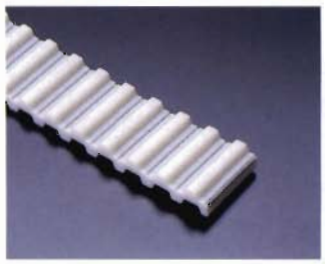
Tooth profiles are pursuant to JIS and DIN.

AT Belts



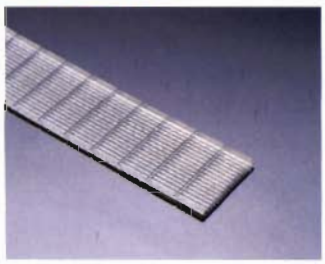
High-torque and high-tension timing belts with large tooth cross sections.
A combination of AT belts and backlashless pulleys, improve positioning accuracy.

Double-sided Belts



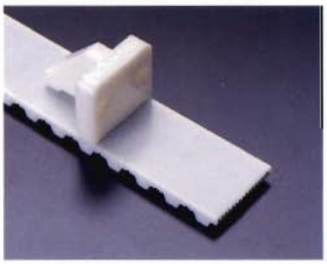
Accurate multi-shaft transfer with teeth on both sides.

Flat Belts



With steel cords, small extension flat belts for easy maintenance.

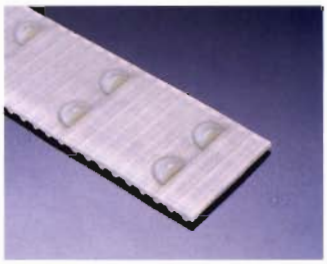
Profiled Belts



Profiles are firmly welded.
Many standard profiles are available.

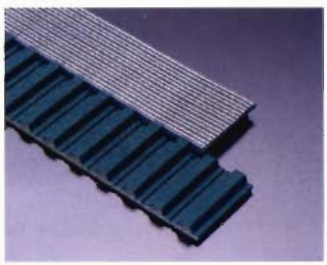
For more information, please refer to P20-39.

One-piece Profiled Belts



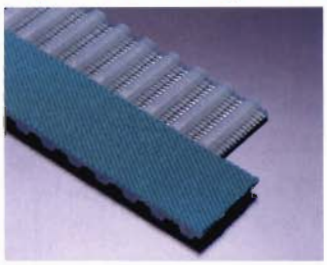
Profiles and belt are formed in one piece with high accuracy.
(Molds are required.)

Nylon Facing on Tooth-side Belts



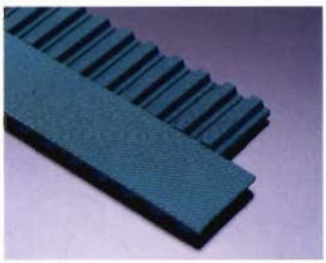
Fabric, tooth side covering, and belt are formed in one piece.
Reducing the friction coefficient with a pulley and a guide rail result in minimizing sounds and loads.

Nylon Facing on Back-side Belts



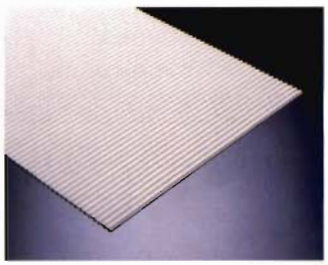
Fabric, belt back covering, and belt are formed in one piece.
Reduces the friction coefficient against the material being conveyed, and is suitable for accumulation transportation.
(Belt back texture patterned belt is also available.)

Nylon Facing on Both-side Belts



Fabric, covering tooth and belt backs, and belt are formed in one piece.

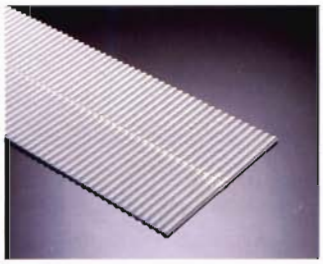
Wide Belts



Long belts up to 450 mm width (T10) are available.

For more information, please refer to P18.

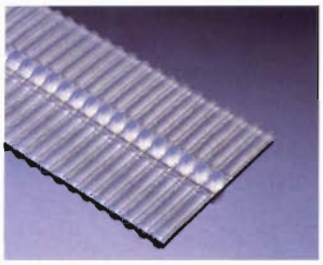
Double Width Belts



Welding two belts side enables manufacturing a belt to a maximum of 800 mm wide.

For more information, please refer to P18.

Self-tracking Belts with V guides



The combination of belts and B-guides produces accurate, liner and synchronous self-tracking belts.
No pulleys are attached to the fringe.

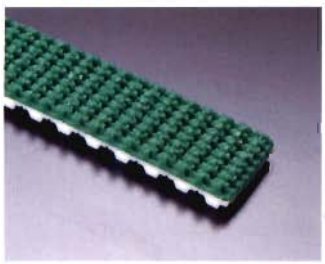
For more information, please refer to P17.

Flat Belts with V guides

Flat belt and V guides are formed in one piece.
Useful for light weight conveyance of circuit boards, etc. when used in a side-by-side configuration.

For more information, please refer to P16.

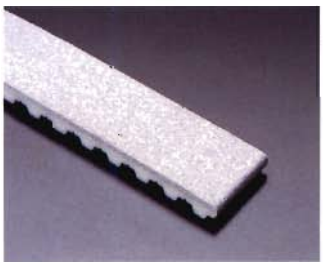
Rough Top Lining Belts



Belts lined with high friction coefficient rough top.
Useful for conveying on slopes, because of its slip prevention shape.

For more information, please refer to P19.

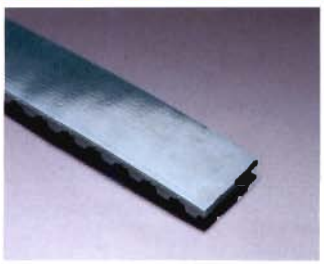
Artificial Leather Lining Belts



Belts lined with soft-touch artificial leather on the belt back.
Suitable for conveying material easily damaged.

For more information, please refer to P19.

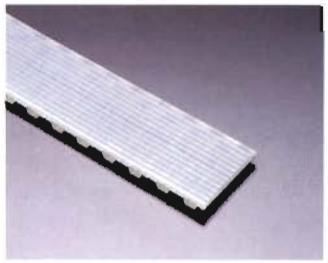
Fabric-lined Belts with High Friction Coefficient



Belts lined with the fabric impregnated with a special urethane on the belt back, which are formed in one piece.
Useful for conveying on slopes with high friction coefficient.

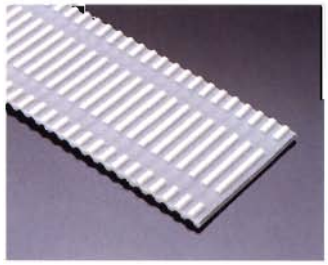
For more information, please refer to P13-18.

Belts with Belt Back Vertical Grooves



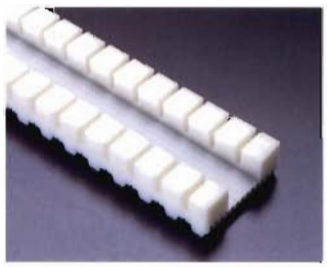
Belts with vertical grooves on the belt back. Less change in frictional resistance leads to more stable grip on material conveyed.

Toothed-side Ground Belts



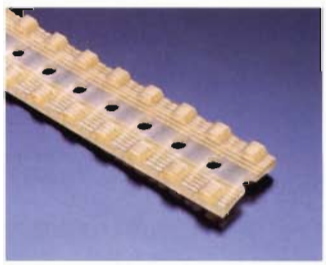
Tooth sides can be ground to request for guide functions, etc., when necessary.

Belt Back Ground Belts



Belt back can be ground to position material conveyed, etc., if necessary.

Perforated Belts



Perforated belts can be made for vacuum conveyance, fitting attachments, and others, as needed.

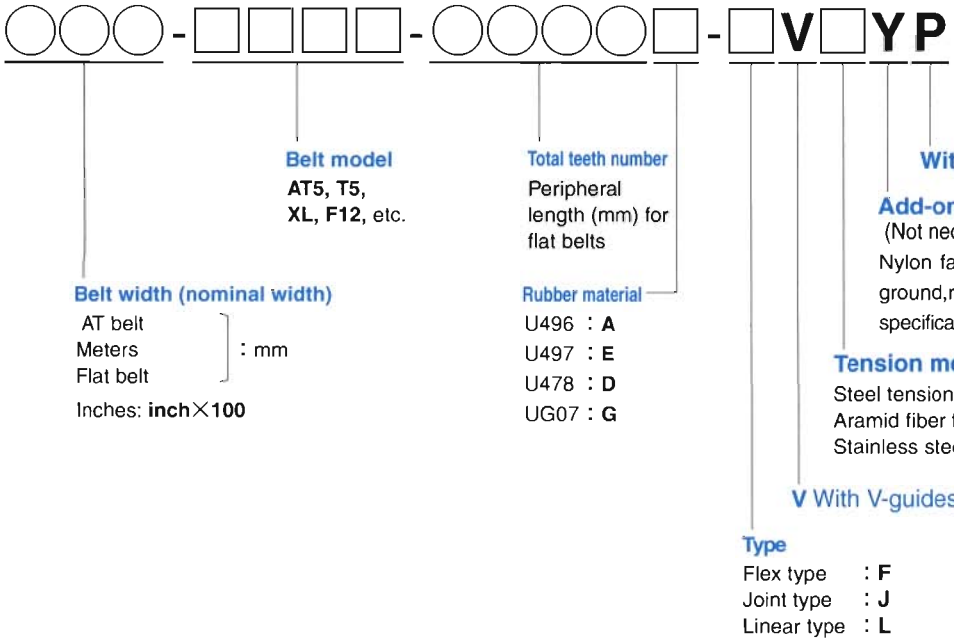
Synchronous Pulleys

Can be completely custom-made. There are stock items. Backlashless pulleys are also available (AT5/AT10).

Precision profile extrusion

Extrusion molding products in long lengths and precision cross-sections (molds are required).
Can be manufactured for purpose such as seals or wipers.

Models and Dimensions Presentation of Iron Rubber® Belt



Examples of types and specifications

050-AT10-0321E-FSYP

Y=Nylon facing on tooth-side

Belt width	: 50mm
Belt model	: AT10 (pitch10mm)
Teeth number	: 321 teeth (Peripheral length 3210mm)
Rubber material	: E (U497)
Type	: Flex
Tension member	: Stainless steel
V-guides	: None
Add-on specifications	: Nylon facing on tooth-side
Profile	: Applicable

075-F20-1500A-J

Belt width	: 75mm
Belt model	: F20
Teeth number	: Peripheral length 1500 mm
Rubber material	: A (U496)
Type	: Joint
Tension member	: Steel
V-guides	: None
Add-on specifications	: None
Profile	: None

100-L-0100A-JVY

Y=Belt back ground

Belt width	: 1 inch (25.4mm)
Belt model	: L (Pitch 9.525mm)
Teeth number	: 100 teeth (Peripheral length 952.5mm)
Rubber material	: A (U496)
Type	: Joint
Tension member	: Steel
V-guides	: Applicable
Add-on specifications	: Belt back ground
Profile	: None

Dimensions and Specifications

Dimensions which can be manufactured and add-on specifications are tabulated for Iron Rubber® belts. Please consult with us for specifications which can not be found in the tables and should be considered, if necessary.

Interpreting the Tables

Dimensions and Specifications of AT Belts

AT5

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member Rubber material	Stainless steel tension member Rubber material
				E	E
F	007 010 015 020 025 040 050	Min. : 600(120) Max. : 10000(2000)	None Nylon facing on tooth-side Min. : 1350(270)	○ ○	○ ○

Type
Each belt type is indicated by:
Flex type : **F**
Joint type : **J**
Linear type : **L**

Nominal width
Belt width in nominal width.
AT belts, Standard belts in meters
025=25mm
Standard belts in inches
100=1 inch (25.4mm)

Length (teeth number)
Peripheral length and teeth number which can be manufactured.
In the above case, you can set the desired number in the following range:
Peripheral length : 600~10000mm
Teeth number : 120~2000 teeth

Add-on Specifications
Add-on specifications to belts formed in one piece (fabric lining, etc.). Add-on specifications with extra processing (double width, special belt back, grounding) are listed in a separate table.
In the above case,
None : Belt with no add-on specification.
Nylon facing on tooth-side :
You can select the nylon facing on tooth-side specification, provided that the peripheral length is 1350 mm or more.

Combination of Specifications
Whether add-on specifications and material can be combined is indicated.
The symbols are:
○ : Available
— : Should be examined, please consult with us.
In the above case,
Steel and stainless-steel tension members are available. Only U497(E) is prepared for the respective belts as rubber material. As for a combination with add-on specifications, no add-on specifications and nylon facing on tooth-side belts can be manufactured.

Material

Rubber material (This rubber material complies with the Japanese Food Sanitation Act)

Material symbol	Abbr.	Color	Hardness (JIS A)	Remarks
U496	A	Translucent	90	
U497	E	White	90	
U478	D	Translucent	85	Low hardness
UG07	G	White	90	Mildewproof/antimicrobial

Tension member

Type	Material	Specification Symbol
High-tension steel cord	Steel (Galvanized)	—
fiber cord	Aramid fiber	K
Stainless steel cord	SUS304	S

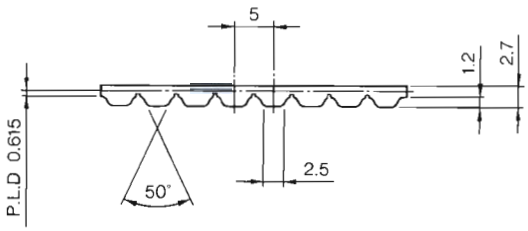
Dimensions and Specifications of AT Belt

AT5

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material	Stainless steel tension member / Rubber material
				E	E
F	007 010 015 020 025 040 050	Min. : 600(120) Max. : 10000(2000)	None Nylon facing on tooth-side Min. : 1350(270)	○ ○	○ ○

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material
				E
J L	007 010 015 020 025 040 050	Min. : 460(92) Max. : Limitless	None Nylon facing on tooth-side	○ ○

No length limit is placed on L (Linear type). One roll length is 60 m.

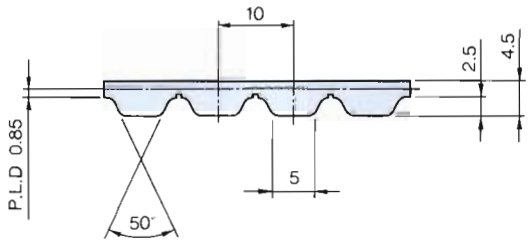


AT10

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material	Stainless steel tension member / Rubber material
				E	E
F	015 020 025 040 050	Min. : 600(60) Max. : 24000(2400)	None Nylon facing on tooth-side Min. : 1350(135)	○ ○	○ ○
	075 100	Min. : 1350(135) Max. : 24000(2400)	None Nylon facing on tooth-side	○ ○	○ ○

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material
				E
J L	015 020 025 040 050 075 100	Min. : 700(70) Max. : Limitless	None Nylon facing on tooth-side	○ ○

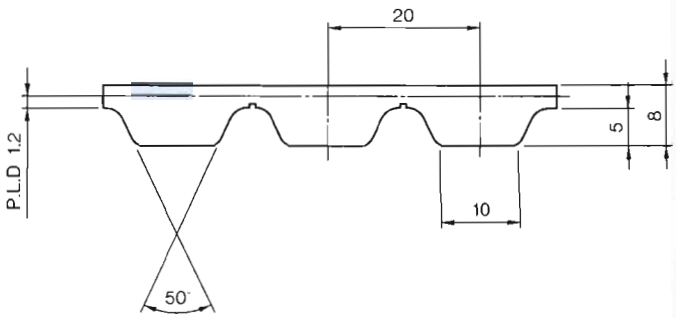
No length limit is placed on L (Linear type). One roll length is 40 m.



AT20

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material
				E
F	025 040 050 075 100	Min. : 1360(68) Max. : 24000(1200)	None Nylon facing on tooth-side	○ ○

No length limit is placed on L (Linear type). One roll length is 25 m.



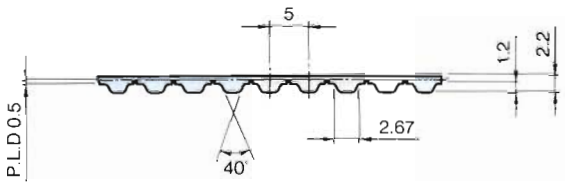
Dimensions and Specifications of Standard Belt (meters)

T5

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material E	Stainless steel tension member / Rubber material E
F	007 010 015 020 025 040 050	Min. : 600(120) Max. : 10000(2000)	None	○	○
			Nylon facing on tooth-side Min. : 1350(270)	○	○

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material A	E	D	Aramid fiber Rubber material / Rubber material A	E	G
J L	007 010 015 020 025	Min. : 250(50) Max. : Limitless	None	○	○	○	○	○	○
			Nylon facing on tooth-side	○	—	—	—	—	—
			Nylon facing on belt back	○	—	—	—	—	—
			Nylon facing on both sides	○	—	—	—	—	—
	040 050	Min. : 455(91) Max. : Limitless	Texture-patterned belt back	○	—	—	—	—	—

No length limit is placed on L (Linear type). One roll length is 60 m.

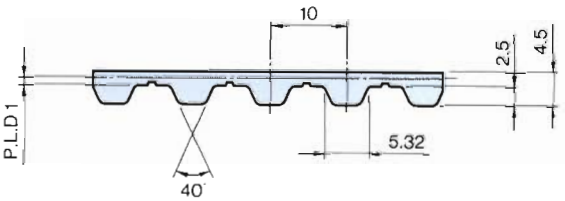


T10

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material E	Stainless steel tension member / Rubber material E
F	015 020 025 040 050	Min. : 600(60) Max. : 24000(2400)	None	○	○
			Nylon facing on tooth side Min. : 1350(135)	○	○
	075 100	Min. : 1350(135) Max. : 24000(2400)	None	○	○
			Nylon facing on tooth-side	○	○

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material A	E	Aramid fiber Rubber material / Rubber material A	E	G
J L	(010)	Min. : 700(70) Max. : Limitless	None	○	○	○	○	○
	015 020 025 040 050 075 100		Nylon facing on tooth-side	○	—	○	—	—
			Nylon facing on belt back	○	—	○	—	—
			Nylon facing on both sides	○	—	—	—	—
			Low hardness belt back	○	—	—	—	—
			High friction nylon facing	○	—	—	—	—
			Texture-patterned belt back	○	—	—	—	—

The 10 mm width belt is only for linear types. No length limit is placed on L (linear type). One roll length is 50 m.
Low hardness belt back specifications are 1 mm thick and total height is 5.5 mm. (Minimum pulley teeth is 28.)
High friction nylon facing specifications are 0.5 mm thick and total height is 5.0 mm.

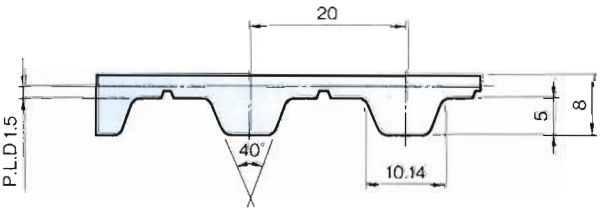


T20

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material E	Stainless steel tension member / Rubber material E
F	025 040 050 075 100	Min. : 1360(68) Max. : 24000(1200)	None	○	○
			Nylon facing on tooth-side	○	○

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member / Rubber material A	E
J L	(020)	Min. : 1000(50) Max. : Limitless	None	○	○
	025 040 050 075 100		Nylon facing on tooth-side	○	○
			Nylon facing on belt back	○	—
			Nylon facing on both sides	○	—
			Low hardness belt back	○	—

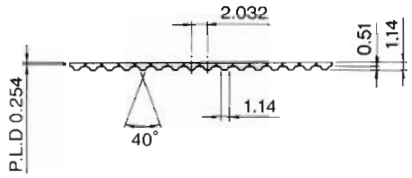
The 20 mm width belt is only for linear types. No length limit is placed on L (linear type). One roll length is 30 m. Low hardness belt back specifications are 2 mm thick and total height is 10 mm. (Minimum pulley teeth is 42.)



Dimensions and Specifications of Standard belt (inches)

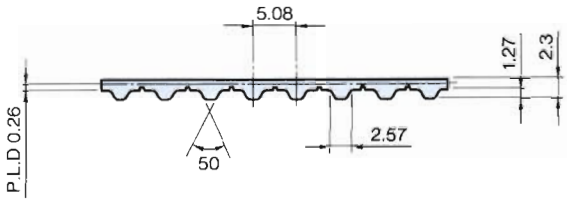
MXL

Type	Nominal width		Length	Add-on specifications	Aramid tension member
		mm			Rubber material
					D
L	013	3.2	Loop length 100m	None	○
	019	4.8			
	025	6.4			
	031	7.9			
	037	9.5			
	050	12.7			
	075	19.1			
	100	25.4			



XL

Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	025	6.4	Min. : 609.6(120)	None	○	○
	031	7.9				
	037	9.5				
	050	12.7				
	075	19.1				
	100	25.4	Max. : 10007.6 (1970)	Nylon facing on tooth-side Min. : 1351.28 (266)	○	○
	150	38.1				
	200	50.8				

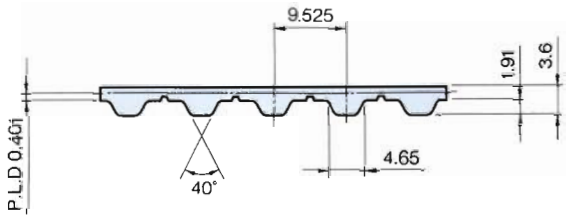


Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material		
		mm			Rubber material		Rubber material		
					A	E	A	E	D
J	025	6.4	Min. : 254(50)	None	○	○	○	○	○
	031	7.9							
	037	9.5		Nylon facing on tooth-side	○	—	—	—	—
	050	12.7	Max. : Limitless						
	075	19.1		Nylon facing on belt back	○	—	—	—	—
L	100	25.4							
	150	38.1	Min. : 457.2(90)	Nylon facing on both sides	○	—	—	—	—
	200	50.8	Max. : Limitless						

No length limit is placed on L (linear type). One roll length is 60 m.

L

Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	050	12.7	Min. : 600.08(63)	None	○	○
	075	19.1				
	100	25.4	Max. : 10001.25 (1050)	Nylon facing on tooth-side Min. : 1352.55 (142)	○	○
	150	38.1				
	200	50.8				
	300	76.2	Min. : 1352.55 (142)	None	○	○
	400	101.6	Max. : 10001.25 (1050)	Nylon facing on tooth-side	○	○

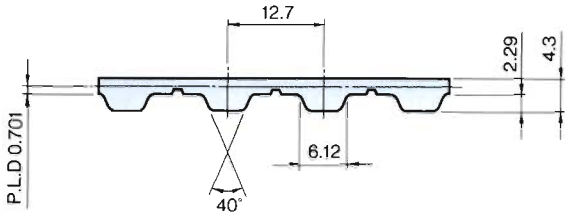


Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material	
		mm			Rubber material		Rubber material	
					A	E	A	E
J	050	12.7	Min. : 666.75(70)	None	○	○	○	○
	075	19.1		Nylon facing on tooth-side	○	—	—	—
	100	25.4		Nylon facing on belt back	○	—	—	—
L	150	38.1	Max. : Limitless	Nylon facing on both sides	○	—	—	—
	200	50.8		Low hardness belt back	○	—	—	—

No length limit is placed on L (linear type). One roll length is 60 m.
Low hardness belt back specifications are 1 mm thick and total height is 4.6 mm. (Minimum pulley teeth is 18.)

H

Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	075	19.1	Min. : 609.6(48)	None	○	○
	100	25.4		Nylon facing on tooth-side		
	150	38.1	Max. : 24003(1890)	Min. : 1358.9 (107)	○	○
	200	50.8				
	300	76.2	Min. : 1358.9(107)	None	○	○
	400	101.6	Max. : 24003(1890)	Nylon facing on tooth-side	○	○

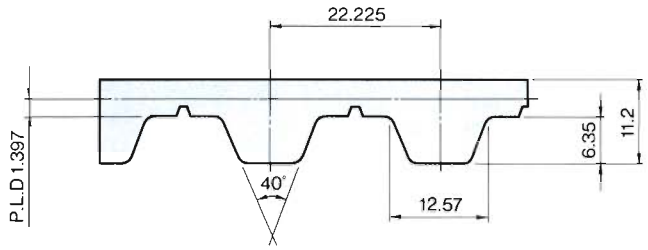


Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material	
		mm			Rubber material		Rubber material	
					A	E	A	E
J	075	19.1	Min. : 771.2(56)	None	○	○	○	○
	100	25.4		Nylon facing on tooth-side	○	—	○	—
	150	38.1		Nylon facing on belt back	○	—	—	—
L	200	50.8	Max. : Limitless	Nylon facing on both sides	○	—	—	—
	300	76.2		Low hardness belt back	○	—	—	—
	400	101.6						

No length limit is placed on L (linear type). One roll length is 50 m.
Low hardness belt back specifications are 1 mm thick and total height is 5.3 mm. (Minimum pulley teeth is 25.)

XH

Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	100	25.4	Min. : 1355.73(61)	None	○	○
	150	38.1				
	200	50.8				
	300	76.2	Max. : 24003(1080)	Nylon facing on tooth-side	○	○
	400	101.6				



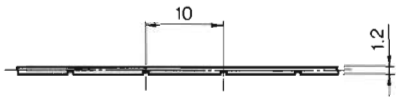
Type	Nominal width		Nominal width Length mm (Teeth number)	Add-on specifications	Steel tension member	
		mm			Rubber material	
					A	E
J	100	25.4	Min. : 1000.13(45)	None	○	○
	150	38.1		Nylon facing on tooth-side	○	—
	200	50.8		Nylon facing on belt back	○	—
L	300	76.2	Max. : Limitless	Nylon facing on both sides	○	—
	400	101.6		Low hardness belt back	○	—

No length limit is placed on L (linear type). One roll length is 25 m.
Low hardness belt back specifications are 2 mm thick and total height is 13.2 mm. (Minimum pulley teeth is 28.)

Dimensions and Specifications of Flat Belt

F12

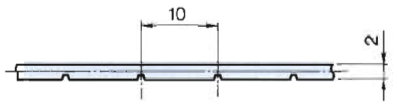
Type	Nominal width	Length mm	Add-on specifications	Steel tension member Rubber material A
F	010 015 020 025 040 050	Min. : 1500 Max. : 10000	None	○



Please specify a belt with the minimum length or more and in multiples of 10 mm.
Minimum pulley diameter is ϕ20.

F20

Type	Nominal width	Length mm	Add-on specifications	Steel tension member Rubber material A
F	015 020 025 040 050 075 100	Min. : 1500 Max. : 24000	None	○



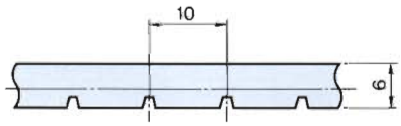
Please specify a belt with the minimum length or more and in multiples of 10 mm.
Minimum pulley diameter is ϕ50.

Type	Nominal width	Length mm	Add-on specifications	Steel tension member Rubber material A
J L	015 020 025 040 050 075 100	Min. : 800 Max. : Limitless	None	○

No length limit is placed on L (linear type). One roll length is 50 m.
Please specify a belt with the minimum length or more and in multiple of 10 mm.
Minimum pulley diameter is ϕ50.

F60

Type	Nominal width	Length mm	Add-on specifications	Steel tension member Rubber material D
F	015 020 025 040 050 075 100	Min. : 1500 Max. : 24000	None	○

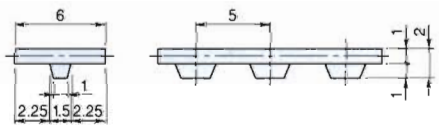


Please specify a belt with the minimum length or more and in multiples of 10 mm.
Minimum pulley diameter is ϕ100.

Dimensions and Specifications of Flat Belt with V-guides

006-F10

Type	Nominal width	Length mm	Add-on specifications	Steel tension member Rubber material E
J	006	Min. : 850 Max. : Limitless	None	○

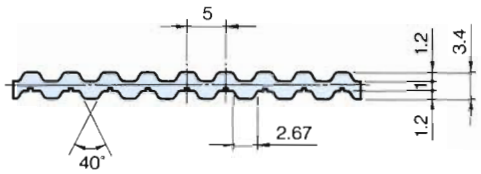


Please specify a belt with the minimum length or more and in multiples of 5 mm.
Minimum pulley diameter is ϕ15.

