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Steel cord conveyor belts

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Belting Manufactures Association (JBMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS K 6369**:2000 is replaced with this Standard.

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Steel cord conveyor belts

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 15236-1** published in 2005 and the first edition of **ISO 15236-2** published in 2004 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standards have been modified. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies the rubber conveyor belt using a steel cord as reinforcement (hereafter referred to as “belt”) which is used in the range of its surface temperature of $-30\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$. However, belts for special use such as oil resistance, acid resistance, alkali resistance, flame resistance, food conveyance and personnel transport are excluded.

NOTE : The International Standards corresponding to this Standard are as follows.

ISO 15236-1:2005 *Steel cord conveyor belts—Part 1: Design, dimensions and mechanical requirements for conveyor belts for general use*

ISO 15236-2:2004 *Steel cord conveyor belts—Part 2: Preferred belt types* (Overall evaluation: MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For the standards with the indication of the year, only the edition of indicated year shall be applied so that the revisions (including amendments) made thereafter are not applied and for the standards without the indication of the year, the most recent edition (including amendments) shall be applied.

JIS B 7503 *Dial gauges*

JIS B 7507 *Vernier, dial and digital callipers*

JIS B 7512 *Steel tape measures*

JIS B 7517 *Vernier, dial and digital height gauges*

JIS K 6200 *Rubber—Vocabulary*

JIS K 6251:2004 *Rubber, vulcanized or thermoplastic—Determination of tensile stress-strain properties*

NOTE : Corresponding International Standard: ISO 37:1994 *Rubber, vulcanized or thermoplastic—Determination of tensile stress-strain properties* (MOD)

JIS K 6256-1:2006 *Rubber, vulcanized or thermoplastic—Determination of adhesion test—Part 1: Adhesion to textile fabric*

JIS K 6257:2003 *Rubber, vulcanized or thermoplastic—Determination of heat ageing properties*

NOTE : Corresponding International Standard: ISO 188:1998 *Rubber, vulcanized or thermoplastic—Accelerated ageing and heat resistance tests* (MOD)

JIS K 6264-2:2005 *Rubber, vulcanized or thermoplastic—Determination of abrasion resistance—Part 2: Testing methods*

NOTE : Corresponding International Standard: ISO 4649:2002 *Rubber, vulcanized or thermoplastic—Determination of abrasion resistance using a rotating cylindrical drum device* (MOD)

3 Terms and definitions

For the purpose of this Standard, the definitions given in **JIS K 6200** and the following definitions apply.

3.1 steel cord joints

butt joints or joints of steel cords in the longitudinal direction in a belt

3.2 troughability

index giving a fitting degree of a belt to carrier rollers

3.3 troughing angle of side idlers

angle of inclination with respect to the mounting surface of side idlers of both ends (see figure 1)

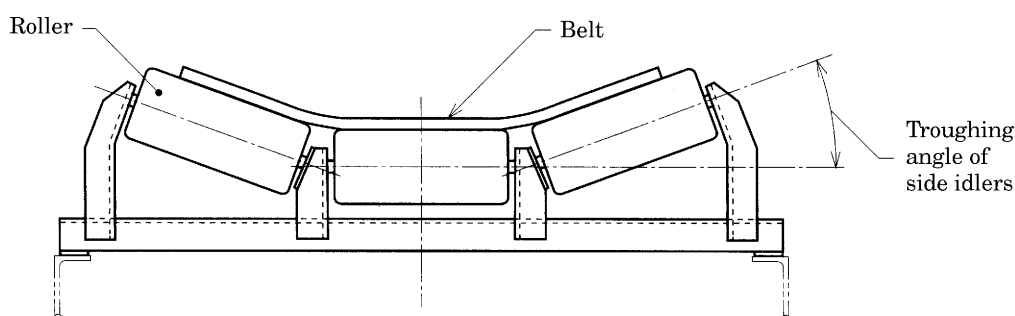


Figure 1 Troughing angle of side idlers (example of three carrier rollers)

3.4 edge width

distance from the exterior of endmost steel cord to the belt edge in the cross-section of a belt (see figure 2)

4 Symbols and units

The symbols and units used in this Standard shall be in accordance with table 1.