Dimensions and Specifications of Double-sided Belt

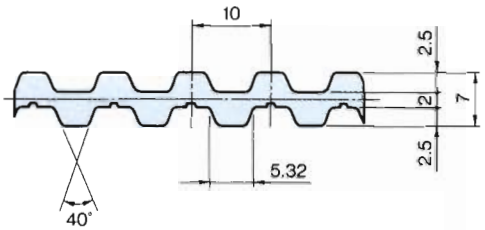
DT5

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
				Rubber material	Rubber material
				E	E
F	007 010 015 020 025 040 050	Min. : 1350(270) Max. : 10000(2000)	None Nylon facing on tooth-side (only for one side)	○ ○	○ ○



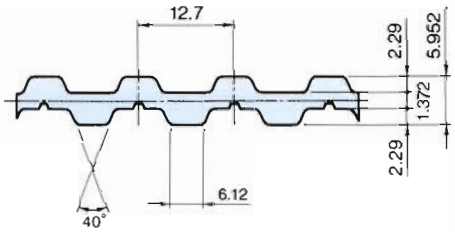
DT10

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
				Rubber material	Rubber material
				E	E
F	015 020 025 040 050 075 100	Min. : 1350(135) Max. : 24000(2400)	None Nylon facing on tooth-side (only for one side)	○ ○	○ ○



DH

Type	Nominal width		Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	075	19.1	Min. : 1358.9(107) Max. : 24003(1890)	None Nylon facing on tooth-side (only for one side)	○ ○	○ ○
	100	25.4				
	150	38.1				
	200	50.8				
	300	76.2				
	400	101.6				

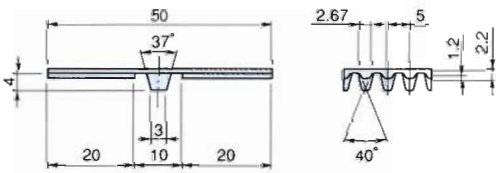


Dimensions and Specifications of Self-tracking Belt with V-guides

T5-V

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member
				Rubber material
				A
J	030 040 050	Min. : 900(180) Max. : Limitless	None	○

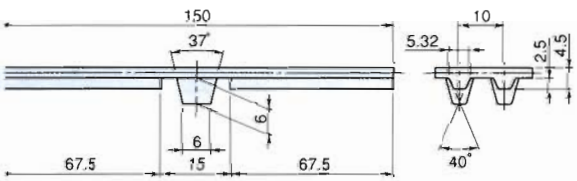
If you need L (linear type), please consult with us.
Minimum pulley teeth is 18.



T10-V

Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member
				Rubber material
				A
J	050 075 100 125 150	Min. : 900(90) Max. : Limitless	None	○

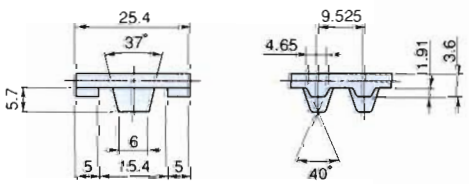
If you need L (linear type), please consult with us.
Minimum pulley teeth is 20.



L-V

Type	Nominal width		Length mm (Teeth number)	Add-on specifications	Steel tension member
		mm			Rubber material
					A
J	100	25.4	Min. : 895.35(94) Max. : Limitless	None	○

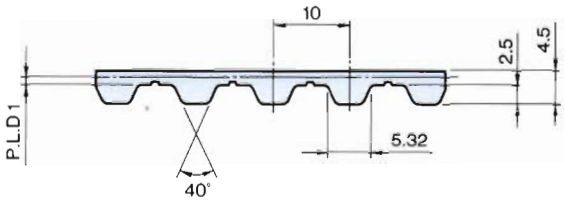
If you need L (linear type), please consult with us.
Minimum pulley teeth is 15.



Dimensions and Specifications of Toothed Wide Belt

T10

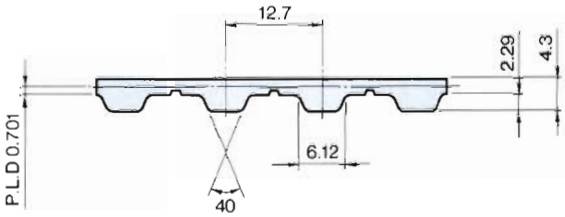
Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material	
				Rubber material		Rubber material	
				A	E	A	E
J	150	Min. : 850(85) Max. : Limitless	None	○	—	○	—
			Texture-patterned belt back	○	—	○	—
			High friction nylon facing	○	—	—	—
	200 250 300 350 400 450	Min. : 1000(100) Max. : Limitless	None	—	—	—	○
			Texture-patterned belt back	—	—	—	○
			High friction nylon facing	—	—	—	○



If you need L (linear type), please consult with us.
High friction nylon facing specification belt is 0.5 mm thick and the total height is 5.0 mm.

H

Type	Nominal width		Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material	
		mm			Rubber material		Rubber material	
					A	E	A	E
J	500	127.0	Min. : 850.9(67)	None	○	○	○	—
	600	152.4	Max. : Limitless	Nylon facing on tooth-side	○	—	○	—

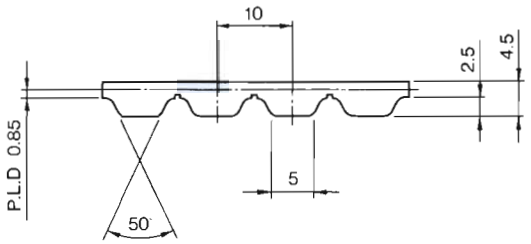


If you need L (linear type), please consult with us.

Dimensions and Specifications of Double Width Belt

AT10

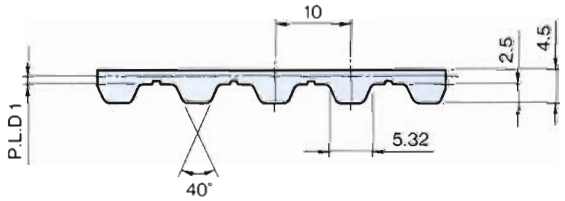
Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
				Rubber material	Rubber material
				E	E
F	150	Min. : 2500(250)	None	○	○
	200	Max. : 24000(2400)	Nylon facing on tooth-side	○	○



Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member
				Rubber material
				E
J	150	Min. : 2500(250)	None	○
	200	Max. : Limitless	Nylon facing on tooth-side	○

T10

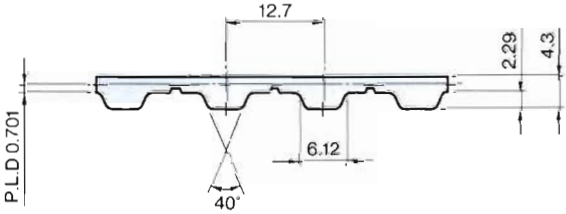
Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
				Rubber material	Rubber material
				E	E
F	200	Min. : 2500(250)	None	○	○
		Max. : 24000(2400)	Nylon facing on tooth-side	○	○



Type	Nominal width	Length mm (Teeth number)	Add-on specifications	Aramid tension member
				Rubber material
				E
J	500 600 700 800	Min. : 2500(250) Max. : Limitless	None	○

H

Type	Nominal width		Length mm (Teeth number)	Add-on specifications	Steel tension member	Stainless steel tension member
		mm			Rubber material	Rubber material
					E	E
F	600	152.4	Min. : 2540(200)	None	○	○
	800	203.2	Max. : 24003(1890)	Nylon facing on tooth-side	○	○



Type	Nominal width		Length mm (Teeth number)	Add-on specifications	Steel tension member		Aramid fiber Rubber material	
		mm			Rubber material		Rubber material	
					A	E	A	E
J	800	203.2	Min. : 2540(200)	None	○	○	○	○
	1000	254.0		Nylon facing on tooth-side	○	—	○	—
	1200	304.8	Max. : Limitless	Nylon facing on belt back	○	—	○	—
				Nylon facing on both sides	○	—	○	—

Dimensions and Specifications of Special Belt Back Belt

Type	Belt Back Material	Thick (mm)	Color	Minimum Pulley Diameter (mm)	Characteristics
Rough top lining	PVC	Approx. 4.3	Green	60	Suitable for conveying on slopes with PVC, high friction coefficient and anti-slip shape.
Artificial leather lining	Artificial leather	2	Gray	50	Suitable for conveying sensitive parts with soft-touch artificial leather surface.
Polyurethane foam pad lining	Polyurethane (Surface rubber hardness 20, 40 — 2 types)	5, 10	Green White	Hardness 20: Thickness 5 / Diameter 72; Thickness 10 / Diameter 144. Hardness 40: Thickness 5 / Diameter 30; Thickness 10 / Diameter 60	Suitable for tractor conveying and for protecting products with an outstanding cushion top.

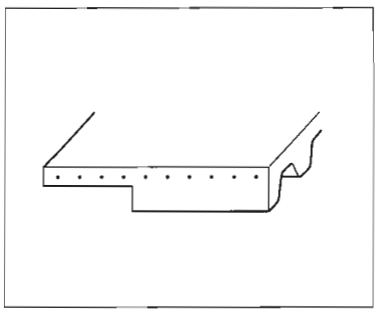
Applicable belt models are AT10, AT20, T10, T20, L, H, and XH.
Please consult with us for other material lining (ex. synthetic rubber).
Rough top and artificial leather above are not compliant with the Japanese Food Sanitation Act.

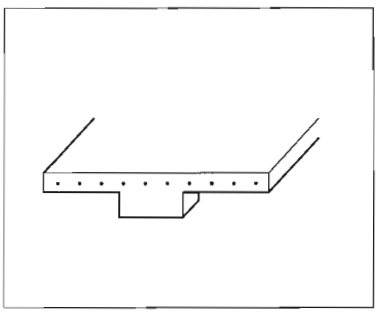
Grinding (Tooth-side / belt back grinding and perforating)

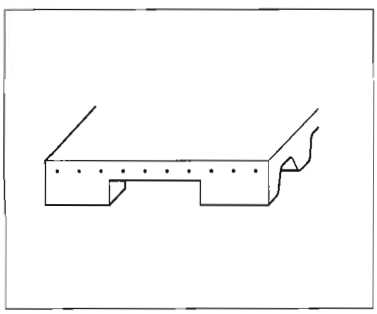
No limit in belt width and length.
We can manufacture as per the drawing.

Process examples

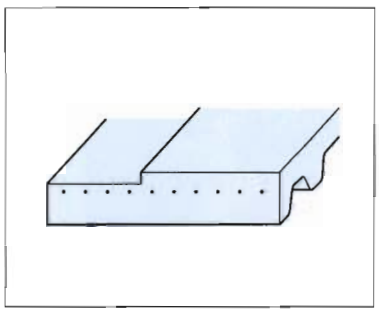
Tooth-side ground

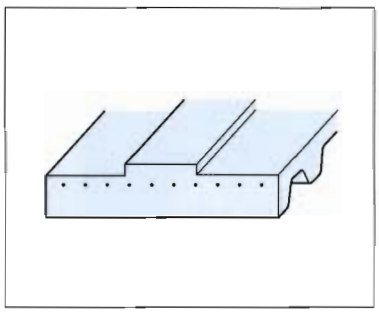


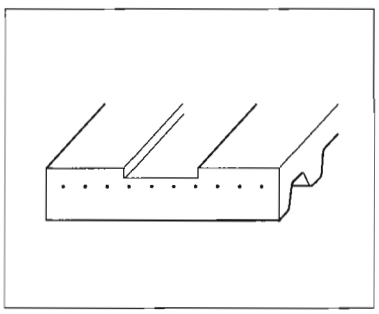




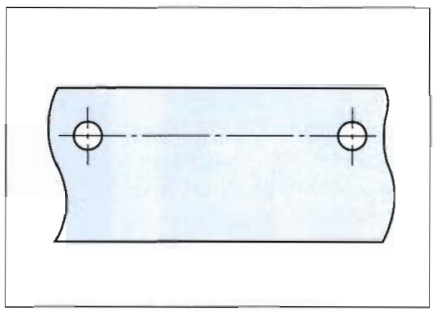
Belt back ground

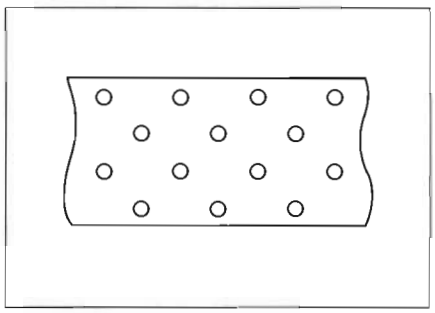


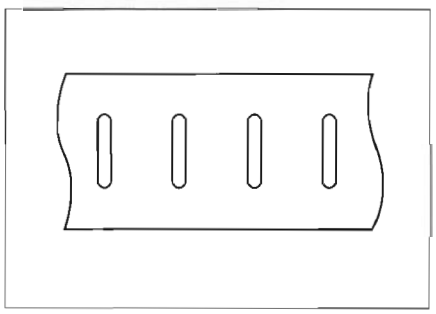




Perforating



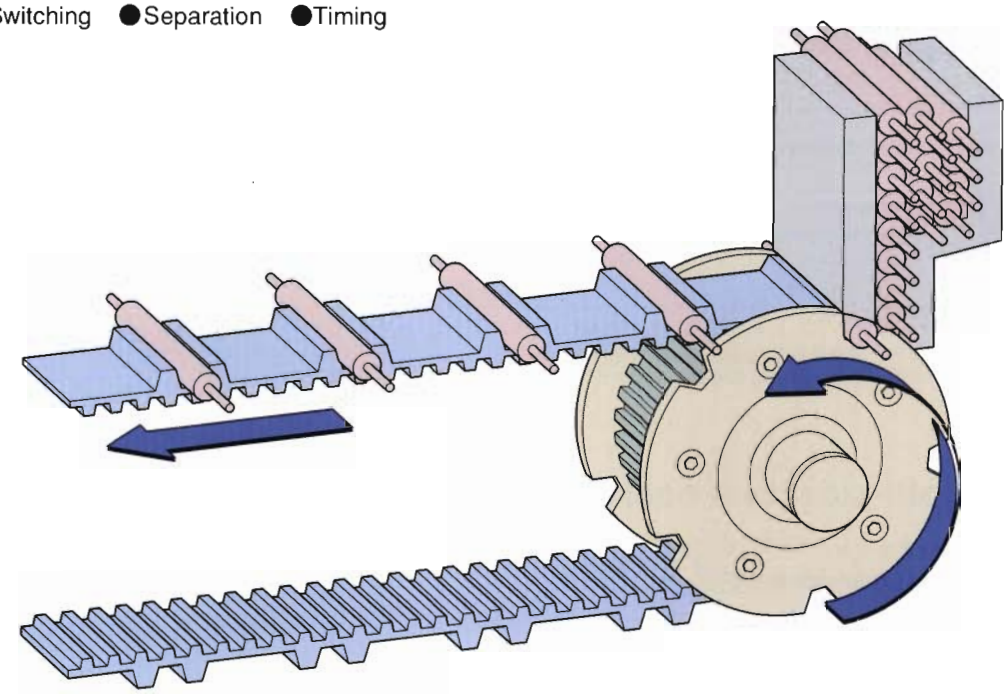


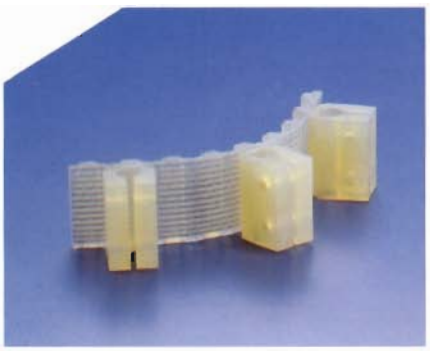
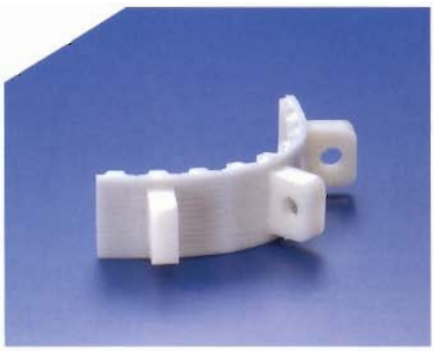
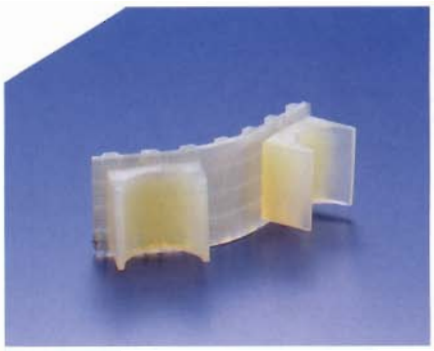
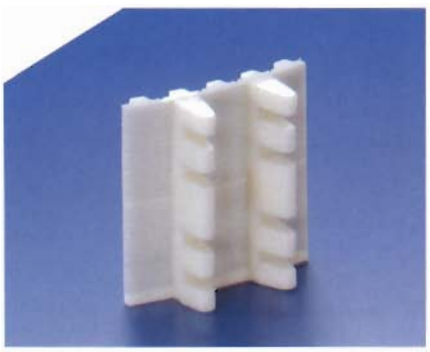
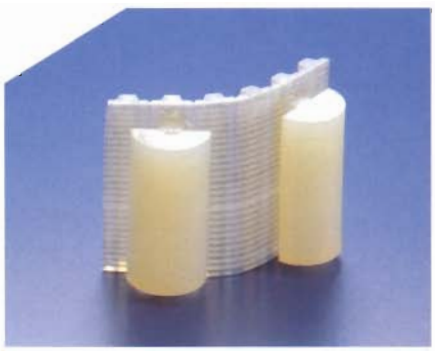
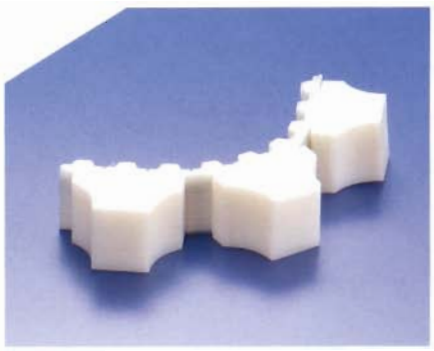


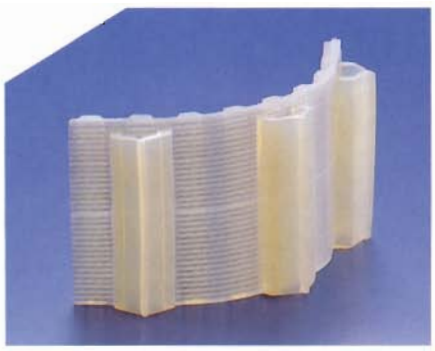
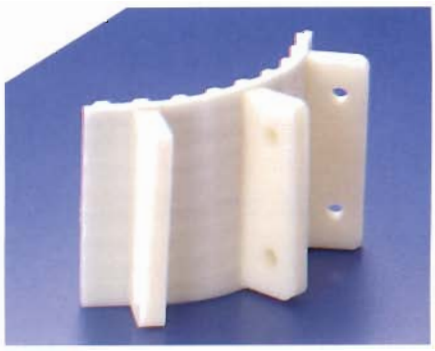
Profile

Iron rubber® belts with firmly welded profiles can be used for the following. The welded profiles allow multi-function in conveyance and control device fields.

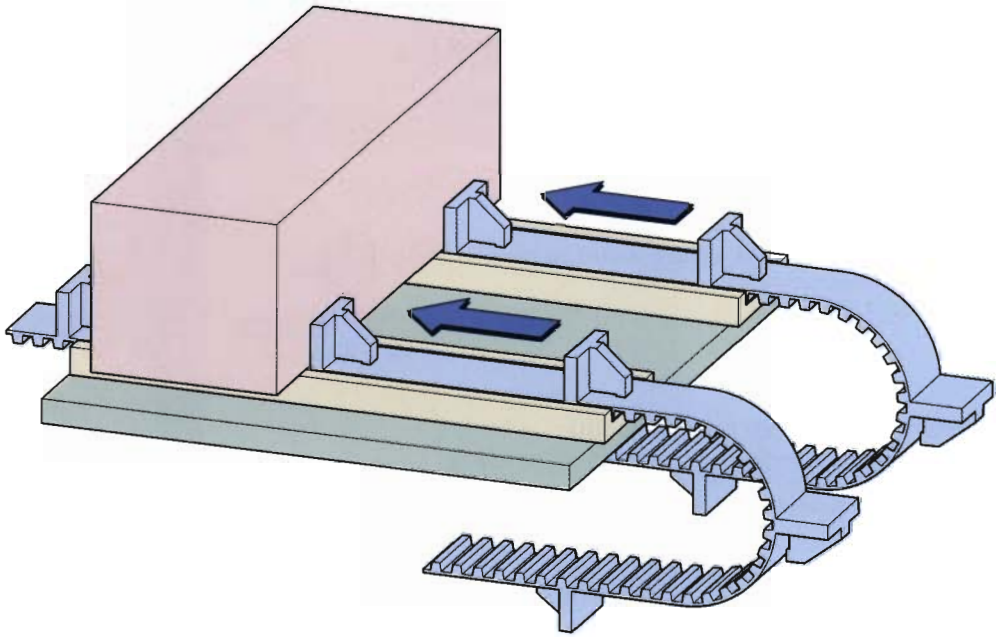
● Positioning ● Switching ● Separation ● Timing

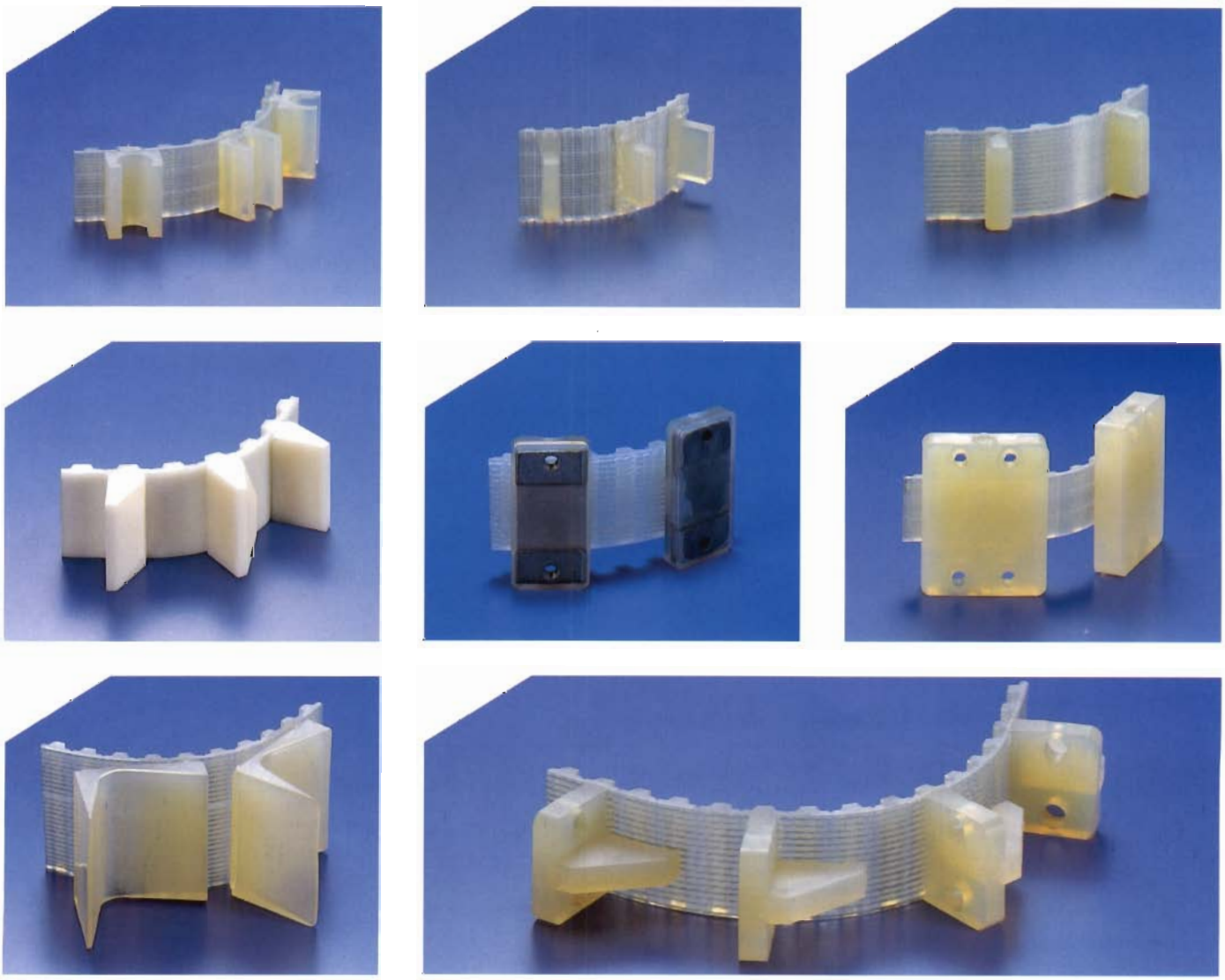


Various kinds of profiles are available. Please see the Profile Drawing for each shape.
If standard profiles are not adaptable for your conditions, please consult with us since we manufacture profiles by grounding or using molds.





Profiled Belt Designing Precautions

Welding Width and Pulley Teeth Number

Profiles should be placed over the tooth (Fig. A). When it is unavoidable, a profile may be placed over the tooth bottom (Fig. B). In this case thickness (S) must be reduced. Profiles welded with irregular pitches and thick profiles (Fig. C) affect contact with pulleys, and lead to breakage.
Please use the following table as the standard for S dimensions.

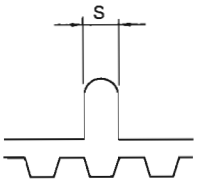


Fig. A

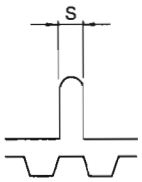


Fig. B

【Note】
If there is no indication of "flash removed", welding width expands due to flash. For welding, the width, S should be the profile dimension + 1, as shown in Fig. 1.

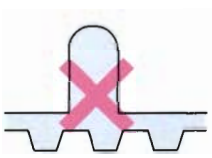


Fig. C

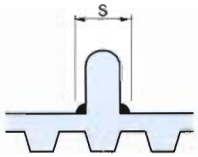


Fig. D

Profile Thickness (Smax welded over the tooth) (mm)

Belt model \ Pulley teeth	14	15	18	20	25	≦30
AT5 / T5	3 (1.5)	3 (1.5)	4 (1.5)	4 (1.5)	5 (2)	5 (2.5)
AT10 / T10	5 (2)	5 (2)	6 (2.5)	6 (2.5)	7 (3)	8 (3)
AT20 / T20	—	—	9 (3)	10 (4)	10 (4)	12 (5)
XL	3 (1.5)	3 (1.5)	4 (1.5)	4 (1.5)	5 (2)	5 (2.5)
L	4 (2)	4 (2)	5 (2.5)	5 (2.5)	5 (2.5)	6 (3)
H	5 (2)	5 (3)	6 (3)	6 (3)	7 (4)	8 (5)
XH	—	—	10 (3.5)	10 (4)	11 (4)	12 (5)

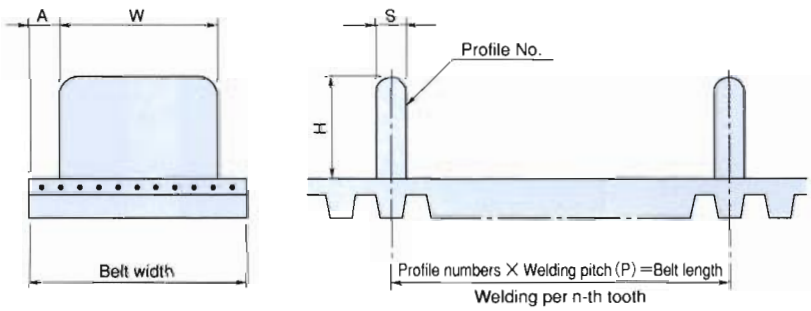
Smax of a profile welded over the bottom is indicated in parenthesis, as shown in Fig. B.

【Example】
When using an Iron Rubber® belt T 10 and pulley with 20 teeth:

- •Over the tooth S≦6
- •Over the tooth bottom S≦2.5
  (In the case of the above Fig. B)

How to specify profiles

A drawing of the profiled belt is required as shown in the following figures.



Profile Tolerance before Welded

S, W, H Dimension	Tolerance
4≦	±0.2
4< ≦16	±0.3
16< ≦31	±0.4
31< ≦63	±0.5

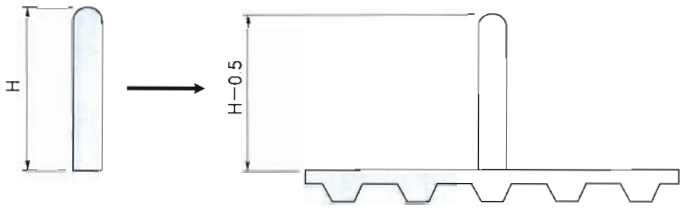
Welded Profile Tolerances

A, H Dimension	Tolerance
16≦	±0.5
16< ≦31	±0.7
31< ≦63	±1.0

P Dimension	Tolerance	
	AT5,AT10,T5,T10,XL,L,H	AT20,T20,XH
63≦	±0.4	±0.6
63< ≦125	±0.5	±0.8
125< ≦250	±0.6	±1.0
250< ≦500	±0.9	±1.5

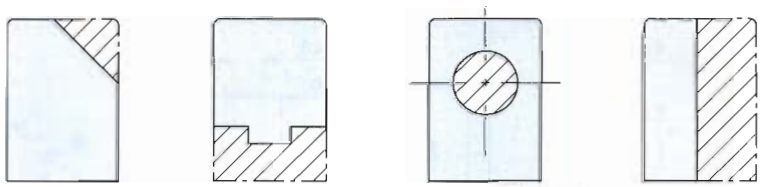
Profile Height

Profile height is lowered by approx. 0.5 mm due to welding on a belt.



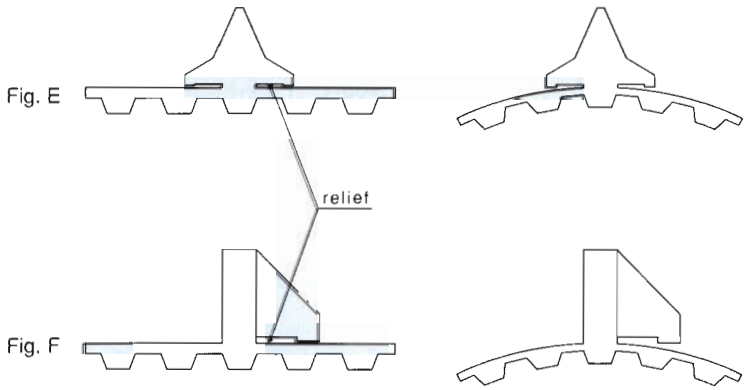
Grinding and Perforating

Standard profiles can be modified by drilling or grinding. Please send a drawing with your requirements.



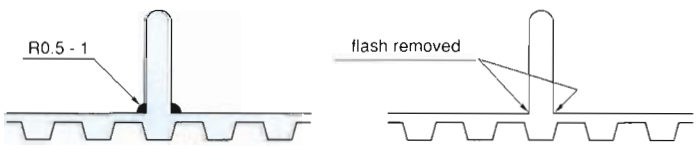
Profiles with Reliefs

The flexibility of the belt will not affected if the appropriate reliefs are designed into the profile.
In Fig. E, only the center part is welded, and the left and right part has a relief for movability to maintain flexibility of a belt. In Fig. F, only the left part is welded, and the right part has a relief for movability.



Welding Flash

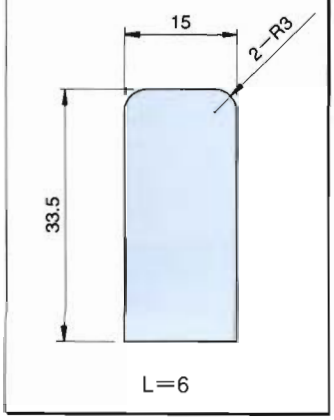
Flash occurs between the profile and the belt back as a result of the welding process employed.The flash radius can be between 0.5 and 1.0mm. If the flash impair function of the profile,please order profiles "with flash removed."



●Please consult with us, when mounting any other attachment on a profile, or adding oscillations or an shock load to a profile by intermittent feeding, etc.

Profile Drawing

FT0100E00-2



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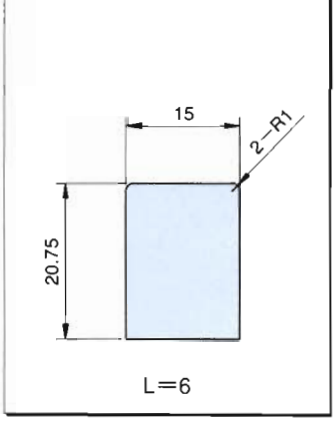

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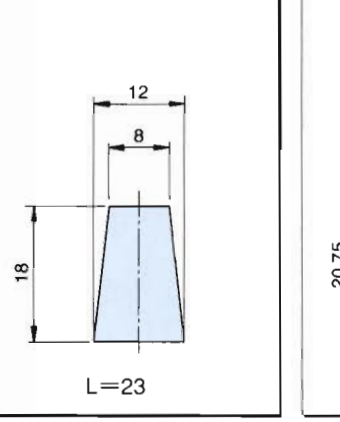

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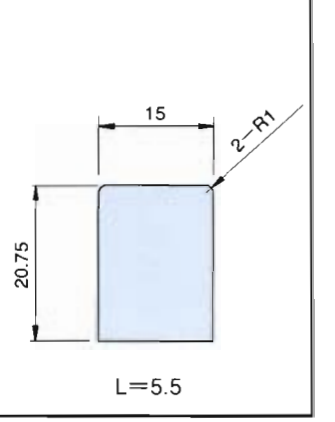

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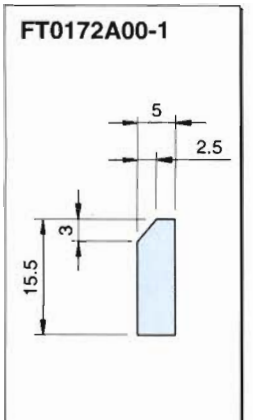

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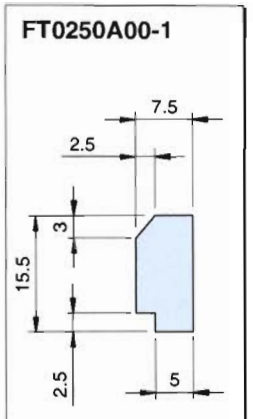

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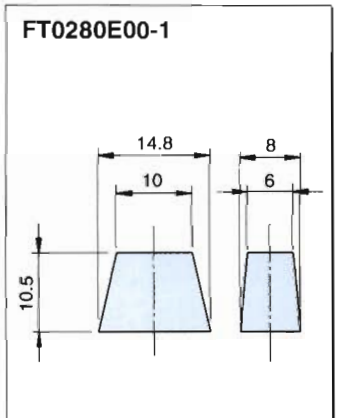

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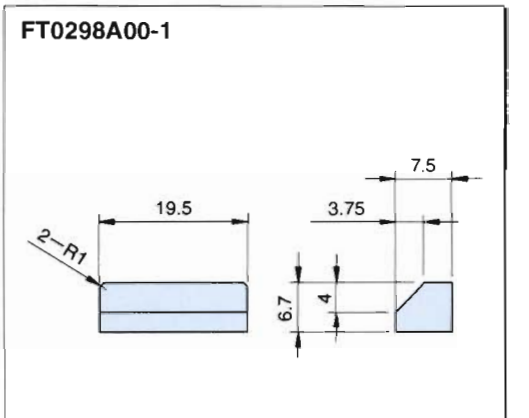

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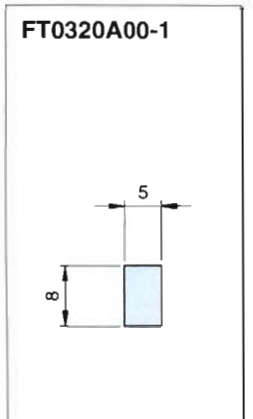

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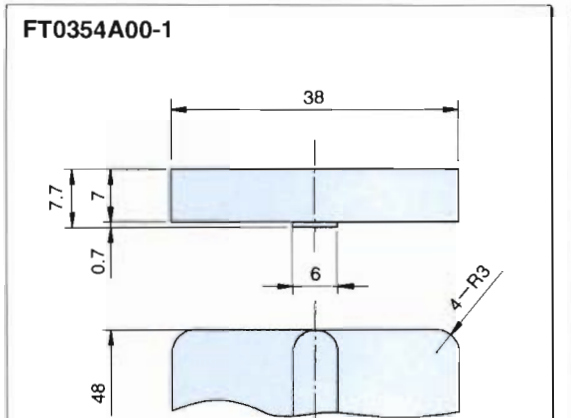

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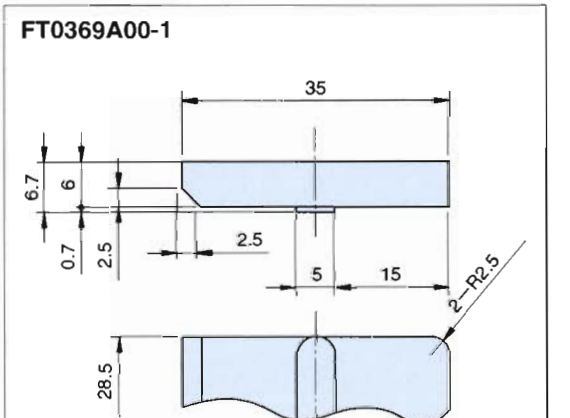

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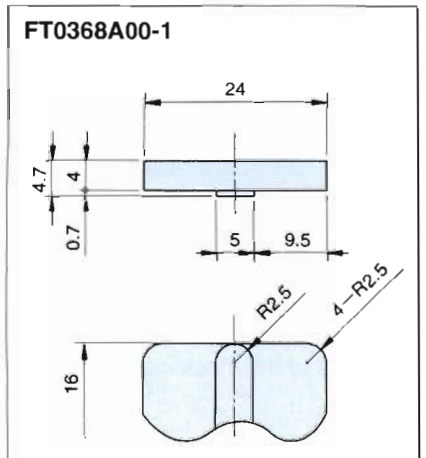

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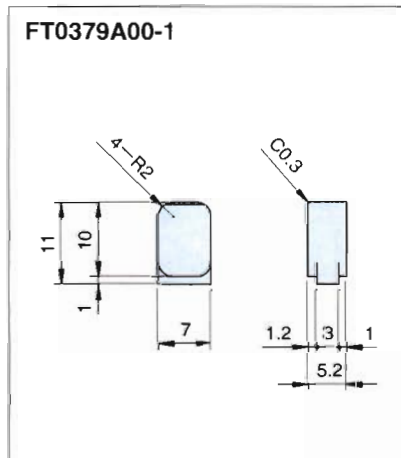

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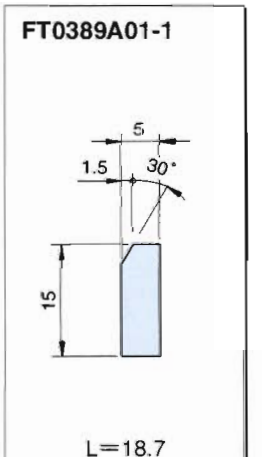

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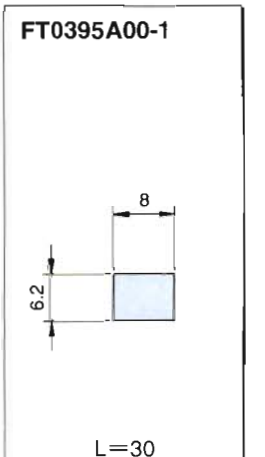

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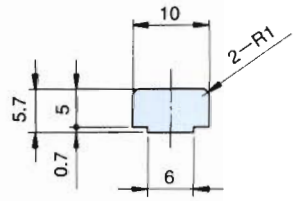

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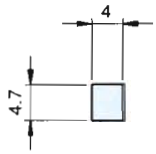

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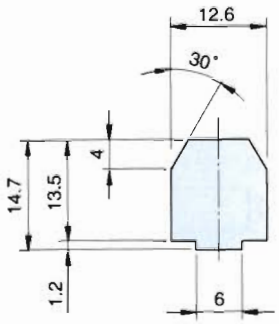

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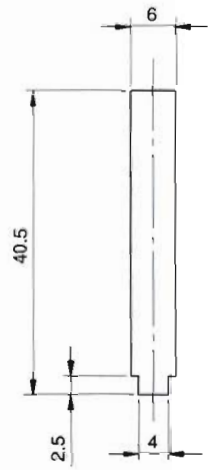

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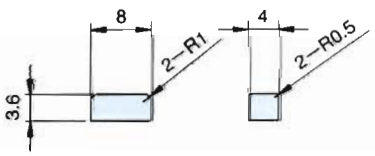

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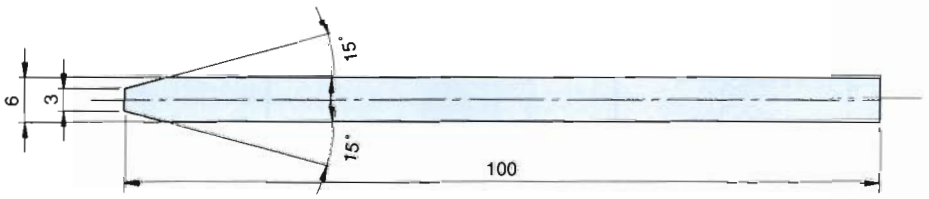

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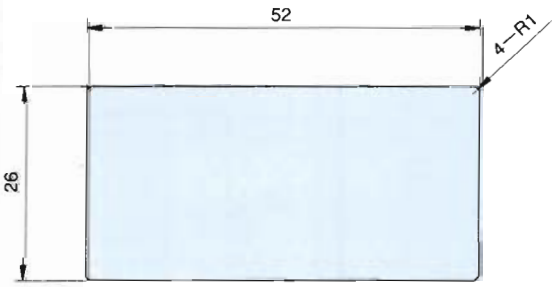

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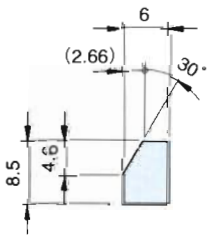

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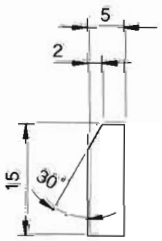

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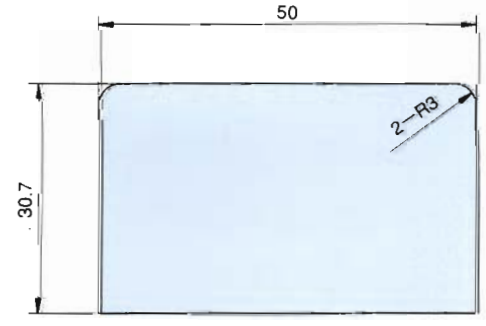

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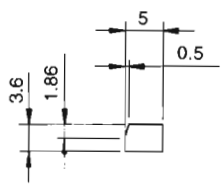

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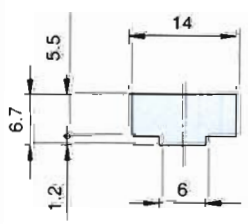

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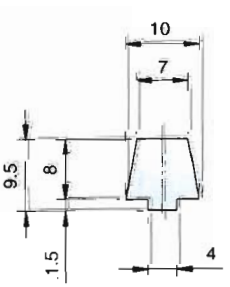

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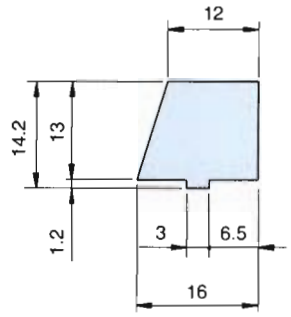

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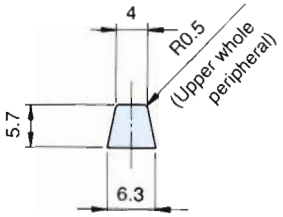

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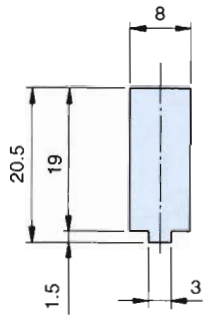

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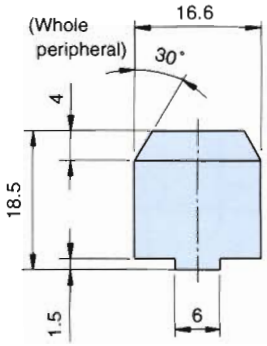

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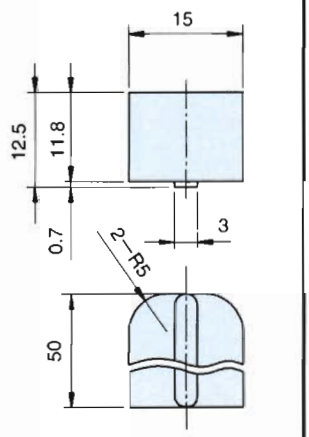

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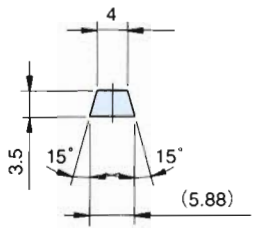

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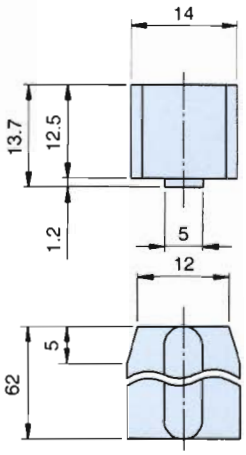

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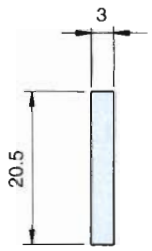

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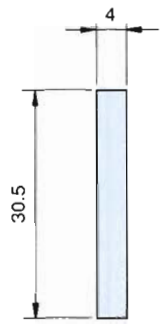

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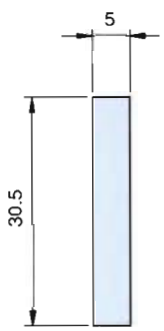

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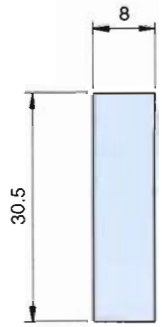

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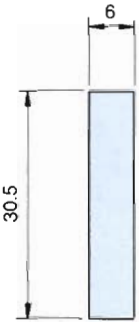

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※Profile height is lowered by approx. 0.5 mm due to a welding of a belt.

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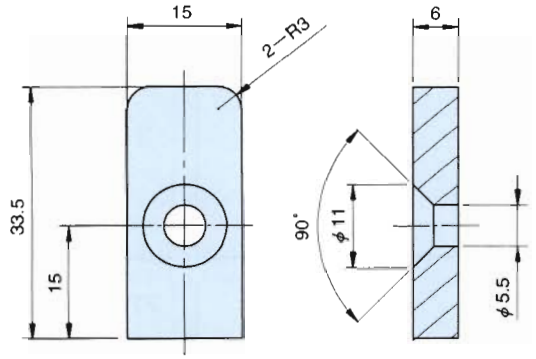

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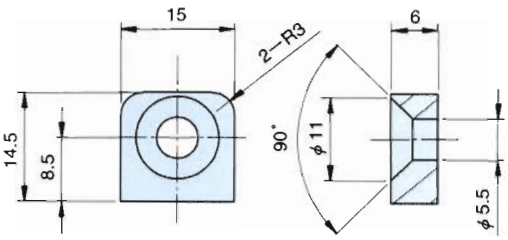

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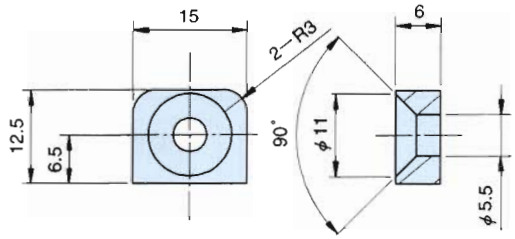

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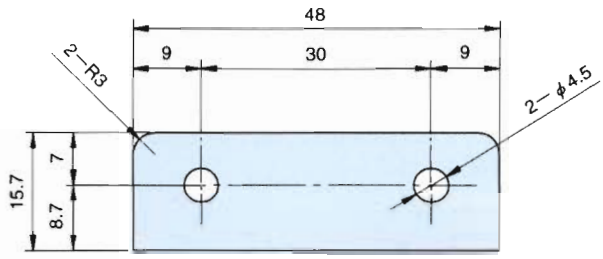

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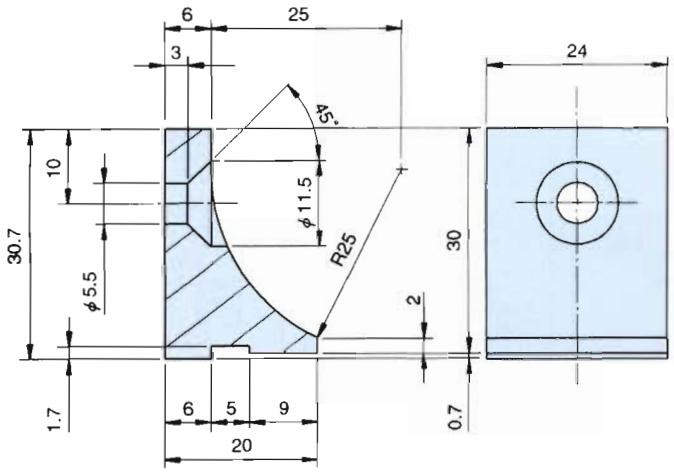

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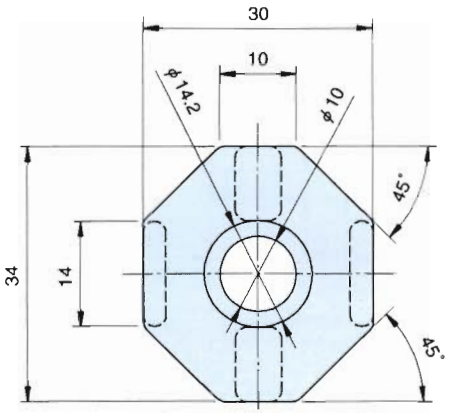

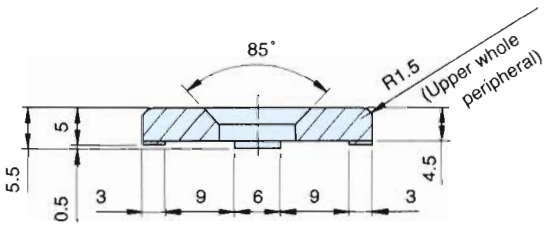

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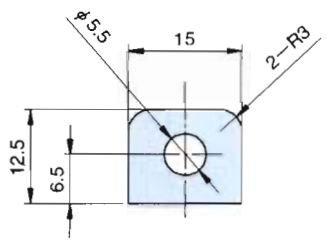

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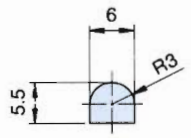

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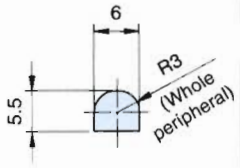

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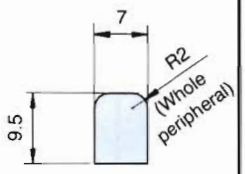

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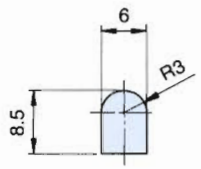

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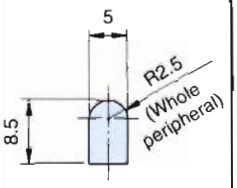

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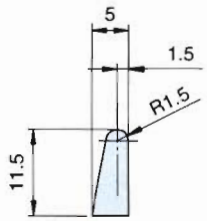

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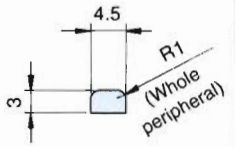

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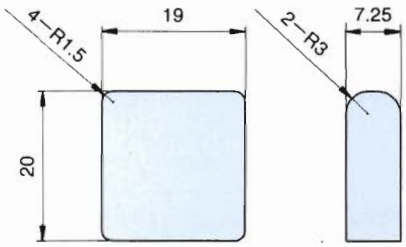

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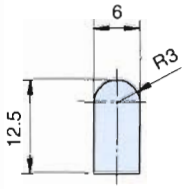

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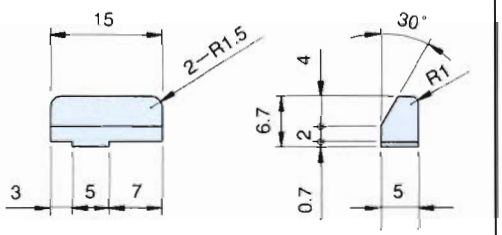

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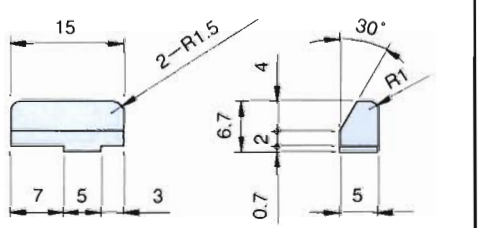

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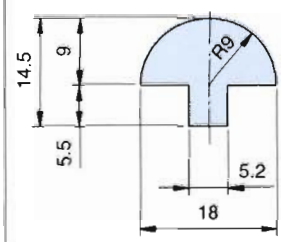

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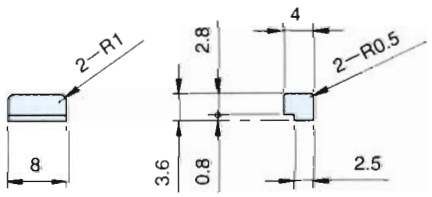

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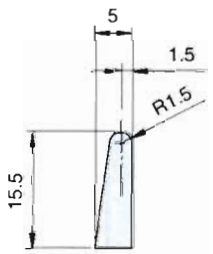

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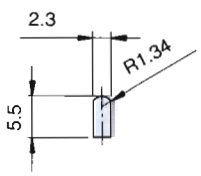

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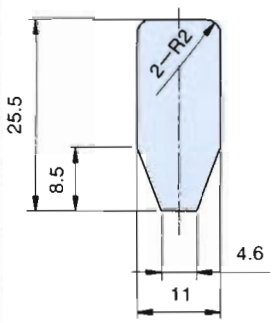

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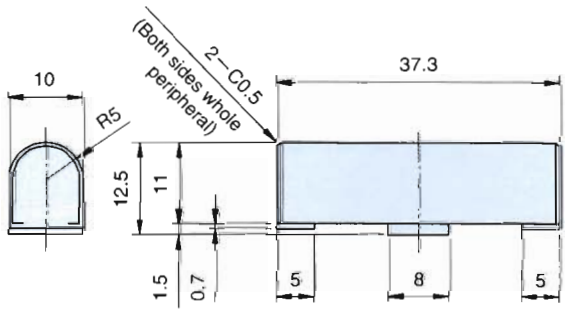

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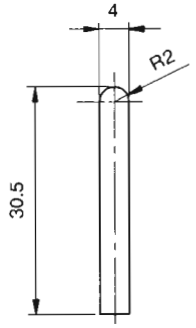

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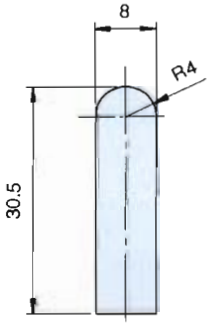

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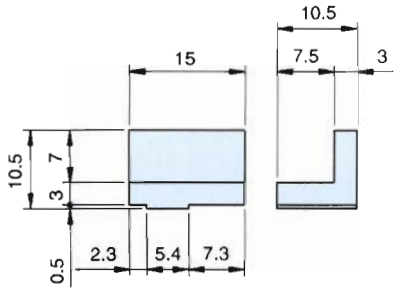

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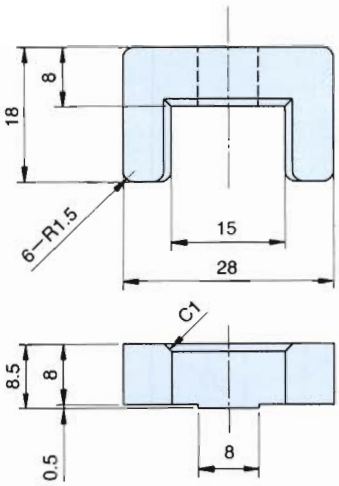

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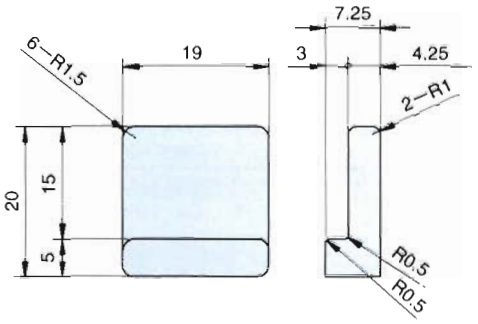