Table 1 Symbol and unit

Symbol	Explanation	Unit
b	Belt width (belt width)	mm
b_1	Distance between centres of endmost steel cords (supporting belt width)	mm
b_2	Edge width (calculated edge width)	mm
b_3	Distance between exterior sides of endmost steel cords	mm
d	Steel cord nominal diameter (steel cord diameter)	mm
F_a	Pull-out strength of steel cord (pull-out force of cord per cord length)	N/mm
F_{bs}	Breaking strength per steel cord (breaking strength of cord taken from cured belt)	kN
F_m	Pull-out force (pull-out force of cord)	N
K_n	Belt strength [minimum (nominal) breaking strength per width of belt]	N/mm
y	Length of pull-out part of test piece for pull-out test of steel cord (test piece measured length for pull-out force test of steel cords)	mm
n	Number of steel cords (number of steel cords)	—
p	Steel cord pitch (steel cord pitch)	mm
t	Belt thickness (belt thickness)	mm
t_1	Thickness of carrying side cover rubber (cover thickness carrying side)	mm
t_2	Thickness of pulley side cover rubber (cover thickness pulley side)	mm
t_3	Belt thickness without carrying side cover rubber and pulley side cover rubber (thickness of belt core)	mm
t_4	Belt thickness without carrying side cover rubber (belt thickness without cover of carrying side)	mm
T	Troughability (troughability)	—
F	Deflection of test piece (deflection)	mm
min	Minimum value (minimum value)	—
max	Maximum value (maximum value)	—
'	Measured value	—
h_m	Median of steel cord height (median steel cord height)	mm
Δh_1	Ratio of number of steel cords located in a range within 1.0 mm above or under h_m to total number of steel cords (number of steel cords positioned within a range of $h_m \leq 1.0$ mm as a percentage of the total number of steel cords)	%
Δh_2	Ratio of number of steel cords located in a range over 1.0 mm above or under but within 1.5 mm h_m to total number of steel cords (number of steel cords positioned within a range of h_m of from > 1.0 mm to 1.5 mm and expressed as a percentage of the total number of steel cords)	%
Δh_3	Ratio of number of steel cords located in a range over 1.5 mm above or under h_m to total number of steel cords (percentage of steel cords with $h_m > 1.5$ mm)	%
NOTE : Corresponding explanations in ISO 15236-1:2005 are described in parentheses for reference.		

5 Classification

The belts shall be classified according to the nominal belt strength, belt width, cover rubber grade and belt type and expressed by the combination as shown in table 2.

Table 2 Classification of belt

Division	Classification							
Nominal belt strength ^{a)}	ST-500	ST-630	ST-800	ST-1000	ST-1250	ST-1400		
	ST-1600	ST-1800	ST-2000	ST-2250	ST-2500	ST-2800		
	ST-3150	ST-3500	ST-4000	ST-4500	ST-5000	ST-5400		
Belt width mm	500	650	750	800	900	1 000	1 050	1 200
	1 400	1 500	1 600	1 800	2 000	2 200	2 400	2 600
	2 800	3 000	3 200					
Cover rubber grade	S, A, L, D, H							
Belt type	A0, A1, A2							
Note ^{a)} ST is the symbol indicating the steel cord conveyor rubber belt. Numerical figures indicate the belt strength.								

6 Structure

6.1 Cross-section structure of belt

The cross-section structure and designation of each part of a belt shall be in accordance with figure 2.