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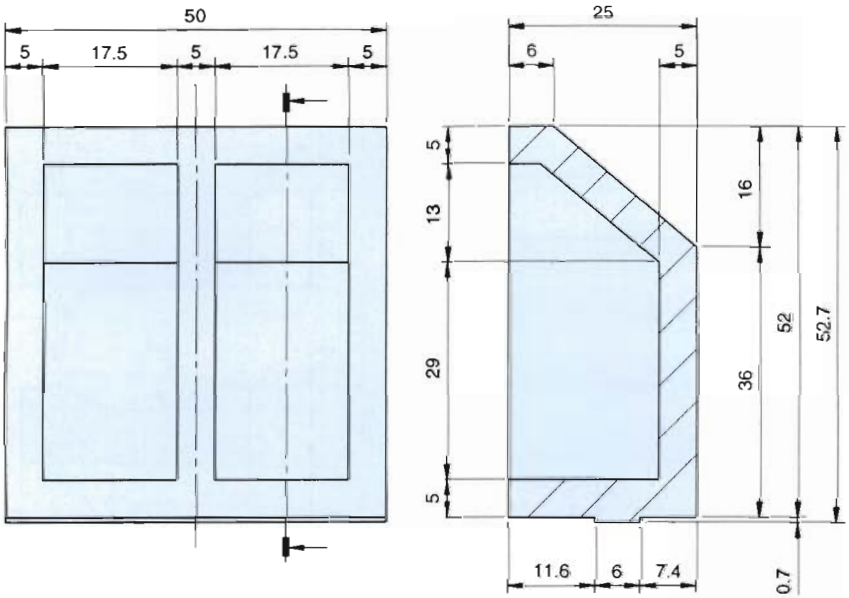

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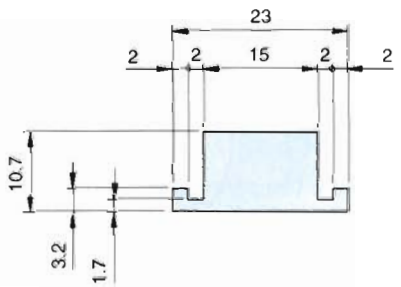

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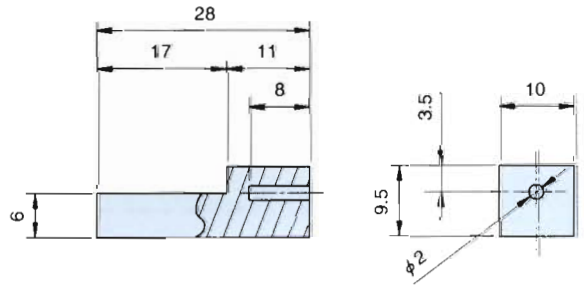

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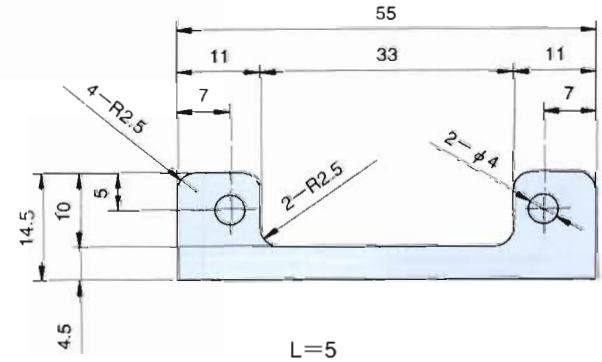

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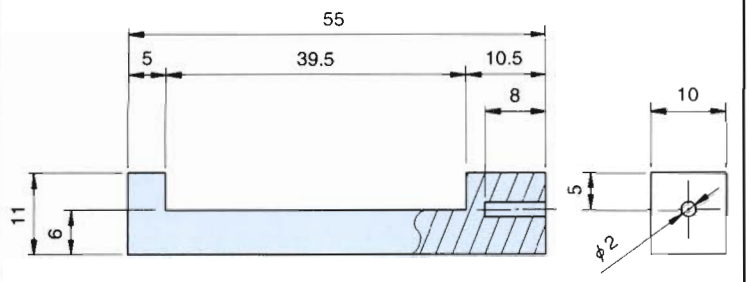

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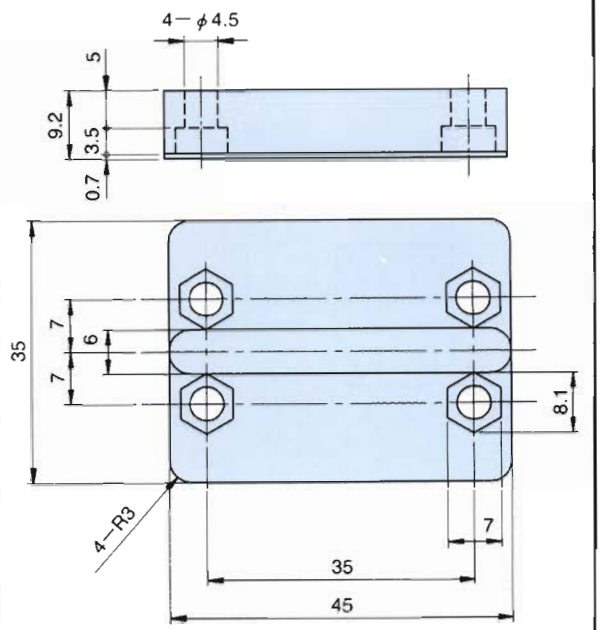

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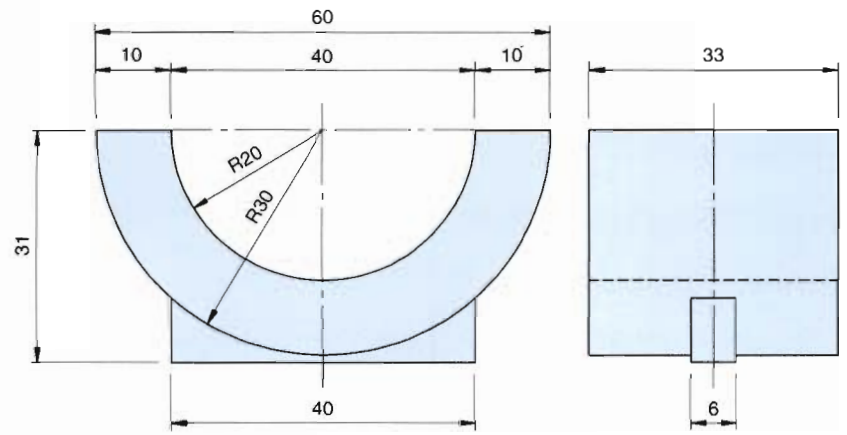

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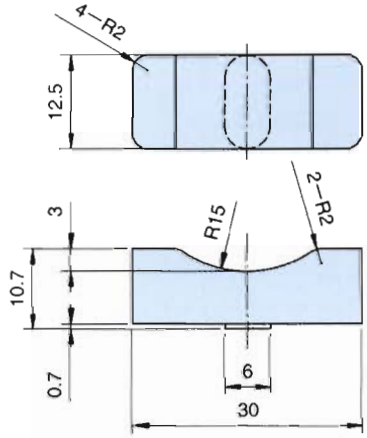

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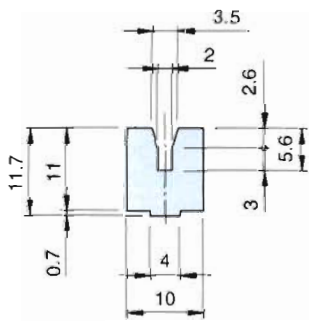

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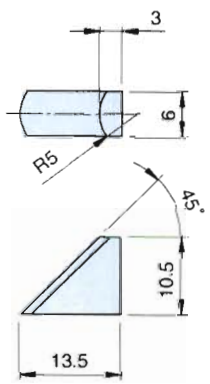

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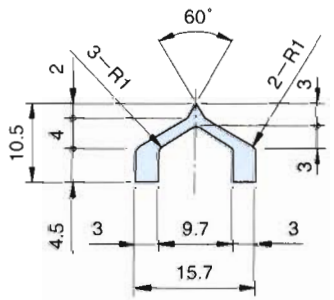

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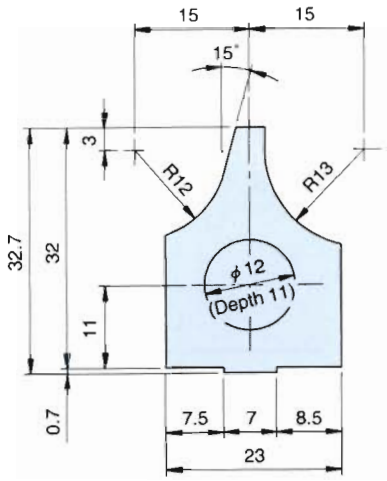

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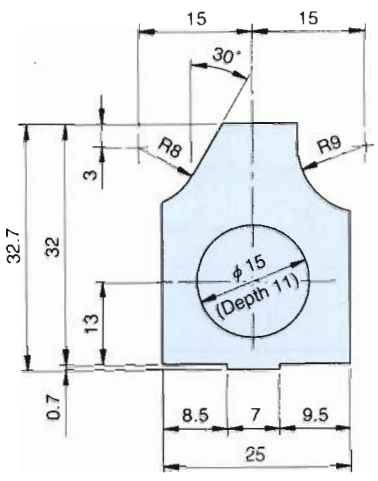

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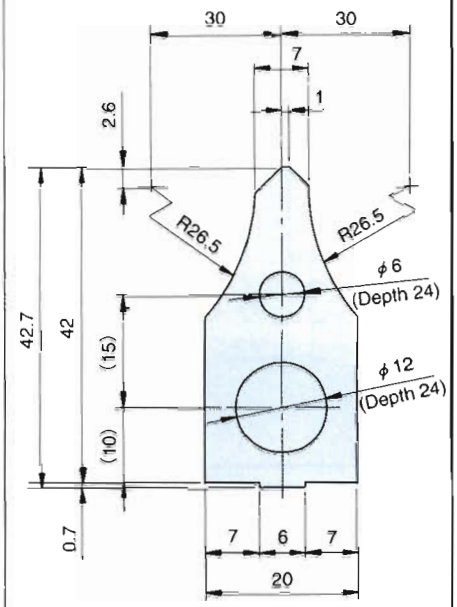

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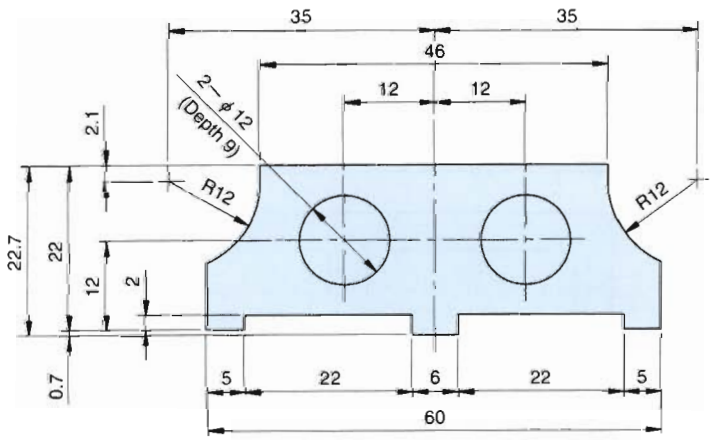

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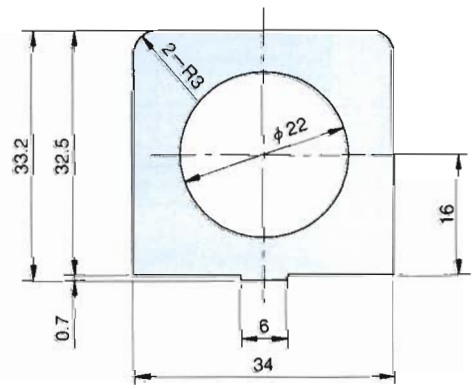

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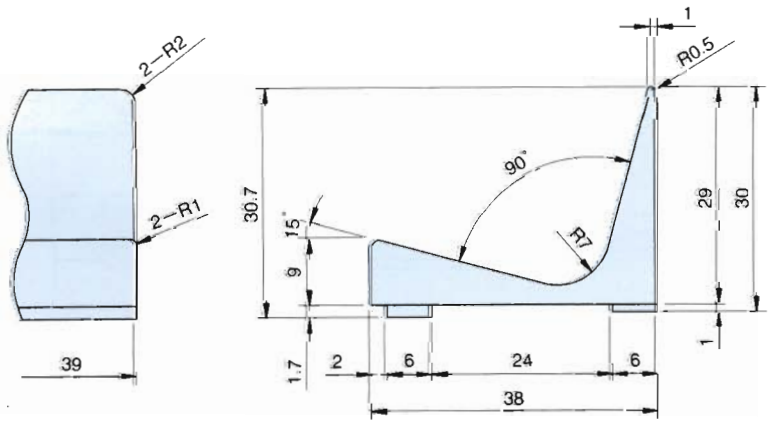

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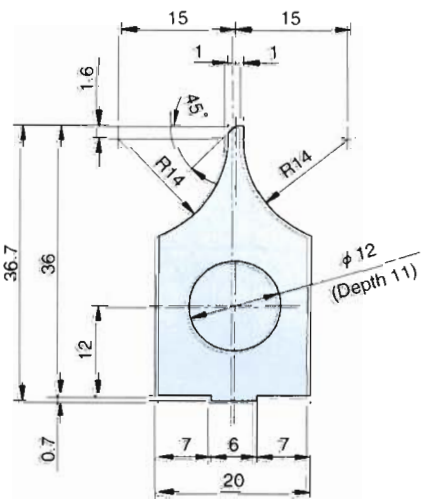

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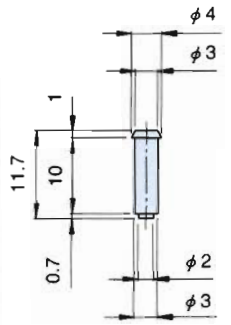

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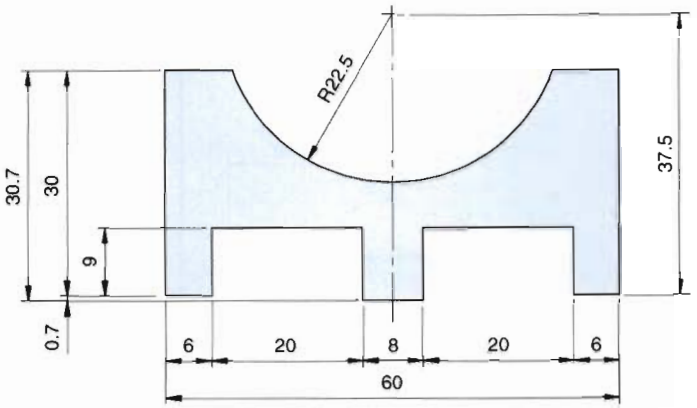

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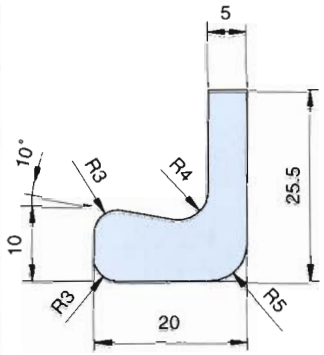

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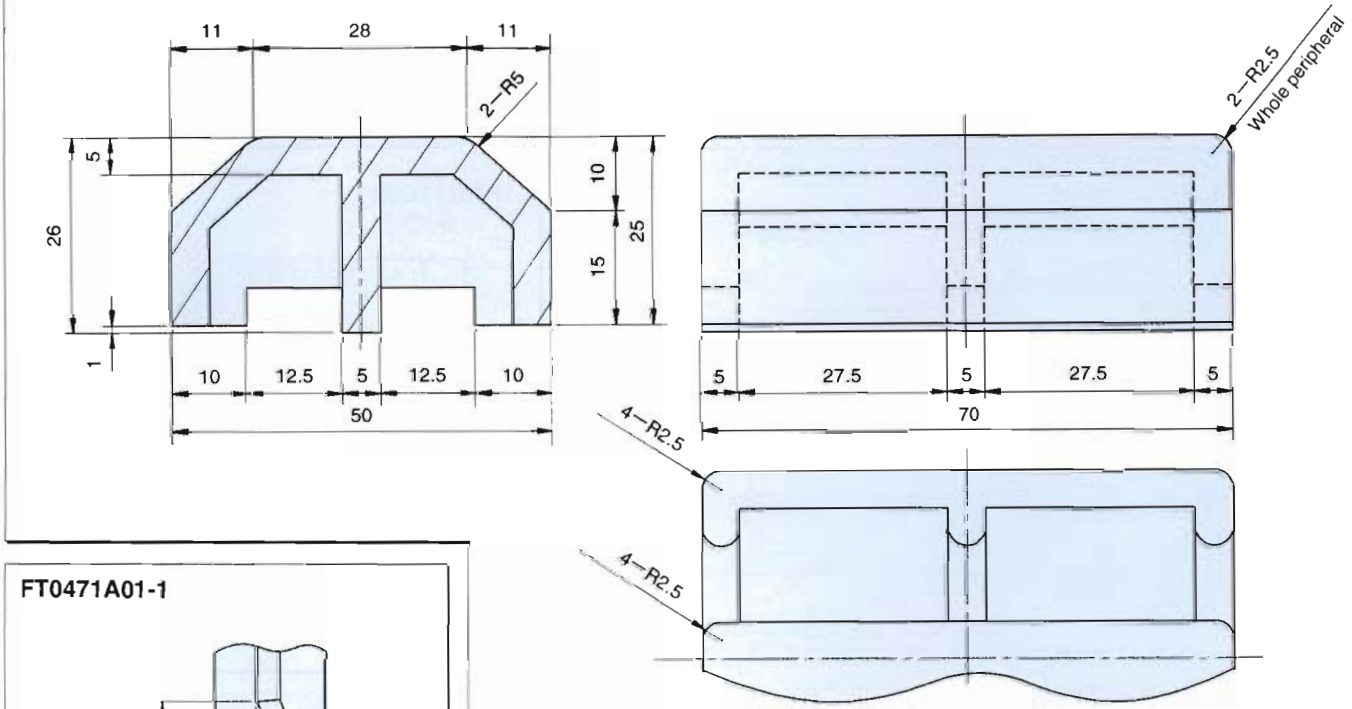

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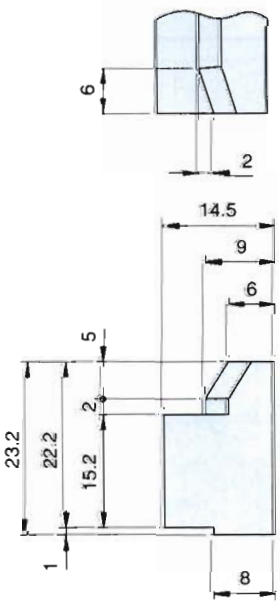

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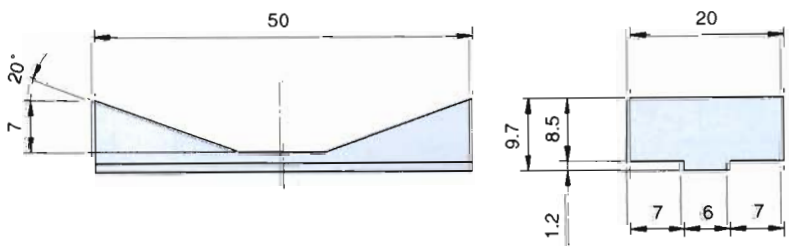

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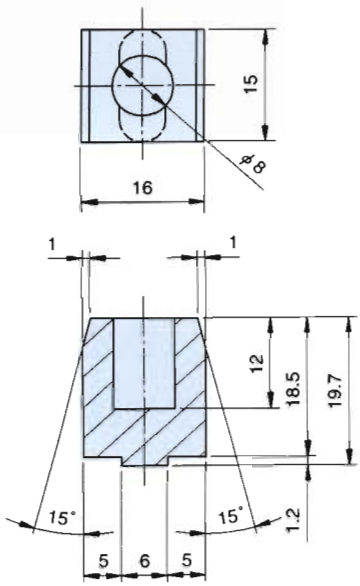

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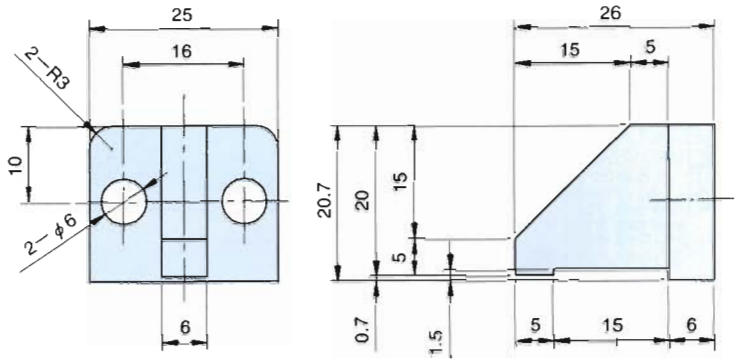

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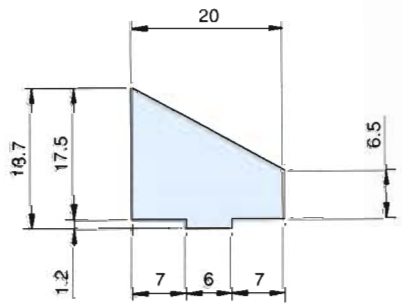

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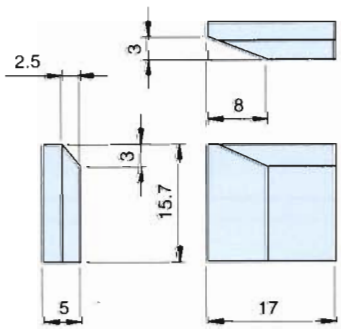

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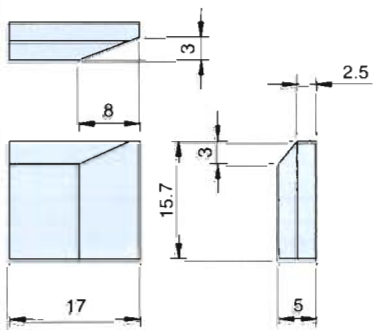

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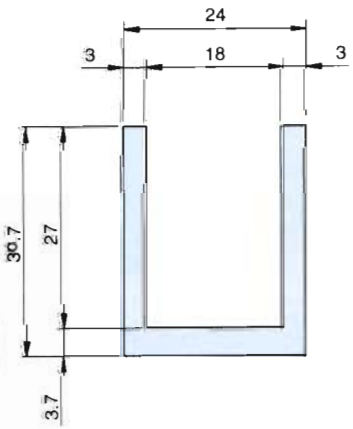

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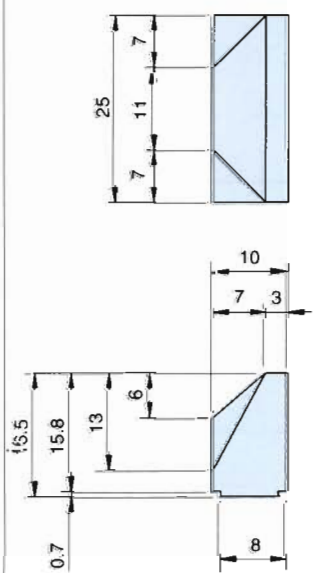

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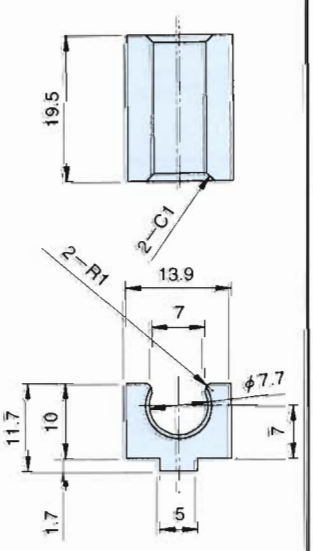

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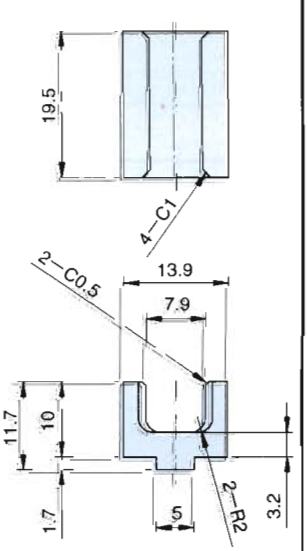

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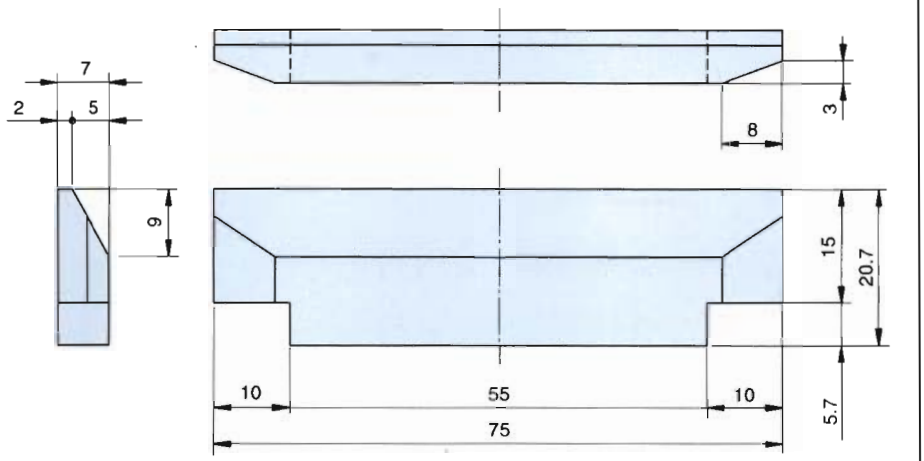

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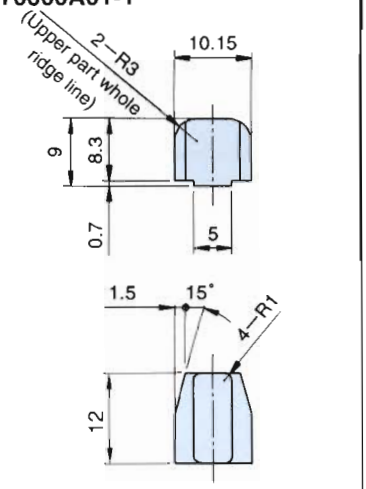

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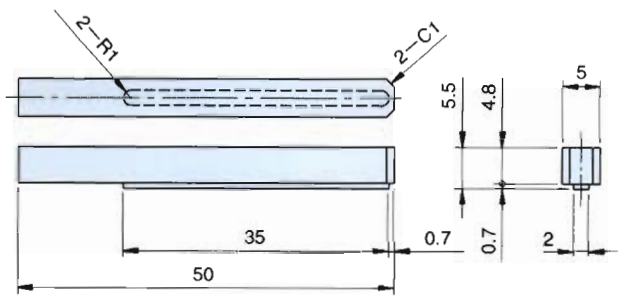

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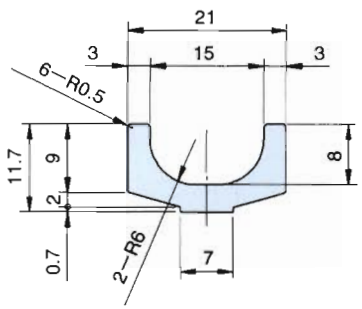

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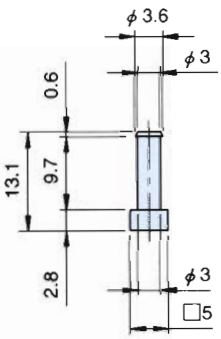

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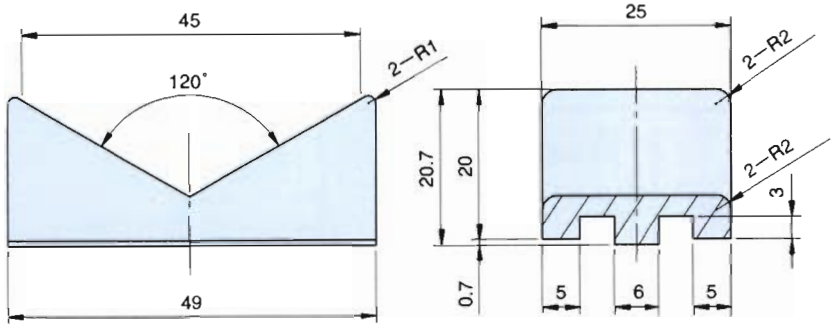

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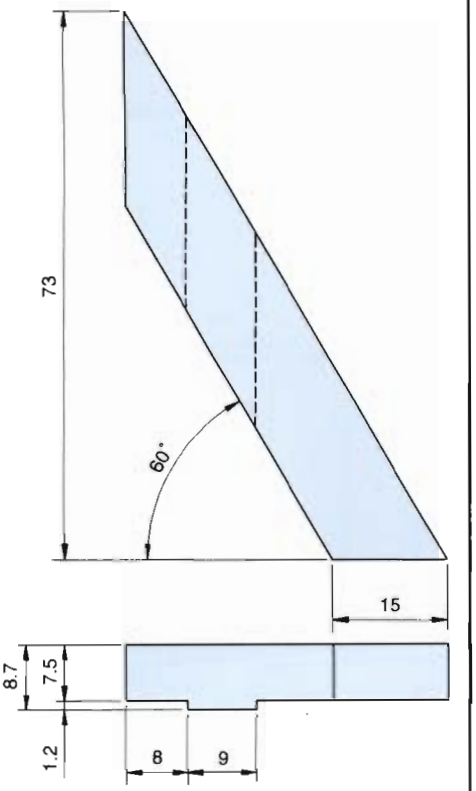

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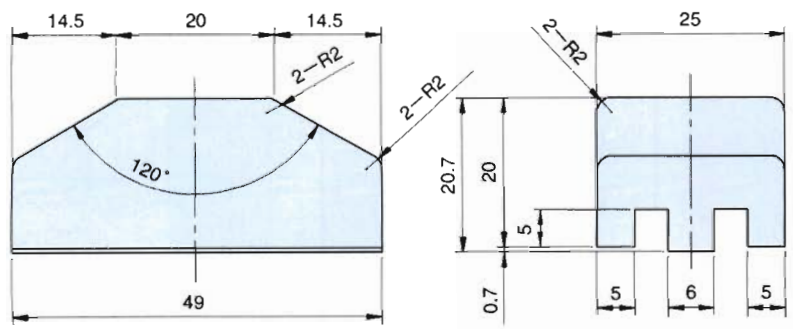

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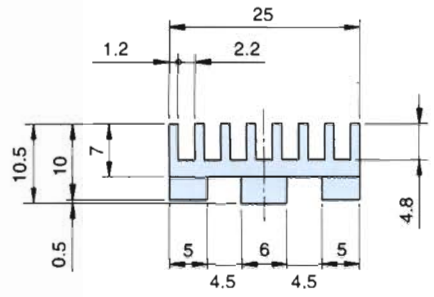

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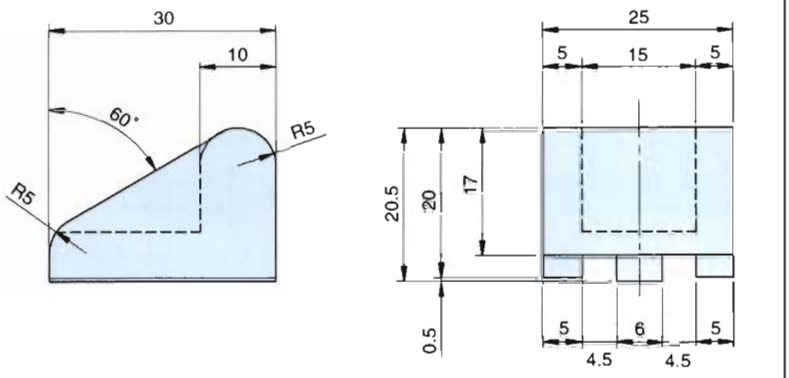

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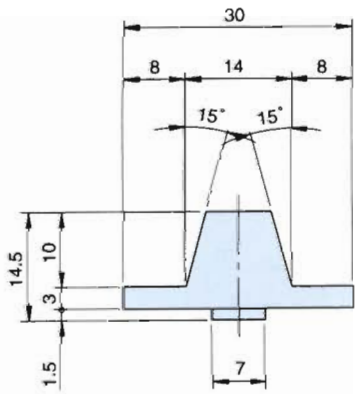

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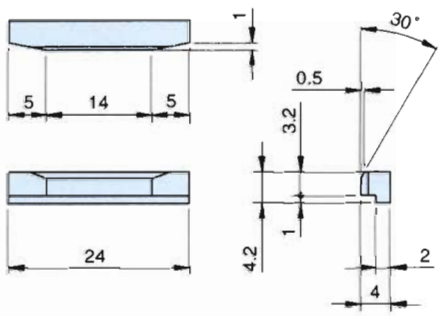

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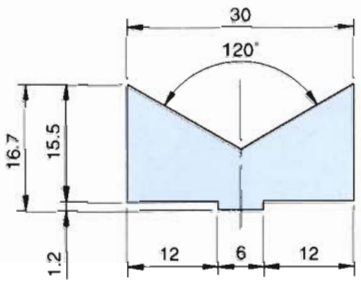

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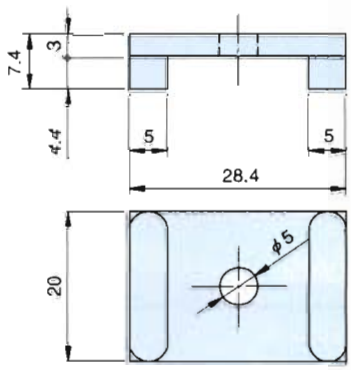

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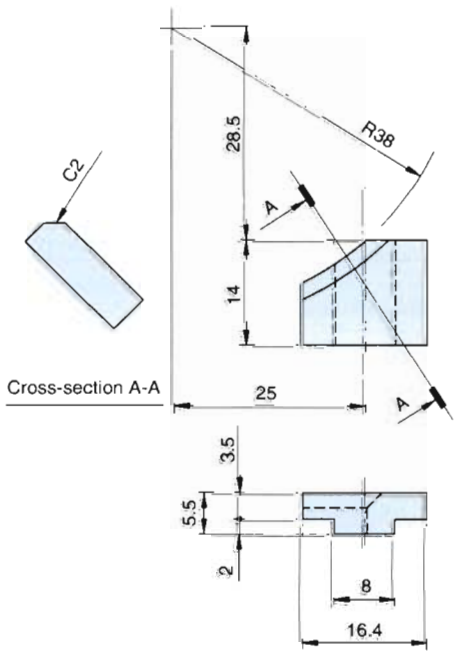

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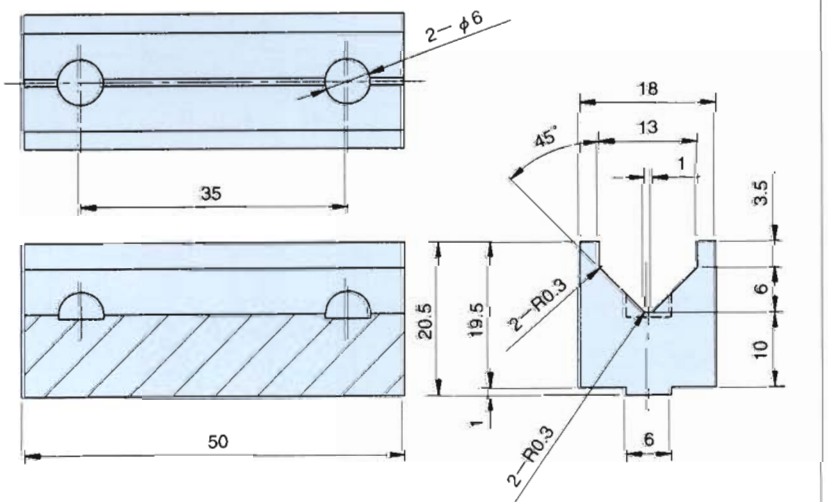

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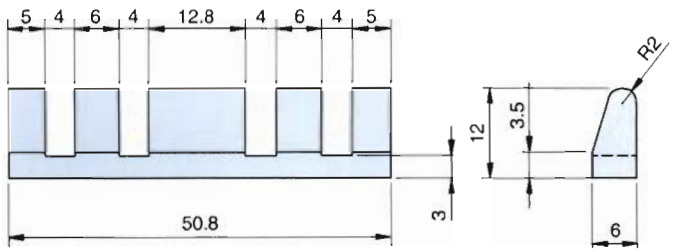

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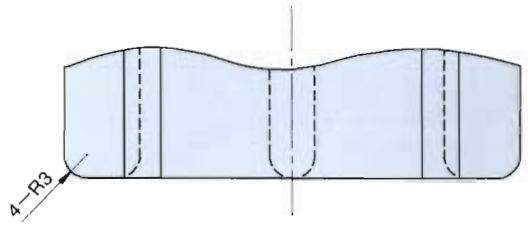

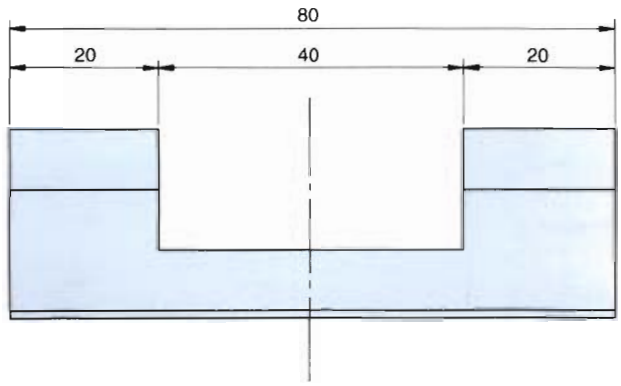

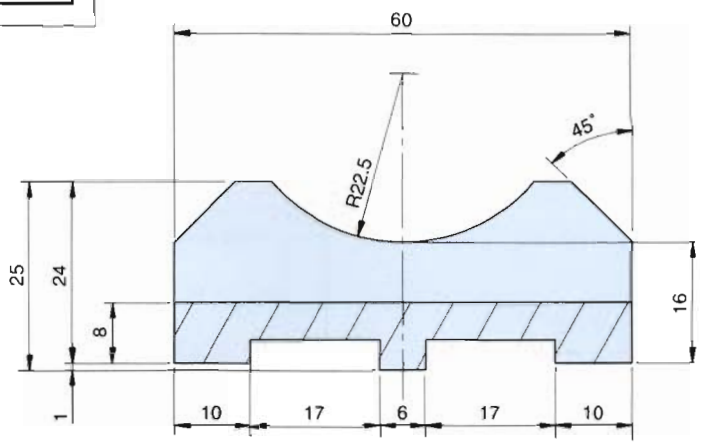

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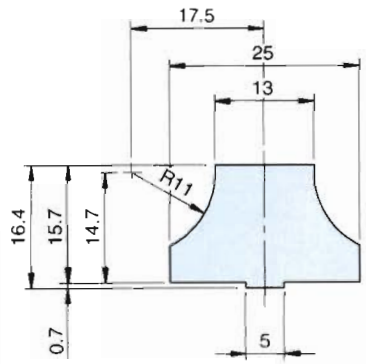

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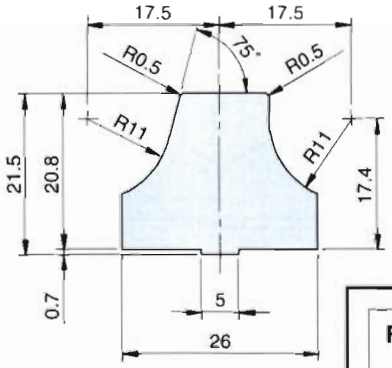

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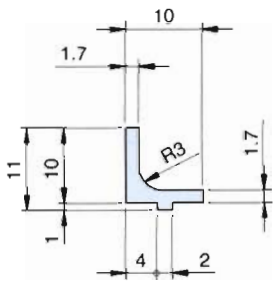

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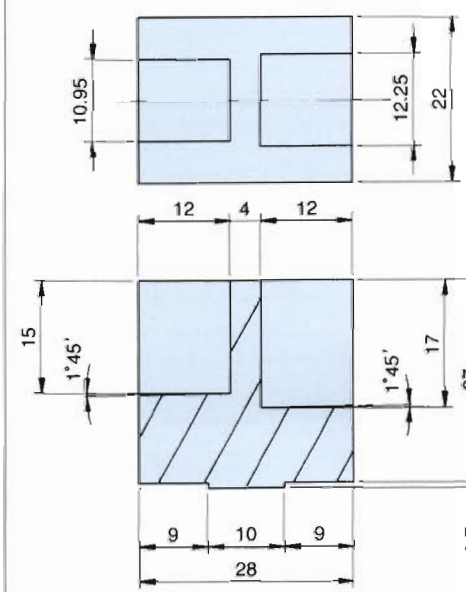

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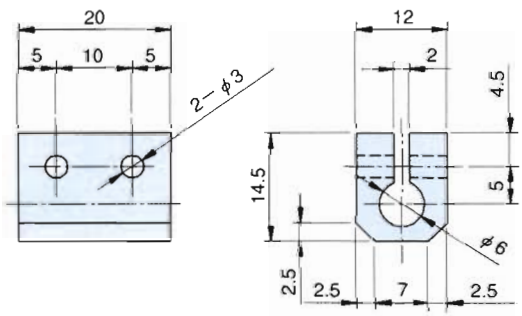

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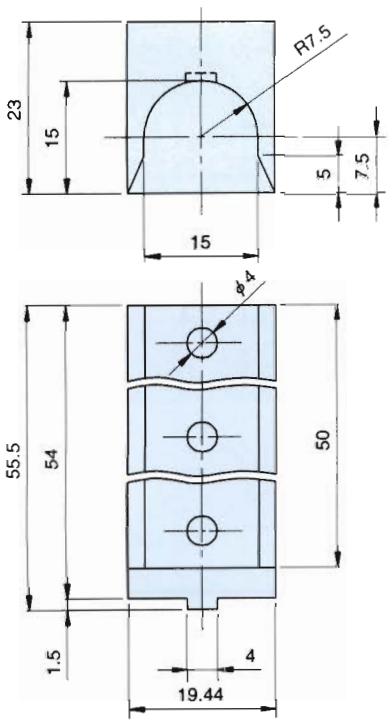

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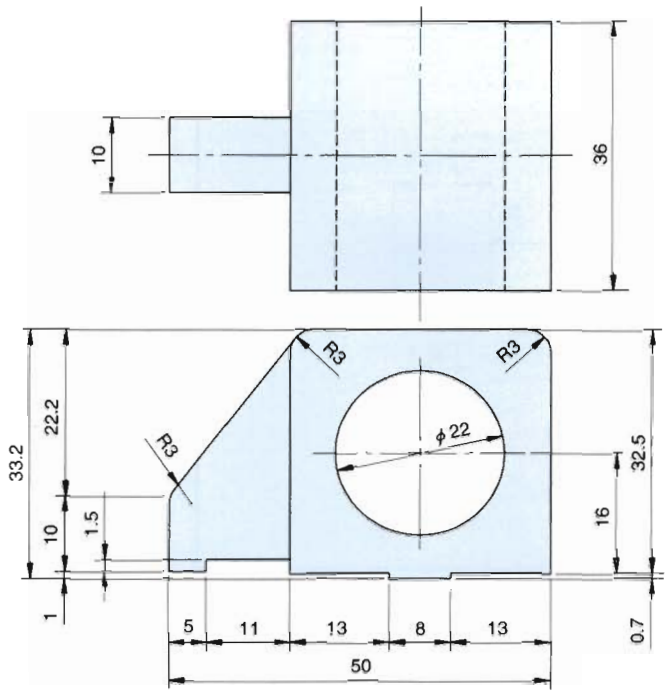

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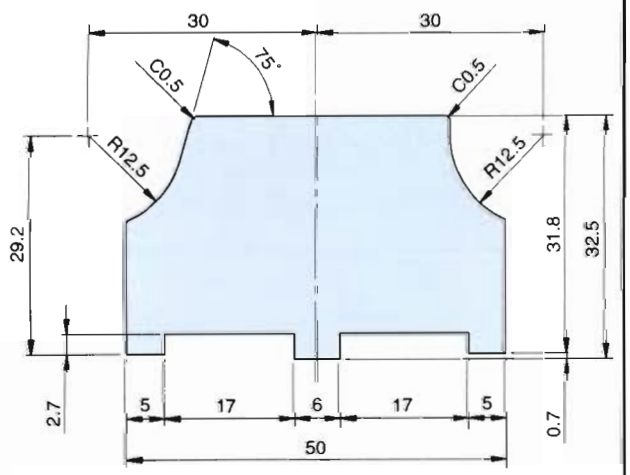

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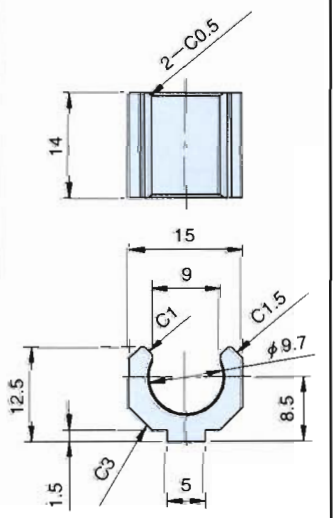

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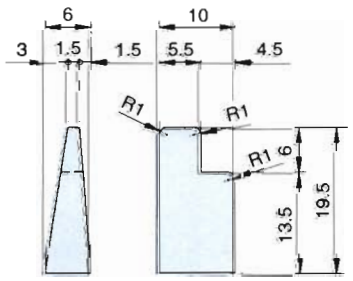

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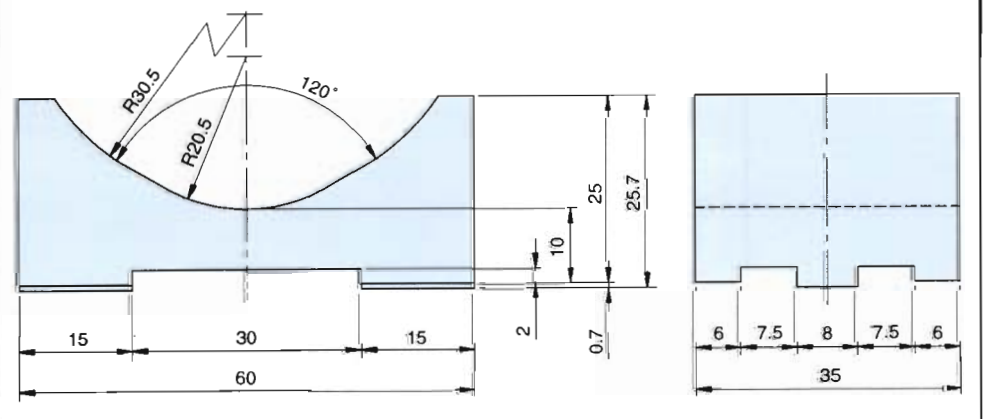

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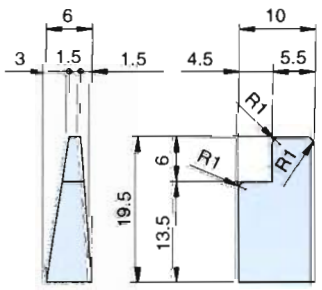

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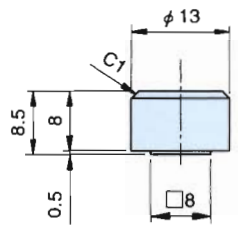

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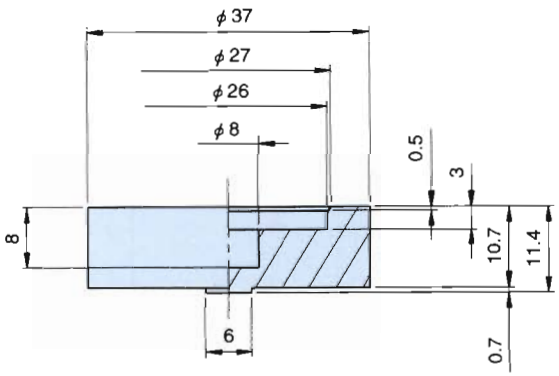

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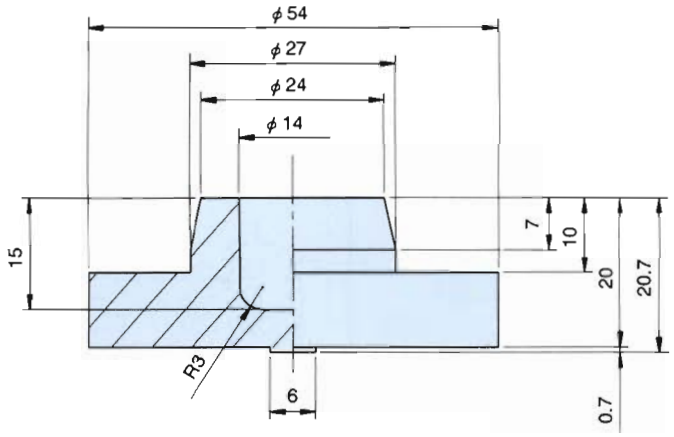

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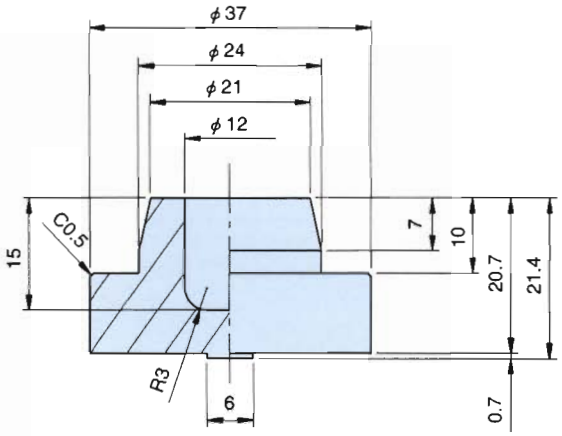

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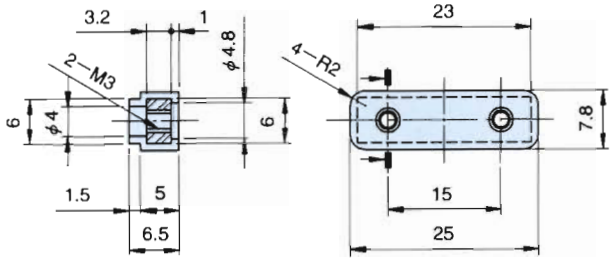

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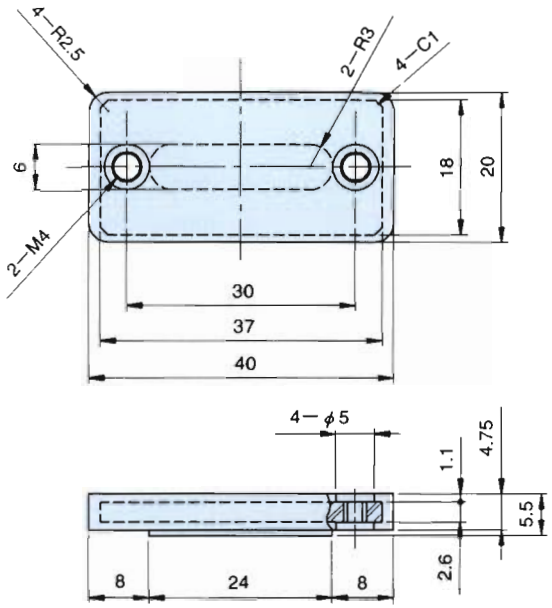

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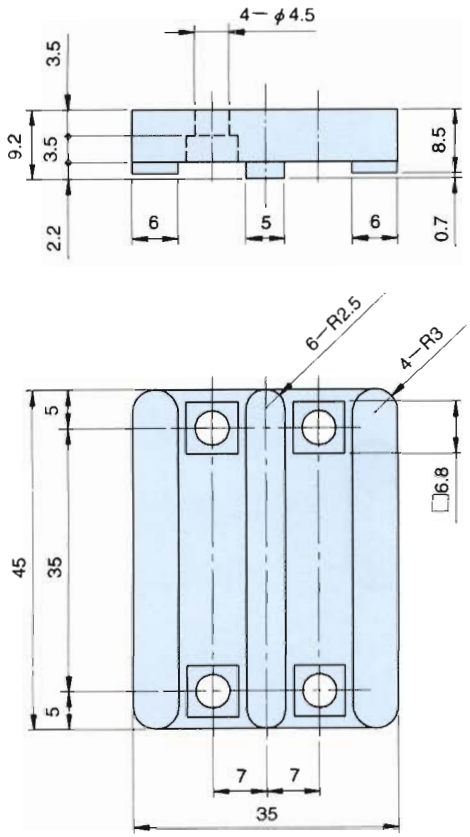


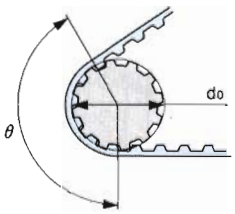
Belt Selection

Select Iron Rubber® belt based on the torque (nm) applied to the belt, or transmission capacity (kW).
Belt model and belt width can be calculated, please consult with us for the add-on specifications.

Conditions on Selection

Conditions required for selection

- •Pulley diameter : d_0 (mm)
- •Pulley rpm : n (rpm)
- •Pulley contact angle : θ (°)
- •Torque : Md(Nm)
  or Transmission capacity : P (kW)



Basically, select by drive pulley. When a driven pulley transfers torque to another, calculate this pulley too, and select the belt with the stricter conditions.

Precautions on Selection

Load Torque and Transmission Capacity

For safety, calculate torque and transmission capacity with the maximum values applied to the belt used.

Plural Belts Drive in Parallel

Calculate with the value of the load divided by belt number, if the load is equally added to the each belt.
Calculate with the maximum load, if there is the possibility the load is added unequally.

Using Idler

When using a idler, correct the torque or transmission capacity given as the condition.

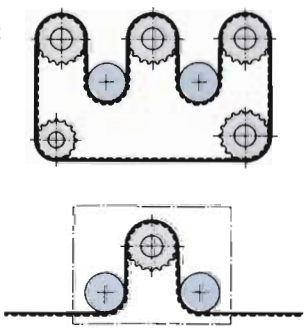
Torque or Transmission capacity used for selection = Torque or Transmission capacity given as the condition × (1+0.1×f)

f : Idler number

【Example】 If transmission capacity, 3.0 kW is given (see the right figure), and the carrying idler number is two in both cases, then the following equation is obtained.

$3.0\times(1+0.1\times2)=3.6$

The value 3.6 kW is used for calculation.



Using Stainless Steel Cord

Correct load torque or transmission capacity given as the condition when a stainless steel wire cord is used for a flex belt.

Torque or Transmission capacity used for selection = Torque or Transmission capacity as the condition × 1.2

Selection Procedure

Step 1 Correct Torque / Transmission Capacity

Correct torque or transmission capacity when using a idler or a stainless steel cord.

●Correcting for idler

$Md = Md_0 \times (1 + 0.1 \times f)$

$P = P_0 \times (1 + 0.1 \times f)$

●Correcting for stainless steel cord

$Md = Md_0 \times 1.2$

$P = P_0 \times 1.2$

Md : Torque used in selection (Nm)
Md_0 : Torque given as the condition (Nm)
P : Transmission capacity used in selection (kW)
P_0 : Transmission capacity given as the condition (kW)
f : Idler number

Step 2 Determine Belt Model

Determine a belt model from the Selection Graph in P 48 and 49.

Determine a belt model from the transmission capacity and pulley rpm if a transmission capacity is given as the condition.

Determine a belt model from the torque and small pulley teeth number if a load torque is given as the condition.

n : Pulley rpm (rpm)

Step 3 Determine Pulley Teeth, z

Determine pulley teeth matched with the belt model.

(Please note the minimum pulley teeth number.)

Step 4 Calculate teeth number, Z_E, meshed in pulleys.

Calculate effective teeth in mesh with pulley teeth number Z and contact angle D.

$$Z_E = z \times \frac{\theta}{360}$$ (Drop the fractional portion of the number.)

z : Pulley teeth number
Z_E : Teeth in mesh

The upper limit, the maximum effective teeth in mesh is specified in the following table:

		Maximum Effective Teeth in mesh
Flex type	F	12
Joint type	J	6
Linear type	L	12

Step 5 Calculating Belt Width, bc

Calculate belt width from the limiting range in P 47.

Use the allowable transmission capacity (Ps), if the transmission capacity is given as the condition.

$$bc = \frac{P \times 10^4}{Ps \times Z_E \times z}$$

Use the allowable transfer torque (Mds), if the torque is given as the condition.

$$bc = \frac{Md \times 10^3}{Mds \times Z_E \times z}$$

Determine the width specification as the value exceeding bc.

Ps : Allowable transmission capacity
Mds : Allowable transfer torque
bc : Belt width (mm)

How to Select

Exercise 1 Selecting from Transmission Capacity (kW)

Requirements
- ●Transmission capacity (kW) —— $P_0 = 10\,kW$
- ●Pulley diameter —— Outside diameter of large pulley $d_{02} \fallingdotseq 200mm$
- ●Small pulley rpm —— $n_1 = 2100$r.p.m.(Reduction ratio 1:2 $i = 0.5$)
- ●Center distance —— $C = 480 \pm 10mm$
- ●Idler —— None
- ●Other —— Belt width 50 mm or less

Step 1 Correcting Idler Effect

Correct for a idler effect using
$P = P_0 \times (1 + 0.1 \times f)$.

Due to no idler,
$P = P_0 = 10\,kW$

Step 2 Determining Belt Model

Use Belt Selection Graph 1, since transmission capacity (kw) is given as the condition.
Transmission capacity is 10 kW and small pulley rpm is 2100, and AT10 is determined.
(It can also be determined as T10/H, but in this case AT10 is selected.)

Step 3 Determining Pulley Teeth Number

Determine the large pulley teeth number as 62 since the outside diameter of the large pulley teeth is d0 ≒ 200.
($dp_2 = 197.35$ $d_{02} = 195.50$)
Determine the small pulley number as 31 since the reduction ratio is 1 : 2, and $62 \times 0.5 = 31$ teeth. ($dp_1 = 98.68$ $d_{01} = 96.80$)

Step 4 Determining Belt Teeth Number

With $i \neq 1$

Obtain the belt length from the following equation:

$$L_P \fallingdotseq \frac{\pi}{2}(dp_1 + dp_2) + 2C + \frac{(dp_2 - dp_1)^2}{4C}$$

Use the following equation to determine the number of belt teeth.

$$Z_B = \frac{L_P}{t}$$

$$L_P \fallingdotseq \frac{\pi}{2}(dp_1 + dp_2) + 2C + \frac{(dp_2 - dp_1)^2}{4C}$$

$$\fallingdotseq \frac{\pi}{2}(98.68 + 197.35) + 2 \times 480 + \frac{(197.35 - 98.68)^2}{4 \times 480}$$

$$\fallingdotseq 1430.1\,mm$$

The pitch of AT10 is 10 mm, then,

$$Z_B = \frac{L_P}{t} = \frac{1430.1}{10} = 143.01 \fallingdotseq 143 \text{ teeth}$$

Step 5 Determining Belt Width

(1) With $i \neq 1$

Obtain the teeth in mesh from the following equation:

$$Z_E = \frac{z_1}{180} \cdot \cos^{-1} \frac{t(z_2 - z_1)}{2\pi C}$$

(2) Calculating belt width

Calculate the belt width from the following equation:

$$bc = \frac{P \cdot 10^4}{Ps \cdot Z_E \cdot z_1}$$

(1) $$Z_E = \frac{z_1}{180} \cdot \cos^{-1} \frac{t(z_2 - z_1)}{2 \cdot \pi \cdot C} = \frac{31}{180} \cdot \cos^{-1} \frac{10 \times (62 - 31)}{2\pi \times 480}$$

$= 14.5$

For joint type belt, $Z_E = 6$, and for flex type, $Z_E = 12$.

(2) **For joint type:**

$$bc = \frac{P \cdot 10^4}{Ps \cdot Z_E \cdot z_1} = \frac{10 \times 10^4}{10.46 \times 6 \times 31} = 51.4mm \rightarrow 75mm$$

For flex type:

$$bc = \frac{P \cdot 10^4}{Ps \cdot Z_E \cdot z_1} = \frac{10 \times 10^4}{10.46 \times 12 \times 31} = 25.7mm \rightarrow 40mm$$

(Ps is imported from the limiting range in P 57. The value for 2000 r.p.m, 10.46 is used due to no corresponding value for 2100 r.p.m.)

From the above, the belt selected is 040-AT10-0143E-F

the small pulley selected is 31-AT10-040-□-□

the large pulley selected is 62-AT10-040-□-□

Exercise 2 Selecting from Torque (Nm)

Requirements
- ●Torque(Nm) —— $Md_0 = 400$Nm (200r.p.m.speed reduced) (1Nm=0.102kgf·m)
- ●Pulley diameter —— Approx. ϕ125
- ●Pulley rpm —— n = 200r.p.m.(i=1)
- ●Center distance —— C ≒ 850mm
- ●Idler —— None
- ●Other —— In meters

Step 1 Correcting Idler Effect

Correct for idler effect using
$Md = Md_0 \times (1 + 0.1 \times f)$

No idler,
$Md = Md_0 = 400$Nm

Step 2 Determining Belt Model

Use Belt Selection Graph 2, since torque (Nm) is given as the condition.
Torque is 400 Nm, and T10 or T20 is determined in meters.
If T 10, pulley teeth should be 40 from the pulley diameter of approx. ϕ125.
T10, as torque is 400 Nm and there are 40 pulley teeth, it is not suitable, and T20 is selected.

Step 3 Determining Pulley Teeth Number

Determine the pulley teeth number as 20 from the pulley maximum diameter approx. ϕ125.
(dp=127.32 do=124.50)

Step 4 Determining Belt Teeth Number

With i=1

Determine the belt teeth number from the following equation:

$$Z_B = \frac{2C}{t} + z$$

$$Z_B = \frac{2C}{t} + z = \frac{2 \times 850}{20} + 20 = 105 \text{ teeth}$$

Step 5 Determining Belt Width

(1) With i=1

Obtain the teeth in mesh from the following equation:

$$Z_E = \frac{z}{2}$$

$$(1)\ Z_E = \frac{z}{2} = \frac{20}{2} = 10$$

For joint type belt, $Z_E = 6$, and for flex type, $Z_E = 10$.

(2) Calculating belt width

Calculate the belt width from the following equation:

$$bc = \frac{Md \cdot 10^3}{Mds \cdot Z_E \cdot z}$$

(2) **For joint type:**

$$bc = \frac{Md \cdot 10^3}{Mds \cdot Z_E \cdot z} = \frac{400 \times 10^3}{26.8 \times 6 \times 20} = 124.4\text{mm}$$

It is impossible to select a joint type belt because the calculated value steps across the standard width limit.

For flex type:

$$bc = \frac{Md \cdot 10^3}{Mds \cdot Z_E \cdot z} = \frac{400 \times 10^3}{26.8 \times 10 \times 20} = 74.6\text{mm} \rightarrow 75\text{mm}$$

(Mds is imported from the limiting range in P 47.)

From the above, the belt selected is 075-T20-0105E-F

the pulley selected is 20-T20-075-□-□

How to Select

Exercise 3 Selecting from Product Weight

Requirements
- ●Torque(Nm) — Unavailable
- ●Pulley diameter — Max. ϕ60 (i=1)
- ●Belt speed — V=0.2m/sec
- ●Center distance — C=2400mm
- ●Idler — None
- ●Other — Convey 20 items with 18 kg weight each.
  Using guide rail(SUS) (For belt, μ=0.6 Please see P 52 for friction coefficient, μ)

Step 1 Calculating Torque

(1) Calculating effective tension

(1) U= Load × Friction coefficient (μ)
=(18×20)×0.6 = 216kgf = 2118N (1N=0.102kgf)

(2) Determine pulley rpm from the following equation:

$$n = \frac{19.1 \cdot 10^3 \cdot V}{dp}$$

(2) $n = \frac{19.1 \cdot 10^3 \cdot V}{dp}$ (Use temporally ϕ60 for dp.)

$$= \frac{19.1 \times 10^3 \times 0.2}{60} = 63 \text{r.p.m.}$$

(3) Convert effective tension to torque by the following equation:

$$Md = \frac{U \cdot dp}{2 \cdot 10^3}$$

(3) $Md = \frac{U \cdot dp}{2 \cdot 10^3} = \frac{2118 \times 60}{2 \cdot 10^3} = 63.54 \text{Nm}$

Step 2 Correcting Idler Effect

Correct for idler effect using
$Md = Md_0 \times (1 + 0.1 \times f)$

No carrying idler,
$Md = Md_0 = 63.54 \text{Nm}$

Step 3 Determining Belt Model

Use Belt Selection Graph 2, since torque (Nm) is given as the condition.
Torque is 63.54 Nm, and T10 is determined.
(It can also be determined as H, but in this case T10 is selected.)

Step 4 Determining Pulley Teeth Number

Determine the pulley teeth number as 18 from a pulley maximum diameter ϕ60.
(dp=57.30 do=55.45)

Step 5 Determining Belt Teeth Number

With i=1

Determine the belt teeth number from the following equation:

$$Z_B = \frac{2C}{t} + z$$

$Z_B = \frac{2C}{t} + z = \frac{2 \times 2400}{10} + 18$

$= 498$ teeth

Step 6 Determining Belt Width

(1) With i=1

Obtain the teeth in mesh from the following equation:

$$Z_E = \frac{z}{2}$$

(1) $Z_E = \frac{z}{2} = \frac{18}{2} = 9$

For joint type belt, $Z_E = 6$.

(2) Calculating belt width

Calculate the belt width from the following equation:

$$bc = \frac{Md \cdot 10^3}{Mds \cdot Z_E \cdot z}$$

(2) $bc = \frac{Md \cdot 10^3}{Mds \cdot Z_E \cdot z} = \frac{63.54 \times 10^3}{8.14 \times 6 \times 18} = 72.7\text{mm} \rightarrow 75\text{mm}$

(Mds is imported from the limiting range in P 47. The value for 60 rpm, 8.14, is used due to no corresponding value for 63 rpm.)

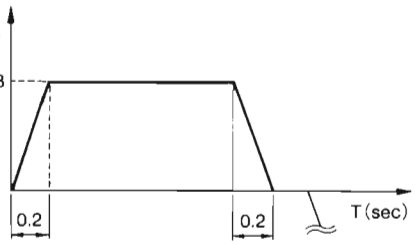
From the above, the belt selected is 075-T10-0498A-J

the pulley selected is 18-T10-075-□-□

Exercise 4 Selecting for the possibility of sudden acceleration and stops

Requirements

- ●Transmission capacity (kW) — $P_0 = 0.5$kW
- ●Pulley diameter — Approx. $\phi 100$ (i=1)
- ●Center distance — 1100mm
- ●Idler — None
- ●Other conditions — Forward and reverse direction operation
  (Time vs. Speed Chart is shown in the right graph.)
  Covey lift and load vertically.
  Pulley material : Aluminum
  Lift + load = 20 kg



Step 1 Calculating Pulley RPM

Determine the pulley rpm from the following equation:

$$n = \frac{19.1 \cdot 10^3 \cdot V}{dp}$$

$$n = \frac{19.1 \cdot 10^3 \cdot V}{dp} = \frac{19.1 \times 10^3 \times 0.68}{100} \fallingdotseq 130 \text{ r.p.m.}$$

Step 2 Calculating Torque

Convert transmission capacity to torque from the following equation:

$$Md_0 = \frac{9.55 \cdot 10^3 \cdot P_0}{n}$$

$$Md_0 = \frac{9.55 \cdot 10^3 \cdot P_0}{n} = \frac{9.55 \times 10^3 \times 0.5}{130} = 36.7 \text{ Nm}$$

Step 3 Calculating Inertia Moment

(1) Calculate the inertia moment of a driven pulley from the following equation:

$$J_1 = \frac{m \cdot D^2}{8 \cdot 10^6}$$

$$(1)\ J_1 = \frac{m \cdot D^2}{8 \cdot 10^6} = \frac{2.2 \times 100^2}{8 \times 10^6} = 2.75 \times 10^{-3} \text{ kgm}^2$$

(Hypothesize the pulley mass is $\phi 100$, and the width is 100, and calculate m when aluminum density is 2.8

$$m = \frac{\left(\frac{100}{2}\right)^2 \cdot \pi \cdot 100}{10^6} \times 2.8 = 2.2\text{kg}$$

(2) Calculate the inertia moment of the vertical traveling substance from the following equation:

$$J_2 = \frac{m \cdot D^2}{4 \cdot 10^6}$$

$$(2)\ J_2 = \frac{m \cdot D^2}{4 \cdot 10^6} = \frac{20 \times 100^2}{4 \times 10^6} = 5 \times 10^{-2} \text{ kgm}^2$$

(3) Total the value of J.

$$(3)\ \Sigma J = J_1 + J_2 = 2.75 \times 10^{-3} + 5 \times 10^{-2} \fallingdotseq 5 \times 10^{-2} \text{ kgm}^2$$

Step 4 Calculating Acceleration Torque

Determine the acceleration torque from the following equation:

$$M_B = \frac{J \cdot \Delta n}{9.55 \cdot T_B}$$

$$M_B = \frac{J \cdot \Delta n}{9.55 \cdot T_B} = \frac{5 \times 10^{-2} \times (130 - 0)}{9.55 \times 0.2} = 3.4 \text{Nm}$$

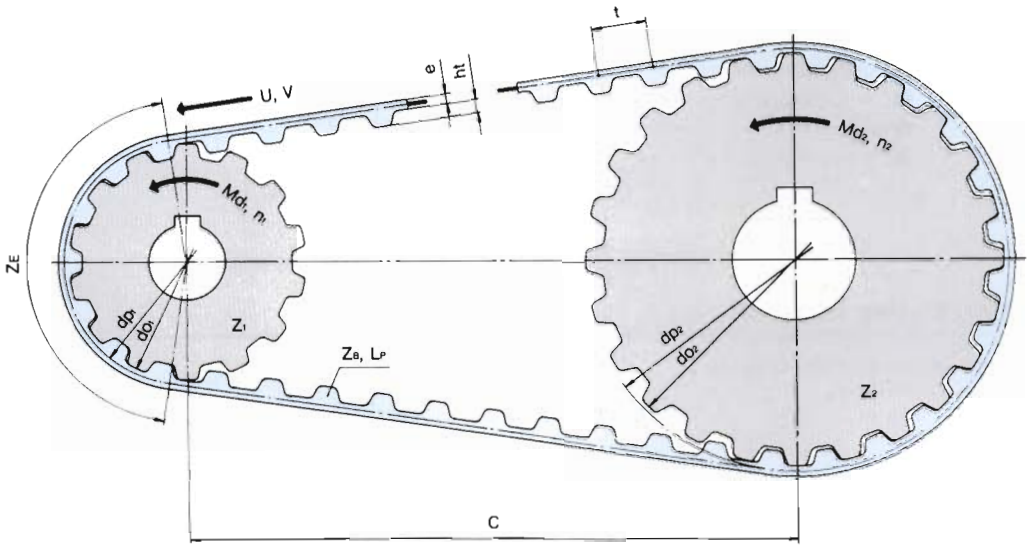
Step 5 Calculating Torque and Accelerating Torque

Total the calculated torque and acceleration torque.

$$Md_0 + M_B = 36.7 + 3.4 = 40.1$$

Please refer to [Exercise 2] in P 43 for the remainder of the calculation procedure.

Formula List

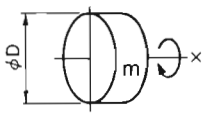
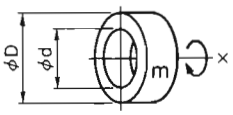
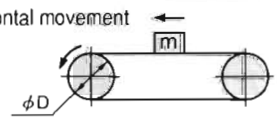
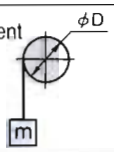


LP : Belt length mm
ZB : Belt teeth number
t : Belt tooth pitch mm
ht : Belt tooth height mm
e : Belt top thickness mm
b : Belt width mm

ZE : Teeth in mesh
C : Center distance mm
z1 : Small pulley teeth number
z2 : Large pulley teeth number
dp1 : Small pulley pitch circle diameter
dp2 : Large pulley pitch circle diameter

do1 : Small pulley outside diameter mm
do2 : Large pulley outside diameter mm
n1 : Small pulley rpm
n2 : Large pulley rpm
P : Transmission capacity kw
Md : Torque Nm

U : Effective tension N
MB : Acceleration torque Nm
TB : Acceleration time s
J : Inertia moment kgm²
V : Speed m/s
ω : Angle speed s⁻¹
m : Mass kg

Belt length (For two axis)	L_P	For i ≠ 1 $L_P \fallingdotseq \frac{\pi}{2}(dp_1+dp_2)+2C+\frac{(dp_2-dp_1)^2}{4C}$		For i=1 $L_P=2C+z\cdot t$
Transmission capacity	P	$P=\frac{Md\cdot n}{9.55\cdot 10^3}$	$P=\frac{U\cdot dp\cdot n}{19.1\cdot 10^6}$	$P=\frac{U\cdot V}{10^3}$
Torque	Md	$Md=\frac{U\cdot dp}{2\cdot 10^3}$	$Md=\frac{9.55\cdot 10^3\cdot P}{n}$	$Md=\frac{P\cdot dp}{2\cdot V}$
Effective tension	U	$U=\frac{2\cdot 10^3\cdot Md}{dp}$	$U=\frac{19.1\cdot 10^6\cdot P}{n\cdot dp}$	$U=\frac{10^3\cdot P}{V}$
rpm	n	$n=\frac{19.1\cdot 10^3\cdot V}{dp}$		
Belt speed	V	$V=\frac{dp\cdot n}{19.1\cdot 10^3}$		
Angle speed	ω	$\omega=\frac{\pi\cdot n}{30}$		
Inertia moment J φD, φd : mm m : kg		Solid cylinder $J=\frac{m\cdot D^2}{8\cdot 10^6}$ 		Hollow cylinder $J=\frac{m\cdot(D^2+d^2)}{8\cdot 10^6}$ 
		Material in horizontal movement $J=\frac{m\cdot D^2}{4\cdot 10^6}$ 		Material in vertical movement $J=\frac{m\cdot D^2}{4\cdot 10^6}$ 
Acceleration torque	M_B	$M_B=\frac{J\cdot \Delta n}{9.55\cdot T_B}$ (Δn: Difference in rpm)		

Unit Conversion

Effective tension	U	1N =0.102kgf
Torque	Md	1Nm =0.102kgf·m
Transmission capacity	P	1kW =1.36 HP=102kgf·m/s
Inertia moment	J	1 kgm² = 0.25kgf•m² (Flywheel effect)

Limiting Range

Limiting Transmission Capacity, Ps

Small pulley rpm n1 (rpm)	AT5	AT10	AT20	T5	T10	T20	XL	L	H	XH
0	0	0	0	0	0	0	0	0	0	0
20	0.052	0.226	0.954	0.043	0.181	0.734	0.044	0.129	0.206	1.021
40	0.101	0.439	1.847	0.084	0.351	1.421	0.085	0.250	0.401	1.975
60	0.147	0.639	2.68	0.123	0.511	2.06	0.124	0.364	0.583	2.86
80	0.192	0.826	3.45	0.160	0.661	2.66	0.161	0.471	0.753	3.69
100	0.233	1.000	4.17	0.194	0.800	3.21	0.196	0.572	0.910	4.45
200	0.422	1.779	7.29	0.351	1.423	5.61	0.354	1.019	1.616	7.78
300	0.592	2.48	10.03	0.494	1.980	7.71	0.498	1.419	2.25	10.20
400	0.753	3.12	12.50	0.627	2.49	9.62	0.632	1.789	2.83	13.32
500	0.905	3.72	14.80	0.754	2.98	11.38	0.760	2.14	3.37	15.75
600	1.050	4.29	16.94	0.875	3.43	13.03	0.881	2.47	3.88	18.02
700	1.187	4.83	18.95	0.989	3.87	14.58	0.999	2.78	4.37	20.2
800	1.324	5.35	20.9	1.104	4.28	16.05	1.113	3.08	4.83	22.2
900	1.456	5.83	22.7	1.213	4.68	17.44	1.223	3.37	5.28	24.1
1000	1.538	6.33	24.4	1.319	5.07	18.77	1.330	3.65	5.72	25.9
1100	1.708	6.80	26.1	1.423	5.44	20.0	1.434	3.92	6.13	27.7
1200	1.829	7.25	27.6	1.524	5.80	21.3	1.536	4.19	6.54	29.4
1300	1.947	7.69	29.2	1.623	6.15	22.4	1.636	4.44	6.93	31.0
1400	2.06	8.12	30.6	1.719	6.49	23.6	1.733	4.69	7.31	32.5
1500	2.18	8.53	32.0	1.814	6.83	24.6	1.829	4.93	7.68	34.0
1600	2.29	8.94	33.4	1.907	7.15	25.7	1.923	5.17	8.04	35.4
1700	2.40	9.33	34.7	1.998	7.46	26.7	2.01	5.40	8.39	36.8
1800	2.51	9.72	36.0	2.09	7.77	27.7	2.11	5.62	8.73	38.2
1900	2.61	10.09	37.2	2.18	8.07	28.6	2.19	5.84	9.06	39.5
2000	2.72	10.46	38.4	2.26	8.37	29.5	2.28	6.06	9.39	40.7
2200	2.92	11.17	40.7	2.43	8.94	31.3	2.45	6.48	10.02	43.1
2400	3.12	11.85	42.8	2.60	9.48	32.9	2.62	6.88	10.63	45.3
2600	3.31	12.51	44.8	2.76	10.01	34.5	2.78	7.27	11.21	47.4
2800	3.49	13.14	46.7	2.91	10.51	35.9	2.94	7.64	11.76	49.4
3000	3.68	13.75	48.5	3.06	11.00	37.3	3.09	8.00	12.30	51.3

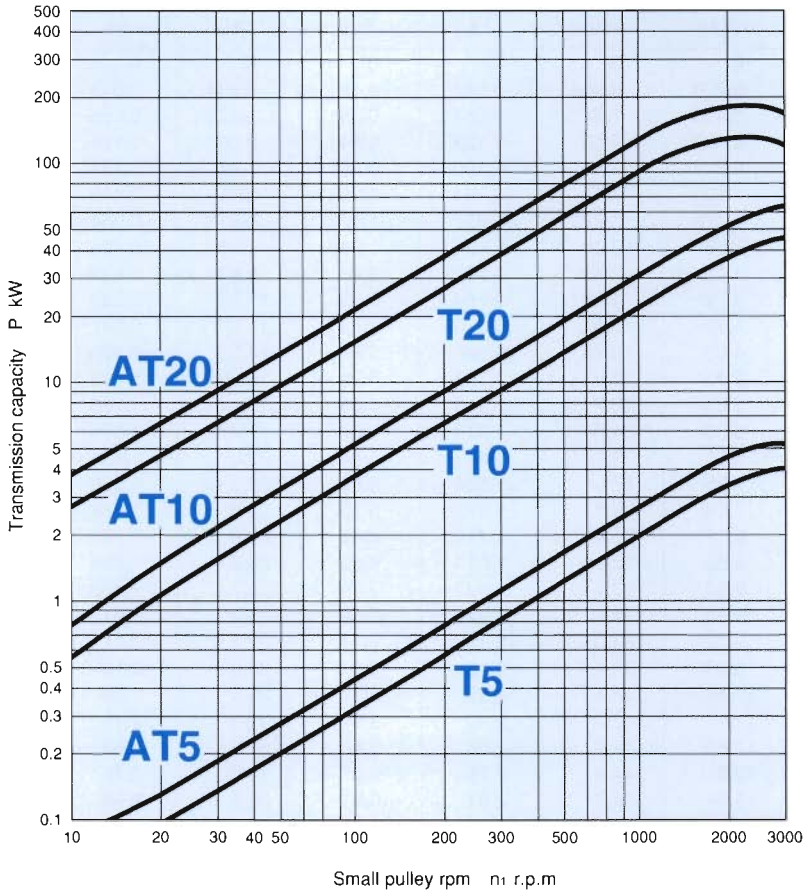
Limiting Transfer Torque, Mds

Small pulley rpm n1 (rpm)	AT5	AT10	AT20	T5	T10	T20	XL	L	H	XH
0	2.52	11.11	47.0	2.10	8.89	36.1	2.13	6.31	10.15	50.3
20	2.46	10.80	45.5	2.05	8.64	35.0	2.08	6.14	9.86	48.7
40	2.40	10.49	44.0	2.00	8.39	33.9	2.03	5.97	9.56	47.2
60	2.35	10.17	42.7	1.955	8.14	32.8	1.976	5.80	9.27	45.6
80	2.29	9.86	41.2	1.906	7.89	31.7	1.923	5.63	8.98	44.0
100	2.23	9.55	39.8	1.857	7.64	30.6	1.871	5.46	8.69	42.4
200	2.01	8.50	34.8	1.677	6.80	26.8	1.690	4.86	7.72	37.1
300	1.887	7.88	31.9	1.572	6.30	24.6	1.584	4.52	7.15	34.0
400	1.797	7.44	29.9	1.497	5.95	23.0	1.509	4.27	6.74	31.8
500	1.728	7.10	28.3	1.440	5.68	21.7	1.451	4.08	6.43	30.1
600	1.671	6.82	27.0	1.393	5.46	20.7	1.403	3.92	6.18	28.7
700	1.623	6.59	25.9	1.352	5.27	19.89	1.363	3.79	5.96	27.5
800	1.581	6.39	24.9	1.318	5.11	19.15	1.328	3.68	5.77	26.5
900	1.545	6.21	24.1	1.287	4.97	18.50	1.298	3.58	5.61	25.6
1000	1.512	6.05	23.3	1.260	4.84	17.92	1.270	3.49	5.46	24.8
1100	1.482	5.90	22.6	1.235	4.72	17.40	1.245	3.41	5.32	24.0
1200	1.456	5.77	22.0	1.213	4.62	16.92	1.223	3.33	5.20	23.4
1300	1.430	5.65	21.4	1.192	4.52	16.48	1.202	3.26	5.09	22.7
1400	1.407	5.54	20.9	1.173	4.43	16.07	1.182	3.20	4.98	22.2
1500	1.386	5.43	20.4	1.155	4.35	15.69	1.164	3.14	4.89	21.6
1600	1.366	5.33	19.93	1.138	4.27	15.33	1.148	3.08	4.80	21.2
1700	1.347	5.24	19.50	1.122	4.19	15.00	1.132	3.03	4.71	20.7
1800	1.329	5.15	19.09	1.108	4.12	14.69	1.117	2.98	4.63	20.2
1900	1.312	5.07	18.70	1.094	4.06	14.39	1.103	2.94	4.56	19.83
2000	1.296	4.94	18.34	1.080	4.00	14.11	1.089	2.89	4.48	19.44
2200	1.267	4.85	17.65	1.056	3.88	13.58	1.065	2.81	4.35	18.70
2400	1.240	4.72	17.03	1.033	3.77	13.10	1.042	2.74	4.23	18.04
2600	1.215	4.59	16.64	1.012	3.68	12.66	1.021	2.67	4.12	17.42
2800	1.192	4.48	15.93	0.993	3.59	12.26	1.002	2.61	4.01	16.85
3000	1.170	4.38	15.43	0.975	3.50	11.87	0.984	2.55	3.91	16.32

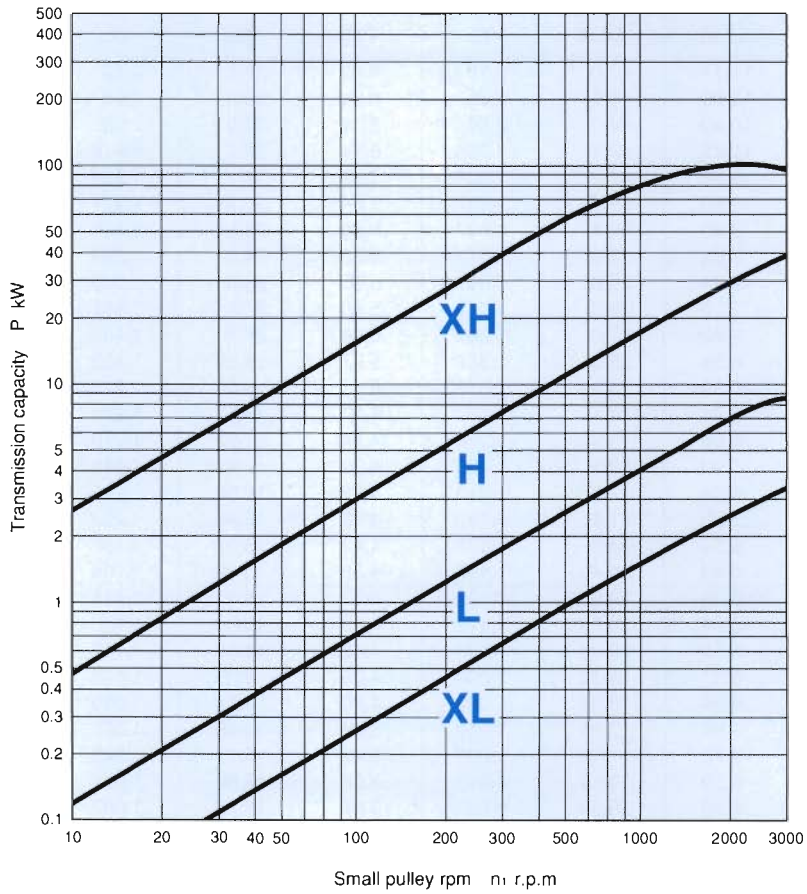
Belt Selection Graph

Selection Graph1 〈Transmission capacity (kW) - Small pulley rpm (rpm)〉

Meters

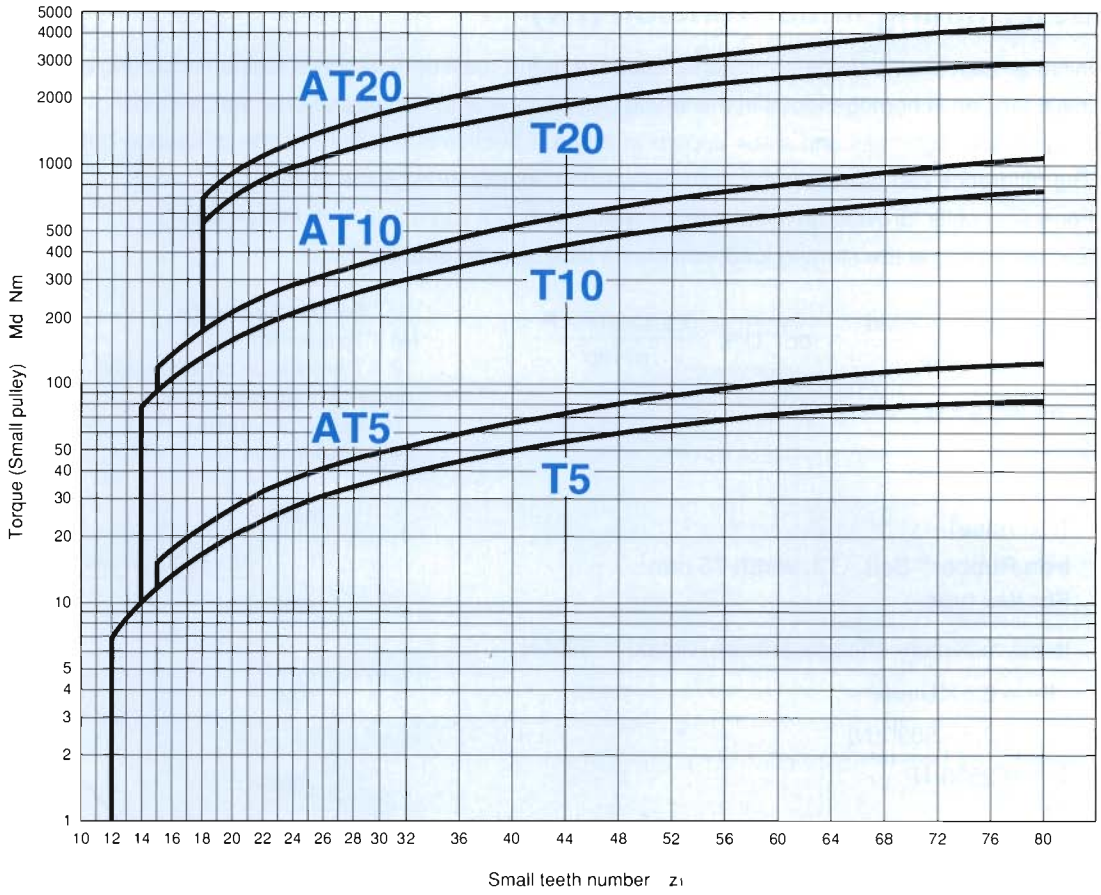


Inches

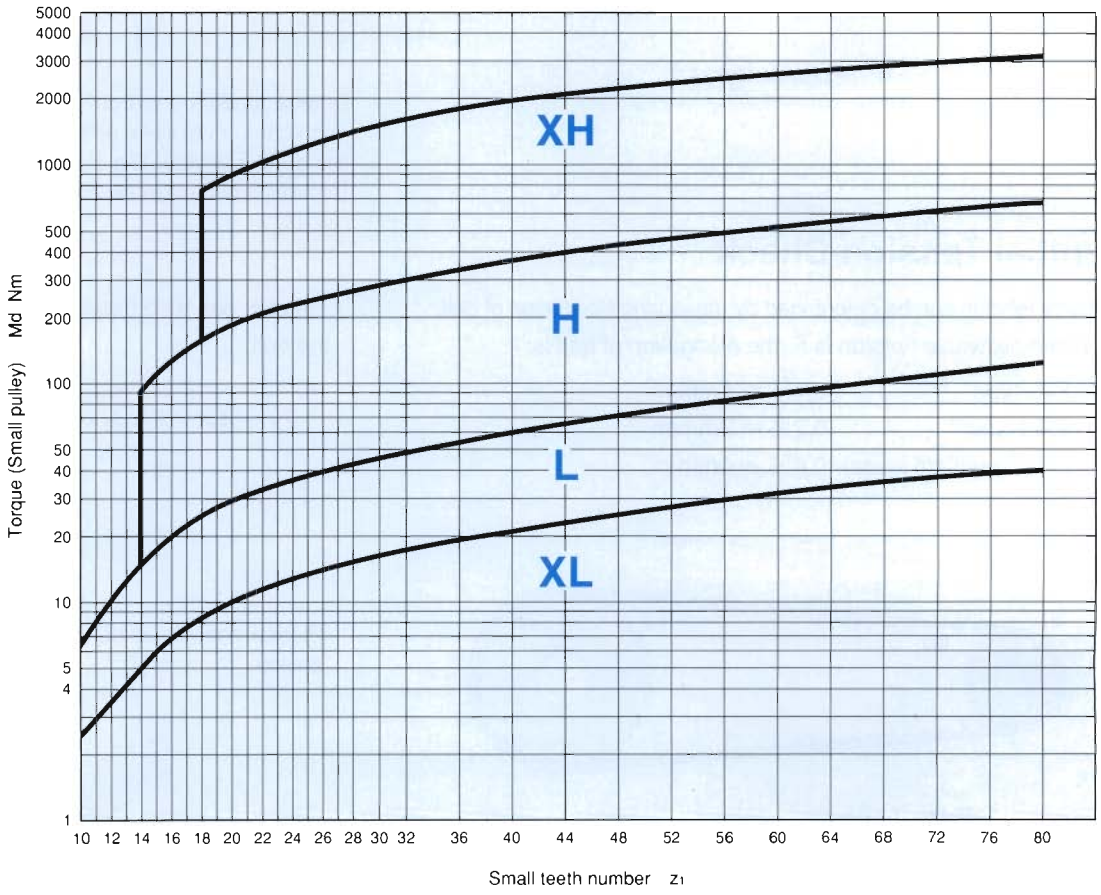


Selection Graph2 〈Torque (Nm) - Small pulley teeth number (z_1)〉

Meters



Inches



Precautions

Setting Initial Tension

Determining Initial Tension (Fv)

Initial tension should be determined in response to the maximum effective tension occurring during transfer.
Initial tension is homogeneous in the whole belt peripheral in non operational status or idling.
In operation, tightness and slack appear in a belt. Effective belt tension is the difference between the tight and slack tension.
The difference can cause torque or transmission capacity through the pulley.
For timing belts, provide an initial tension which does not sag a belt at the slack side.
Sag appearing at the starting load indicates a lack of initial tension.

$$U=\frac{2\times10^3\times Md}{dp} \quad \text{or} \quad U=\frac{19.1\times10^6\times P}{n\times dp}$$

$$Fv=0.5\times U$$

U : Effective tension (N)
Md : Torque (Nm)
P : Transmission capacity (kW)
dp : Pulley diameter (mm)
n : Pulley rpm (rpm)
Fv : Initial tension (N)

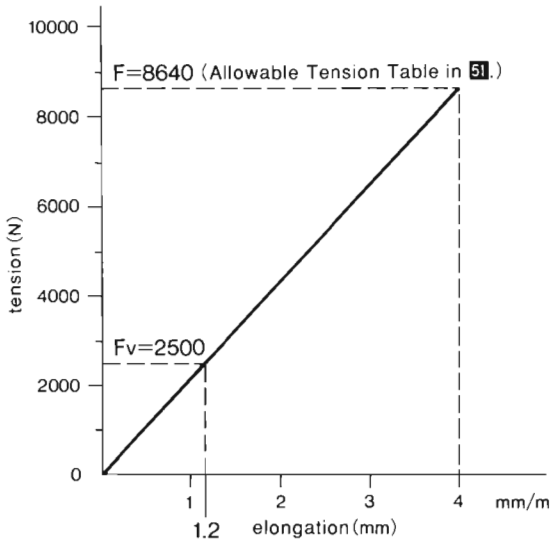
【Exercise】
Iron Rubber® Belt (T2, width 75 mm)
For flex type

In the maximum effective tension (Umax) = 5000N

$Fv = 0.5\times Umax$
$= 0.5\times5000(N)$
$= 2500(N)$

Calculate elongation corresponding to the initial tension from the right graph.

(Determine F from the Allowable Tension Table in P 51.
For T20 Flex type, F=8640N from the width 75 mm.)

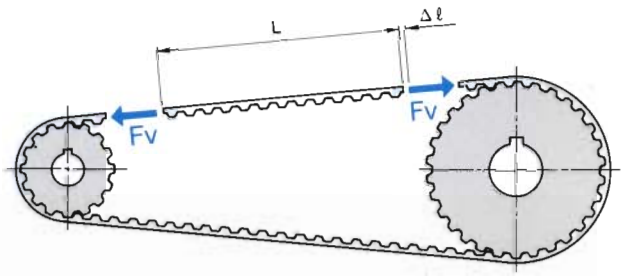


Draw a straight line from the intersection point of F= 8640N and 4 mm / m to zero, determine the point it intersects with the line of Fv= 2500N. The elongation is 1.2 mm.
【Note】 Do not use in exceeding allowable tension.

Initial Tension Check

Initial tension can be determined by measuring elongation of belt.
When allowable tension is F, the elongation of belt is:

Flex type	0.4% = 4mm/m
Joint type	0.2% = 2mm/m
Linear type (Cord shape)	0.4% = 4mm/m



The relationship between force and elongation follow Fooke's Law (in a proportional relationship) and median value can be calculated.

• Tension can also determined by measuring frequency of the belt.

$$Fv = 4\times f^2\times m\times \ell^2$$

Fv : Belt tension (N)
f : Frequency (Hz)
m : Belt weight per 1 m (kg/m)
ℓ : Span length (m)

Please consult us as we prepare a frequency measuring device.

Allowable Tension

For stainless steel tension member, the values in the tables should be multiplied 0.8.

AT5

(N)

Belt Width mm	Flex Type F	Joint Type J	Linear Type L
7	260	130	310
10	420	210	470
15	690	350	740
20	960	410	960
25	1280	620	1280
40	2010	920	2010
50	2540	1240	2540

AT10

(N)

Belt Width mm	Flex Type F	Joint Type J	Linear Type L
15	1440	710	1620
20	2160	890	2160
25	2700	1070	2700
40	4500	1960	4320
50	5760	2500	5400
75	8640	3650	8100
100	11700	5000	10800

AT20

(N)

Belt Width mm	Flex Type F	Linear Type L
25	4360	4700
40	7390	7720
50	9400	9740
75	14440	14440
100	19150	19480

T5 / DT5

(N)

Belt Width mm	Flex Type F	Joint Type J	Linear Type L
7	200	100	200
10	300	150	300
15	450	200	400
20	625	270	550
25	775	350	700
40	1250	490	980
50	1575	630	1250

T10 / DT10

(N)

Belt Width mm	Flex Type F	Joint Type J	Linear Type L
10	—	—	470
15	880	320	640
20	1200	440	880
25	1520	640	1280
40	2400	960	1920
50	3040	1280	2560
75	4560	1920	3840
100	6160	2560	5120
150	—	2560	—

T20

(N)

Belt Width mm	Flex Type F	Joint Type J	Linear Type L
20	—	—	1960
25	2880	1670	2340
40	4500	1980	3960
50	5760	2520	5040
75	8640	3780	7560
100	11520	5040	10800

MXL

(N)

Belt Width		Linear Type
Nominal width	mm	L
013	3.2	45
019	4.8	65
025	6.4	90
031	7.9	120
037	9.5	140
050	12.7	175
075	19.1	260
100	25.4	350

XL

(N)

Belt Width		Flex Type	Joint Type	Linear Type
Nominal width	mm	F	J	L
025	6.4	180	90	180
031	7.9	230	120	230
037	9.5	270	135	270
050	12.7	380	175	350
075	19.1	580	270	530
100	25.4	780	350	700
150	38.1	1180	530	1060
200	50.8	1600	700	1400

L

(N)

Belt Width		Flex Type	Joint Type	Linear Type
Nominal width	mm	F	J	L
050	12.7	640	320	640
075	19.1	960	480	960
100	25.4	1280	640	1280
150	38.1	1900	950	1900
200	50.8	2600	1270	2540
300	76.2	3820	—	—
400	101.6	5250	—	—

H / DH

(N)

Belt Width		Flex Type	Joint Type	Linear Type
Nominal width	mm	F	J	L
075	19.1	1120	480	960
100	25.4	1520	640	1280
150	38.1	2320	960	1920
200	50.8	3120	1280	2560
300	76.2	4720	1920	3840
400	101.6	6320	2640	5120
500	127.0	—	2030	—
600	152.0	—	2500	—

XH

(N)

Belt Width		Flex Type	Joint Type	Linear Type
Nominal width	mm	F	J	L
100	25.4	2880	900	1800
150	38.1	4320	1800	3600
200	50.8	5760	2520	5040
300	76.2	8640	3780	7560
400	101.6	11700	5040	10080

Wide T10 (N)

Belt Width mm	Joint Type J
150	2560
200	1750
250	2190
300	2790
350	3500
400	4110
450	4380

Precautions in Use

Precautions in Design

●UG07(Material symbol G) is mildewproof and antimicrobial, but clean regularly. Verification test is carried out as per ASTMG-21-70. For more information, please refer to P60.

●Select a belt according to the use conditions, and confirm if it is available.

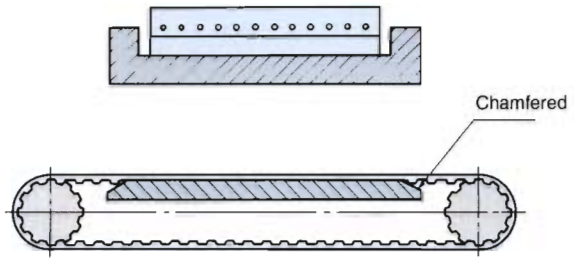
●For Profiled Belt

- •Check the welding width and pulley teeth number without fail.
- •Please consult with us, when installing another attachment to a profile, when oscillation or shock load by an intermittent feed, etc. are added on a profile.

●When using a belt in wet locations, aramid fiber tension members are used for joint types and stainless steel tension members are for flex types.

●About Guide Rail

- •Use a guide rail for conveyance.
- •Stainless steel, polyamide, ultrahigh molecular weight polyethylene, etc. are suitable for guide rail material.
- •Select a guide rail with a side guide, and chamfer in the direction of the length at the both ends for positive driving operation.
- •Use the right table for the index of the friction coefficient (μ).

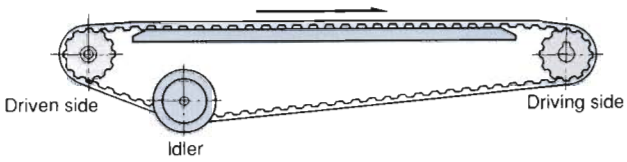


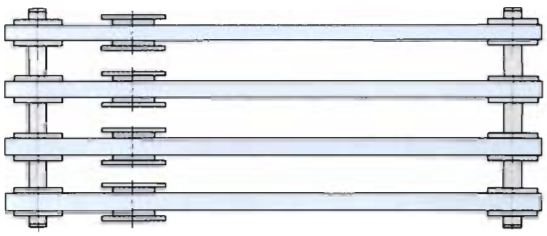
Rubber material : NOK U496

Guide rail \ Belt	Standard (Dry)	Standard (Water-lubricated)	Nylon facing on tooth side
Stainless steel	0.6	0.3	0.3
Polyamide	0.3	0.1	0.2
Ultrahigh molecular weight polyethylene	0.3	0.1	0.2

●For Plural Belt Drives

- •Use a matched set belt.
- •Belt tension and pulley alignment should be adjusted per belt.





●Minimum Pulley Teeth Number

Please consult the following table, since the minimum pulley teeth number varies with the number of revolutions.

Revolution No.(rpm)	AT5	AT10	AT20	T5 DT5	T10 DT10	T20	XL	L	H DH	XH
≧600	15	16	18	12	14	18	10	12	14	18
≧720			20			20				20
≧900			22			22				22
≧1200		18	24		16	24			16	24
≧1800	16	20		14	18		12	14	18	
≧3000	18	22	26	16	20	26		16	20	26

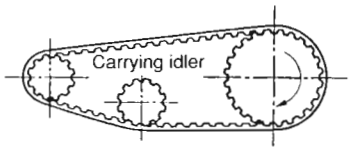
●Idler

•When there is no choice to use a carrying idler, set it at the slack side.

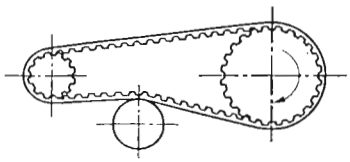
•A carrying idler should be set inside the belt where feasible.
When setting a carrying idler inside the belt, the teeth number should be greater or equal to the small pulley.
When setting a carrying idler outside the belt, use a flat pulley without crown and a diameter larger than or equal to the value indicated in the table.

Belt Model	Minimum Carrying Idler Diameter (mm)
AT5	40
AT10	80
AT20	180
T5	30
T10	70
T20	180
MXL	15
XL	30
L	50
H	90
XH	180

Installing from the Inside



Installing from the Outside

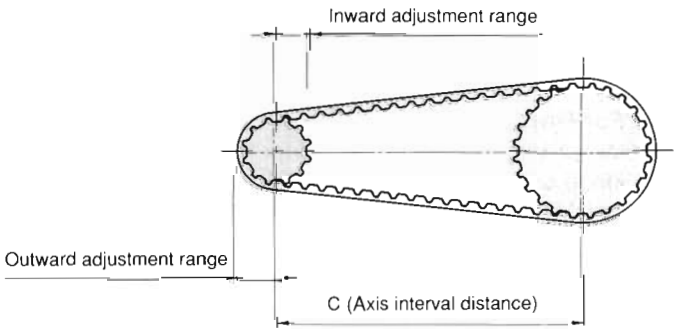


●Minimum Adjusting Range of Center Distance

•Minimum adjusting range of center distance should be determined form the following table, considering a margin for installation or stretching.

Center Distance (mm)	Outward Adjustment Range (mm)
≧600	5
<600 - 1000	10
<1000 - 1500	15
<1500 - 2000	20
<2000 - 2500	25
<2500 - 3000	30
<3000	Center distance×0.01

Model	Inward Adjustment Range (mm)
T5, XL	5
AT5, L	10
AT10, T20, H	15
AT20, T20, XH	40



When using a pulley with fringe, a larger adjustment range should consider the fringe outer diameter.

Cautions for Storing

●Do not fold.

●Do not store in stacked or in folded conditions.

●When storing over a long term, keep it in a cool and dark place as much as possible.
(Avoid extremely high or low temperatures, moisture, and sunlight.)

●Do not scratch the pulley.

Precautions on Toothed Pulley

●When using a pulley with an additional process, the following shall be ensured.

- No flash and/or acute angle.
- Dimension accuracy after processing.
- Pulley strength after processing.

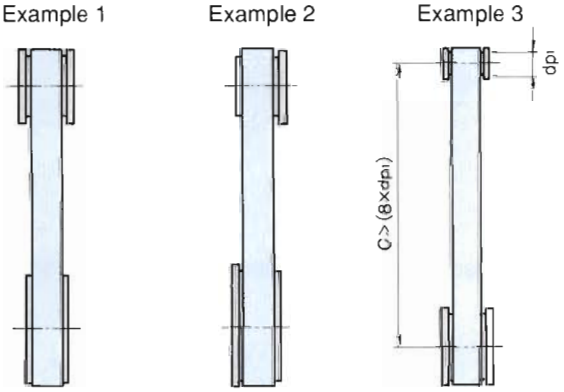
●When incorporating a fringe into a pulley, fix the fringe not to have clearance by caulking, etc. after checking for foreign matter.

●Belt belt slips to one side in operation due to pulley alignment or belt rotation.
Pulley should be installed as follows:

For Two-Axis

Set fringes on both sides of one of the two pulleys (ex. 1), or one fringe opposite the other (ex. 2). But if the axis interval is 8 or more times the small pulley diameter (ex. 3), set fringes on both sides of both pulleys.

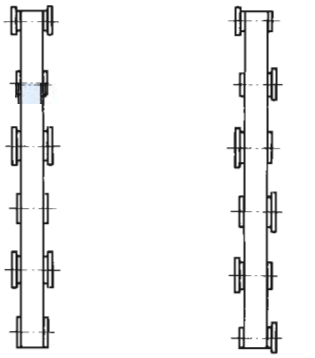
Example 1 Example 2 Example 3



For Multi-Axis

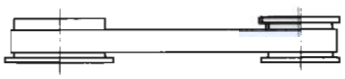
Use a pulley with fringes in both sides for every other pulley (ex. 4), or a fringe on alternating pulleys.(ex.5)

Example 4 Example 5



For Horizontal Shaft Drive

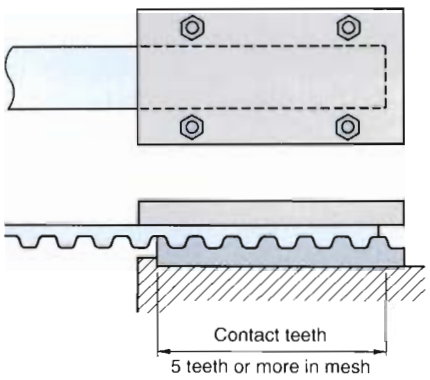
Install fringes on both sides for one pulley, and one fringe on the lower side for the other pulley, because a belt may slip off the pulley due to the belt empty weight.



※When using T20 and XH timing belts in horizontal shaft drive, it is recommendable to mount the fringes with screws.

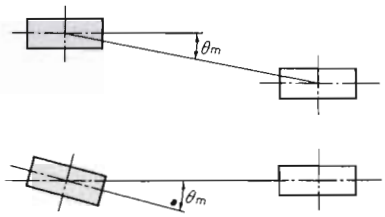
Precautions in Installation

- Be sure to install the pulley after powering off and checking that the machine is stopped.
- Install after shortening the center distance, or loosening the tension pulley. Belt or pulley may be damaged or the belt life may be shortened if the pulley is forced with a tool.
- Installing for a linear type belt
  - Install with 5 teeth or more meshed using a holding device.
    (6 teeth meshed in the right figure.)
  - Do not .perforate directly.



- Belt installation tension should be appropriate as per P 50.
  Inappropriate tension may cause early breakage and/or axis breakage.
- When using a multiple looping belt, exchange all belts simultaneously without exception.
  If not, early breakage may result.
- If a pulley goes out of alignment, early rupture or fringe fallout may take place.
  Use within the range specified in the following table.

Belt width mm	≧25.4	25.4 - 75	≦75
tan θ m	≧6/1000	≧4.5/1000	≧3/1000



Precautions in operation

- Be sure to use a safety cover for a rotating parts.
- Static electricity from a belt may cause a fire or malfunction of a control device.
  Set a ground on the machine side.
- Avoid foreign matter.
- Exchange a belt if abrasion of teeth, tooth bottom cracks and/or belt back cracks are found.
- Exchange a pulley if abrasion and/or collusion is found.

Precautions for Spent Belts

- Do not burn a spent belt. Toxic gas may occur.

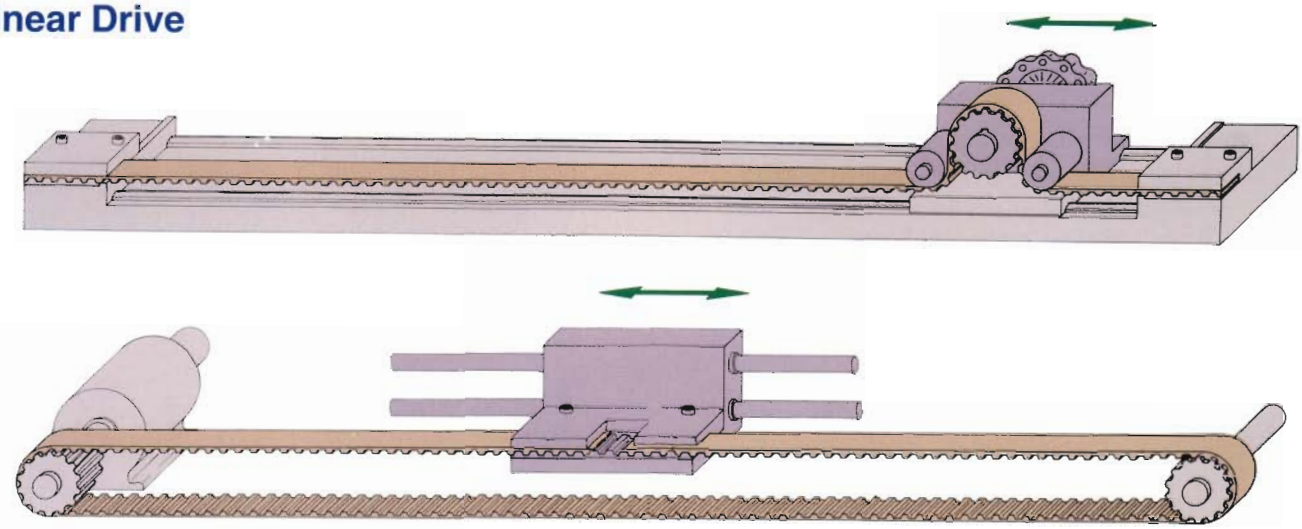
Other Precautions

- Do not use the belts for purposes other than originally intended.
- Be sure to set an additional safety device, when it is expected that a belt may be ground, or a machine slips, self runs, or stops, which may result in an accident causing injury or death, or a serious accident.
- Do not use a belt as insulation.

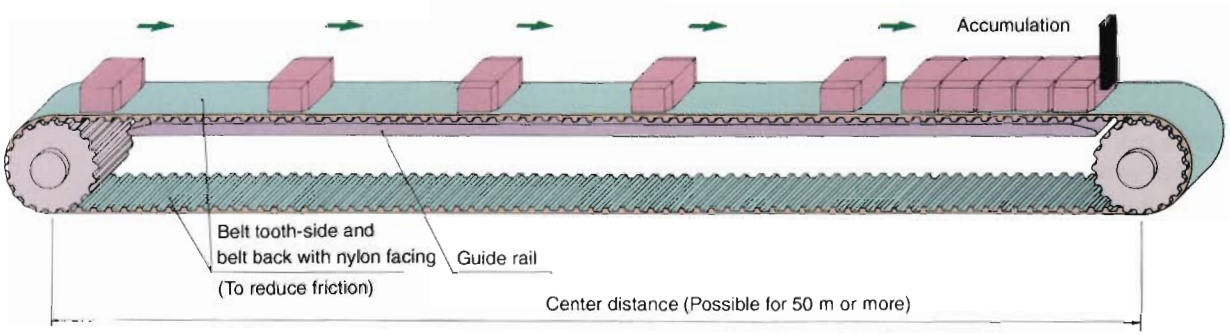
Applications

Constructing the optimum belt line matched to purpose and conditions.
Iron Rubber® belt can provide to you the expanding world of system design.

Linear Drive

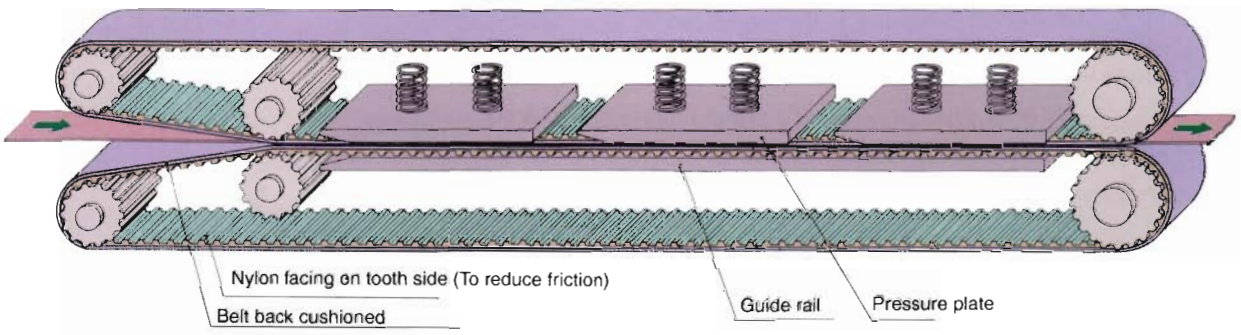


Accumulation Conveyor

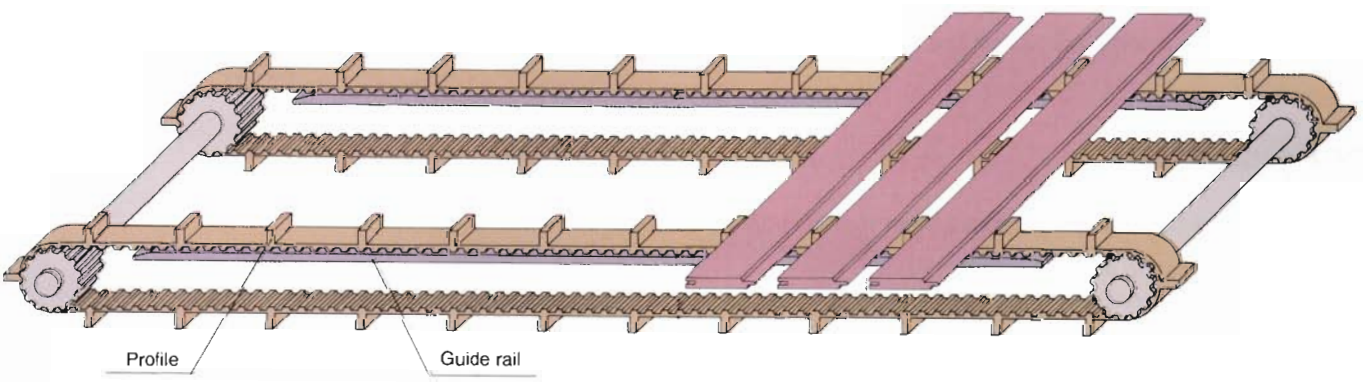


Tractor Drive

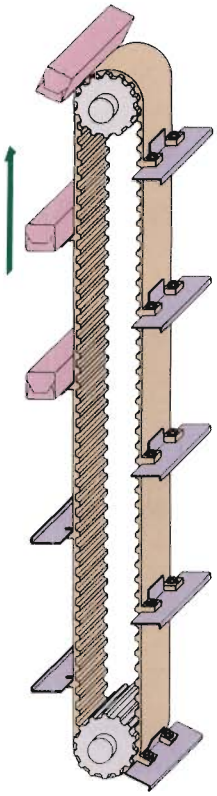
●Sheet Metal Conveyance



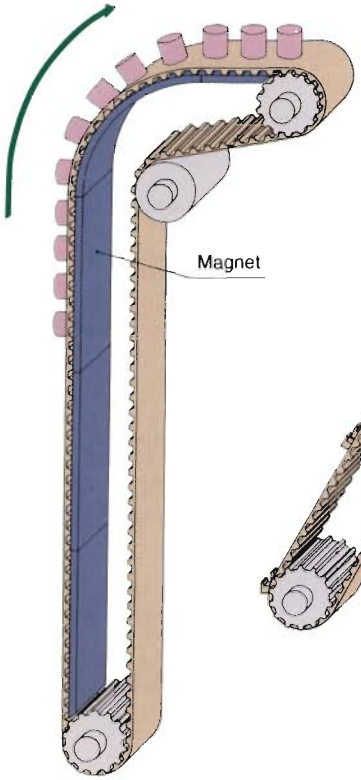
Synchronous Conveyor



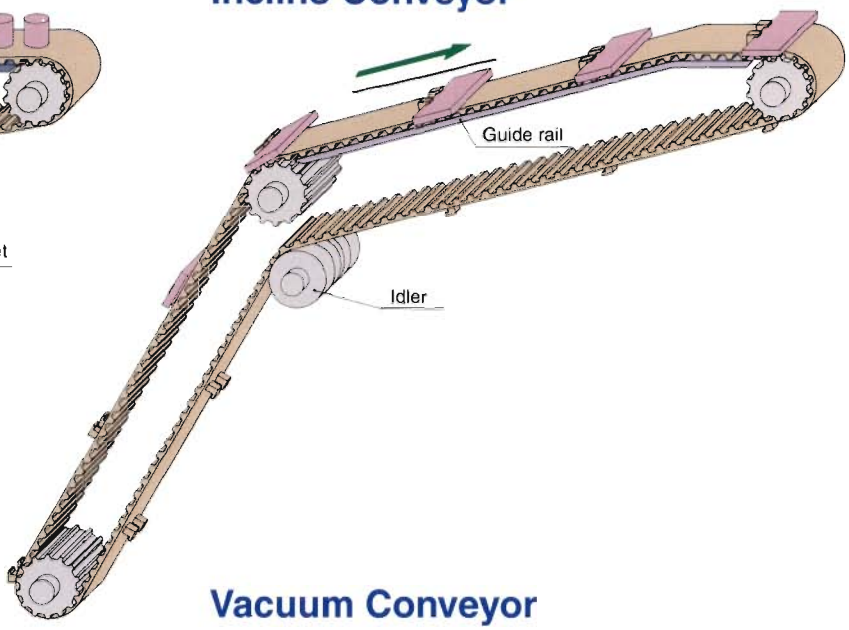
Vertical-Conveyor



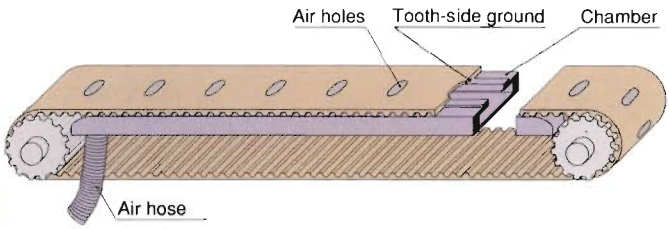
Magnetic-Conveyor



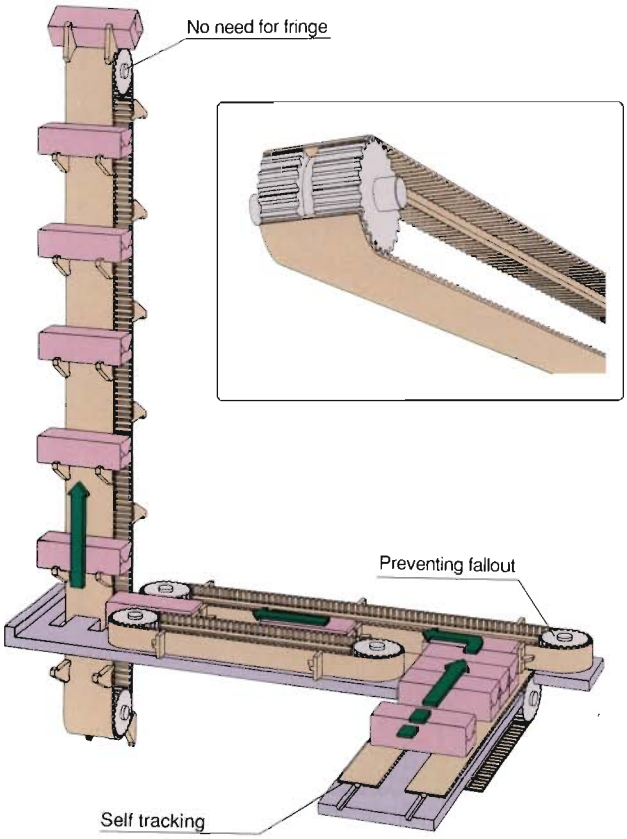
Incline Conveyor



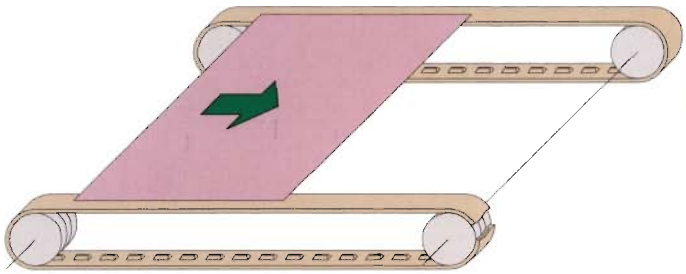
Vacuum Conveyor



Combination Examples of Belt with V-guides



Base Conveyance



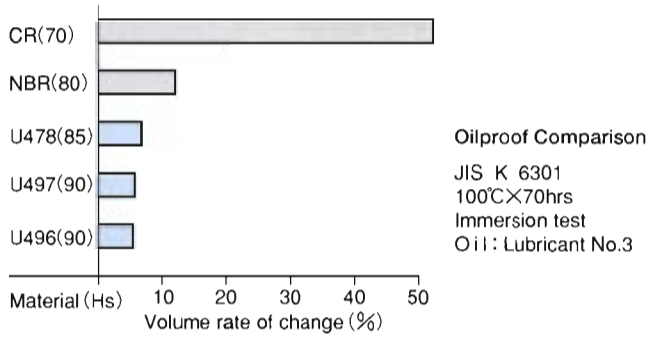
Material

Rubber Material (Compliance with the Japanese Food Sanitation Act)

Item \ Type (Abbr.)		U496(A)	U497(E)	U478(D)	(Reference) Chloroprene rubber
Physical characteristics	Hardness (JIS A)	90	90	85	80
	Tensile strength (kg/cm²)	390	390	350	170
	100% modulus (kg/cm²)	80	80	65	55
	Elongation (%)	580	580	450	260
	Tear strength (kg/cm)	120	120	95	45
Other characteristics	Ozone resistance (20%elongation、50pphm 40℃×168hrs)	No crack	No crack	No crack	Cracked
	The Japanese Food Sanitation Act	Accept	Accept	Accept	Reject
	Color	Translucent natural	White	Translucent natural	Black

Oilproof

The following figure compares ordinary synthetic rubber, CR and NBR with Iron Rubber®.
Iron Rubber® is widely used for a hydraulic packing and is extraordinarily oilproof.

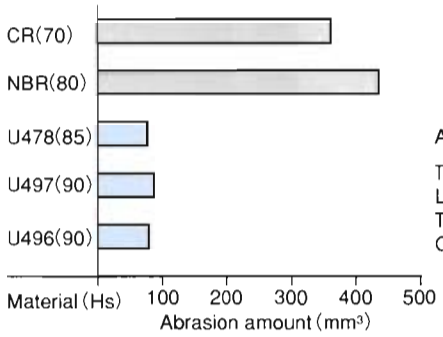


Oilproof Comparison

JIS K 6301
100℃×70hrs
Immersion test
Oil : Lubricant No.3

Abrasion Resistance

Iron Rubber® excels in abrasion resistance. The figure below compares abrasion resistance with ordinary synthetic rubber.



Abrasion Comparison

Taber's abrasion resistance test
Load: 1000g
Test number: 1000 turns
Grindstone: H-18

Iron Rubber® Antistatic Finish

U496 , U497, and U478 are the antistatic specifications.

Surface Electric Resistance (Test piece)

Material Name	Surface Electric Resistance (Ω)
U496	10^{10}
U497	10^{10}
General polyurethane	10^{13}

Chemicalproof

- This applies to conveying material containing chemical and/or oil.
  If you want to immerse, please contact us.
- Acids, alkalis, peroxides, water or water containing matter may corrode steel tension member,
  Please take note.

○ Usable
△ Required prior study
× Not usable

Chemicalproof Rubber

Chemical Name	0-40℃	40-80℃
Alcohols, glycols		
Methyl alcohol	△	×
Ethyl alcohol	△	×
Butyl alcohol	△	△
Ethylene glycol	△	×
Glycerin	△	×
Cyclohexanol	△	△
Ether		
Ethyl alcohol	△	×
Petroleum ether	△	×
Ketones		
Acetone	×	×
Methyl ethyl ketone	×	×
Cyclohexanone	×	×
Aldehydes		
Formalin	△	×
Carboxylic acids		
Acetic acid	△	×
Butyric acid	△	△
Ester		
Ethyl acetate	×	×
Amyl acetate	×	×
Dioctyl phthalate	○	○
Tri-o-cresyl phosphate	△	×
Ethylene glycol acetate	△	×
Aromatic hydrocarbon		
Benzene	△	×
Toluene	△	×
Chloro benzene	×	×
Aniline	△	×
Styrene	△	×
Benzine	△	×
Organic halogen		
Chloroform	△	△
Ethylene dichloride	△	△
Trichloroethylene	×	×
Carbon tetrachloride	×	×
Freon 22	△	×

Chemical Name	0-40℃	40-80℃
Other		
Strong acid (-pH3)	△	×
Weak acid (pH4-6)	△	△
Strong alkali (pH11-14)	△	×
Weak alkali (pH10-11)	△	△
Salt	○	○
Butter	○	○
Margarine	○	○
Vegetable oil	△	△
Animal oil	△	△
Turpentine oil	△	△
Tar oil	△	△
Machine oil	△	△
Heavy oil	○	△
Light oil	△	△
Kerosene	△	×
Gasoline	△	×
Paraffin oil	△	△
Fat	○	○
Vaseline	○	○
Sugar	○	○
Fructose	○	○
Molasses	○	○
Fruit juice	○	○
Milk	○	○
Gelatin	○	○
Vinegar	△	×
Water	○	△
Common salt	○	○
Brine	○	△
Starch	○	○
Yeast	○	△
Liqueur	○	△
Soap/soapy water	○	△
Ink	△	△
Dye	△	△
Oxygenated water	△	△
Bleaching agent	○	△
Ozone	○	○

References

Material

Mildewproof/Antimicrobial Specification (UG07)

Antimicrobial Performance

Viable cells after cultivating 24 hours under 30℃ using contact process.

Viable cell numbers (number/m ℓ)

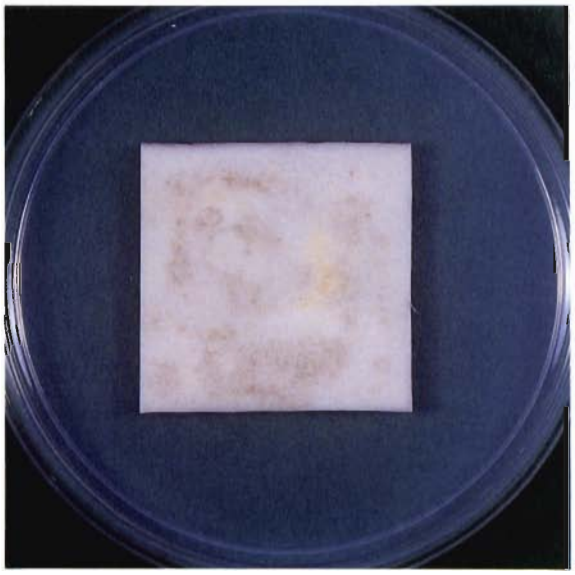
Name of Bacteria (Initial bacteria number)	Escherichia coli (1×10^6)	Staphylococcus aureus(3.6×10^5)
U497	9.2×10^6	5.5×10^6
UG07	$>10^2$	$>10^2$

Mildewproof Performance

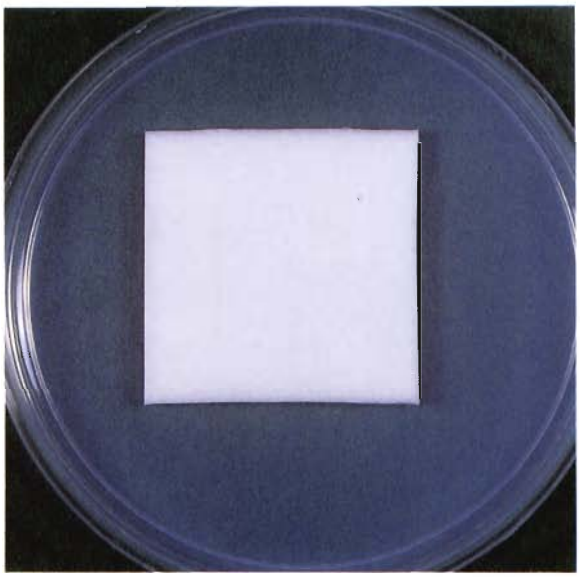
Conditions 28 days after performing the test in conformance with ASTMG-21-70.

【Test Results】

U497 Mildews grew on 60% or more of the sample area.



UG07 No mildews are grown.



Bacteria Studied
Fusarium graminearum
Neurospola sitophila
Phoma
Aspergillus niger
Penicilium citrinum
Cladosporium cladosporioides
Aureo bacsidium pullulans
Chaetomium globosum

●It is suitable for use in an environment where molds grow easily such as in damp places or on food conveyance lines. The material meets with the Japanese Food Sanitation Act and food can be directly placed on it.

Precision Profile Extrusion

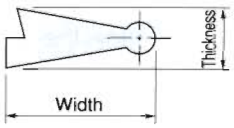
Characteristics

- Long extrusions can be produced with high precision.
- It can be formed in one piece with reinforcements such as tension member, fabric, etc.
- It can be manufactured with a thermoplastic elastomer center around polyurethane rubber.

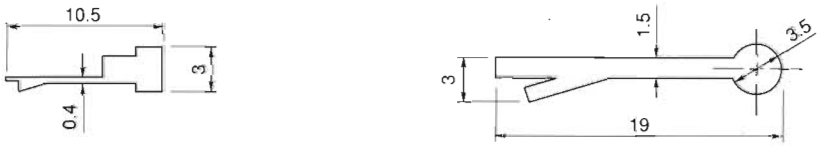
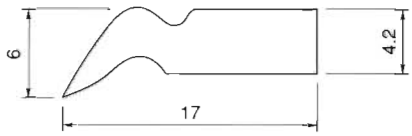
※Standard products are not prepared. We will manufacture the product with a custom designed shape (Molds are needed.)

Index of Manufacture Range

Point	Diameter (mm)
Width	5～50
Thickness	0.4～10
Length	Limitless (50～100 m/loop)



Typical Examples

Type	Shape
Linear seal	
Wiper	

Rubber Material

Major Material

Material Symbol	Abbr.	Hardness (JIS A)
U496	A	90
U497	E	90
U478	D	85

Uses

■Linear Seal

Linear seals are superior abrasion resistance and dustproof rubber and used in magnetic scales to protect the precision parts inside the scale from dust, etc.

■Wiper

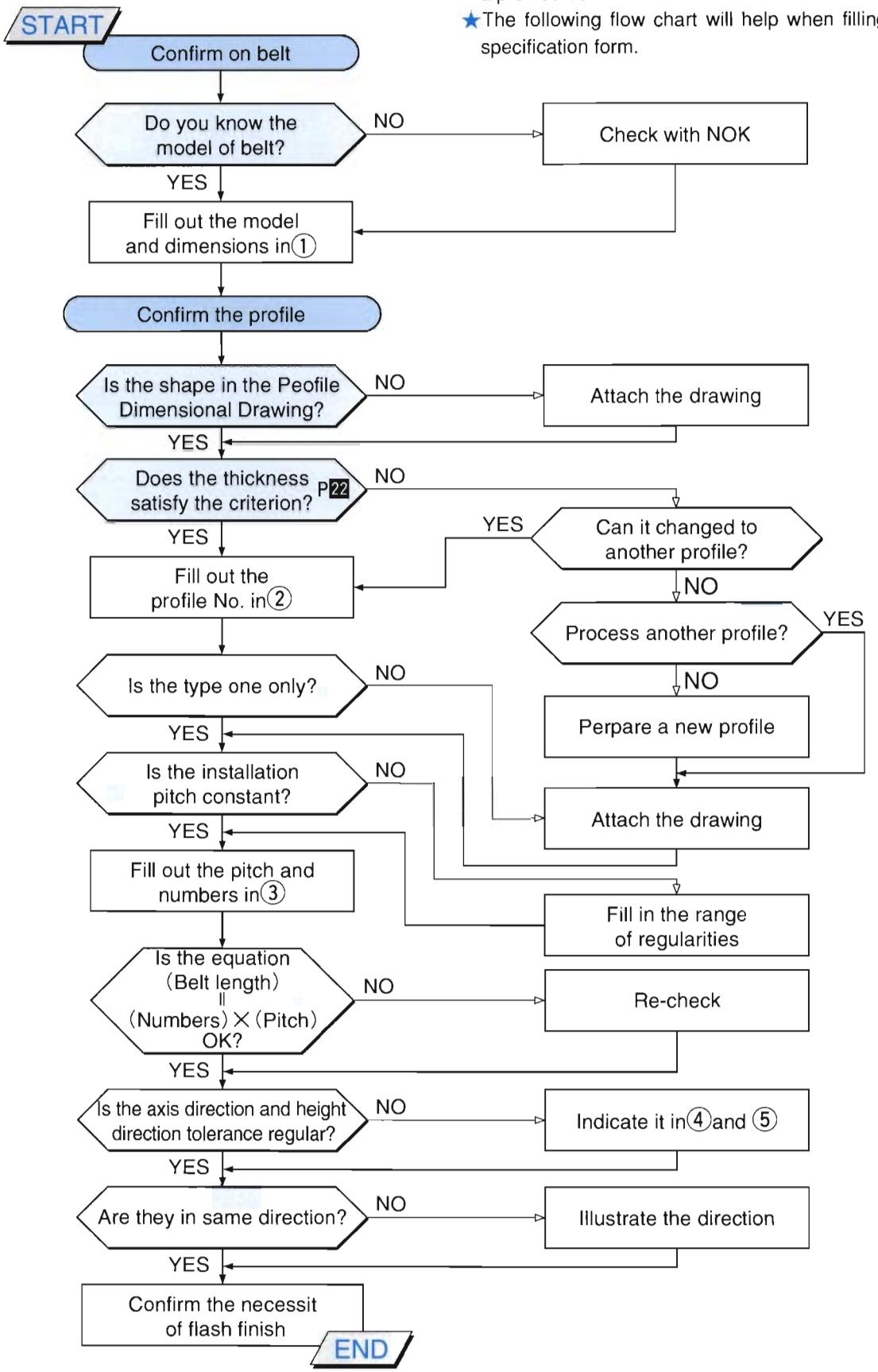
Wipers are mainly used in the sliding parts of a machine tool to protect the machine's innards from chipping, oil, dust, etc.

Profiled Belt Specification

Check Flow for Filling Out a Specification Form

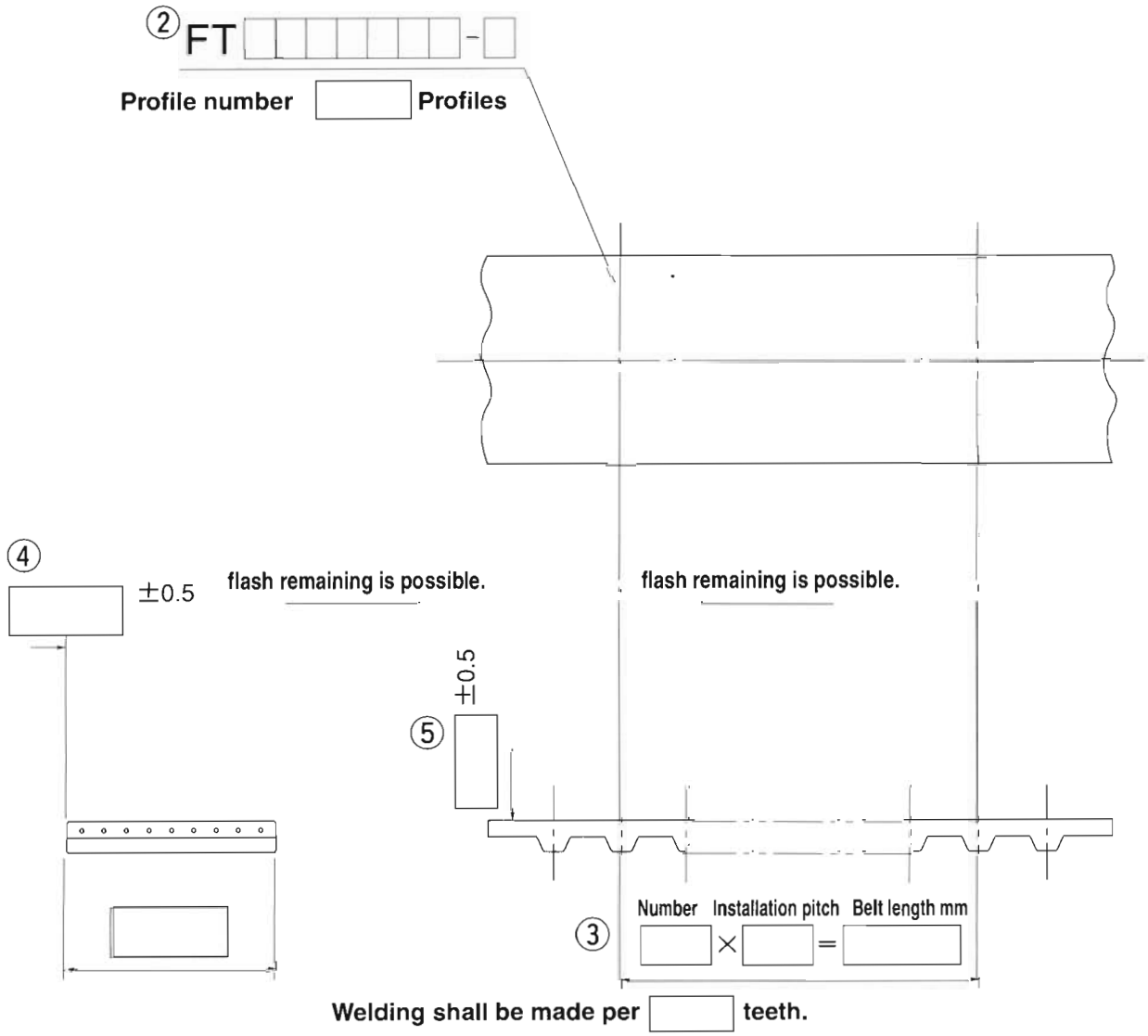
★Please use the specification form in P63 when ordering a profiled belt.

★The following flow chart will help when filling out the specification form.



Profiled Belt Specifications

Belt Model & Dimensions	① ＿＿＿ — ＿＿＿ — ＿＿＿ — ＿＿＿ P Nominal width Belt model Teeth number Rubber material Specification



Remarks

Damage Causes and the Remedies

Damage	Cause	Remedies
Belt break	1. Over load	Change design (Increase size of belt)
	2. Over load by machine accident	Prevent reoccurrence of an accident
	3. Shock over load	Change design and reject a shock load
	4. Small pulley diameter	Change design (Increase pulley diameter)
	5. Folded belt	Pay attention to handling
	6. Run on to fringe	Re-adjust alignment and review fringe shape
	7. Foreign substance in mesh	Improve the environment or set a protective cover
	8. Lowered strength due to corrosion of a tension member (steel)	Improve the environment, or change to aramid fiber or stainless steel cord
Belt side abrasion	1. Bad pulley alignment	Re-adjust alignment
	2. Bad pulley alignment due to rigidity shortage of an axis and a bearing	Exercise care on axis load and change specification
	3. Bending and poor shape of pulley fringe	Correct fringe bending, or switch to a new fringe
	4. Coarse surface roughness of pulley fringe	Switch to an appropriate fringe
Belt tooth abrasion	1. Over load	Change design (Increase size of belt)
	2. Over tension of a belt	Correct initial tension
	3. Many particles due to abrasion	Improve the environment or set a protective cover
	4. Over-loose belt	Correct initial tension
Belt teeth bottom abrasion	1. Over tension of a belt	Correct initial tension
	2. Bad tooth profile of a pulley	Switch to a normal pulley
Partially tear of tension member	1. Foreign substance in mesh	Improve the environment or set a protective cover
	2. Broken in using a wrench, etc. when installing a belt.	Exercise care when installing
	3. Partially folded belt	Exercise care in handling
	4. Fatigue on sides due to bad alignment	Re-adjust alignment
Belt jumping	1. Over load (Over load attended with a shock)	Change design (Increase size of belt)
	2. Over load due to an accident by a machine	Prevent reoccurrence of an accident
	3. Shock over load	Change design or reject a shock load
	4. Shortage of teeth in mesh	Increase pulley teeth number or teeth in mesh by a carrying idler.
	5. Initial tension shortage	Correct initial tension
	6. Bad pulley alignment due to rigidity shortage of an axis and a bearing	Exercise care for axis load and change specification
	7. Small pulley diameter	Change design (Increase pulley diameter)
	8. Inertia moment for start and stop is not considered.	Change design
Vertical split belt	1. Belt runs protruding from a pulley	Re-adjust alignment
	2. Run on to fringe	Re-adjust alignment and review fringe shape
	3. When installing, force a belt over the fringe	Exercise care to handle when installing
	4. Inappropriate fringe arrangement	Adopt appropriate fringe arrangement
Abrasion of belt back rubber	1. Bad pulley alignment which contacts with belt back rubber	Re-adjust alignment
	2. Contact with a foreign matter such as frame of a machine, etc.	Eliminate the substance contact
Cracked belt back rubber	1. Small pulley diameter	Change design (Increase pulley diameter)
	2. Running under low temperature	Increase environment temperature
Belt seems longer	1. Center distance becomes short	Correct to a normal center distance
	2. Loose tension pulley	Improve installation method
Pulley tooth abrasion	1. Over load	Change design
	2. Over tension of a belt	Correct tension
	3. Inappropriate pulley material (soft)	Change to a hard material, and conduct surface hardening
	4. Many particles due to abrasion	Improve the environment or set a dustproof cover.
Abnormal noise	1. Over load	Change design
	2. Over tension of a belt	Correct initial tension
	3. Bad pulley alignment	Re-adjust alignment
	4. Bad pulley tooth shape	Switch to a normal pulley
	5. Wider belt width compared to pulley diameter	Change design
	6. Blow noise from pulley and belt	Switch to a nylon facing on tooth side belt
Peeled off profile	1. Heavy thickness of profile	Thinner profile thickness, or increase pulley teeth number
	2. Repetition load to a profile	Change design and review structure