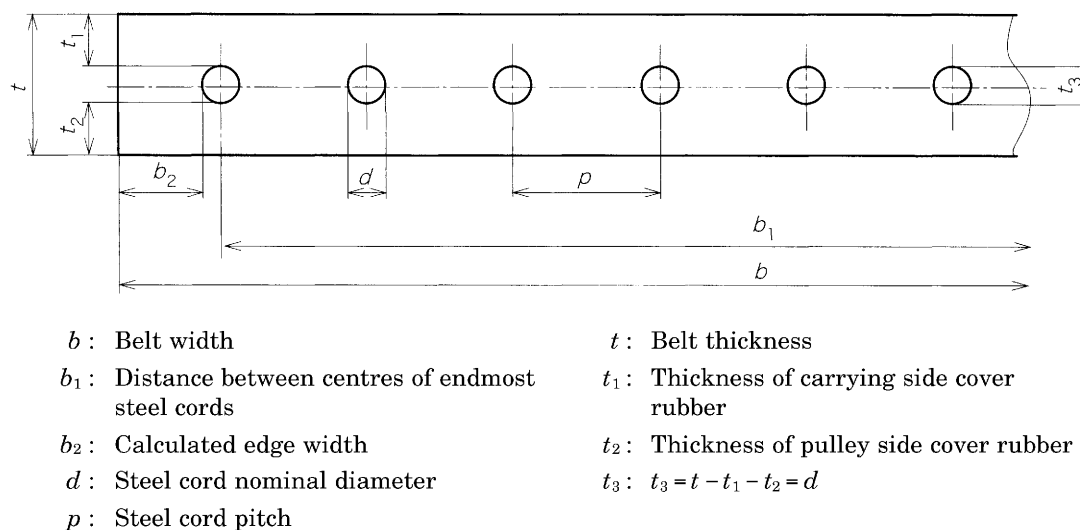


Figure 2 Cross-section structure of belt and designation of each part

6.2 Steel cord joints

When jointing the steel cords within the manufacturing length of a belt, the following conditions shall be satisfied for every belt roll.

- The number of jointed steel cords shall be not more than 2 % of the total number of steel cords.

- b) The number of joints shall be not more than one position per one steel cord.
- c) When there are two or more steel cords which need jointing, the interval between joints shall be separated by 10 m or over in the longitudinal direction of the belt.

6.3 Belt types

The pitch, number and nominal diameter of steel cords in the belt shall be in accordance with table 3, table 4 and table 5. The division of belt type shall be as follows.

- A0: Belt type specified in the conventional **JIS**
- A1: Belt type A1 specified in **ISO 15236-2:2004**
- A2: Belt type A2 specified in **ISO 15236-2:2004**

Table 3 Belt type A0

Nominal belt strength	ST-500	ST-630	ST-800	ST-1000	ST-1250	ST-1400	ST-1600	ST-1800	ST-2000	ST-2250	ST-2500	ST-2800	ST-3150	ST-3500	ST-4000	ST-4500	ST-5000	ST-5400
Minimum belt strength N/mm K_n min	500	630	800	1 000	1 250	1 400	1 600	1 800	2 000	2 250	2 500	2 800	3 150	3 500	4 000	4 500	5 000	5 400
Maximum steel cord diameter d_{max} mm	2.8	3.0	3.5	4.0	4.5	4.5	5.0	5.0	6.0	6.3	7.2	7.6	8.1	8.6	9.2	10.1	10.6	11.5
Minimum steel cord breaking strength F_{bs} min kN	5.6	7.0	8.9	13.2	16.5	18.5	21.1	23.7	26.4	29.6	41.7	46.7	52.5	58.4	66.7	80.4	89.3	103.9
Steel cord pitch p mm	10.0	10.0	10.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	15.0	15.0	15.0	15.0	15.0	16.0	16.0	17.0
Minimum cover rubber thickness mm	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.5	5.5	6.0	6.5	7.0	7.5	8.0
Belt width b mm	Number of steel cords n																	
500	45	45	45	38	38	38	38	—	—	—	—	—	—	—	—	—	—	—
650	60	60	60	50	50	50	50	50	50	50	40	40	40	40	40	37	37	35
750	70	70	70	59	59	59	59	59	59	59	47	47	47	47	47	44	44	41
800	75	75	75	63	63	63	63	63	63	63	50	50	50	50	50	47	47	44
900	85	85	85	71	71	71	71	71	71	71	57	57	57	57	57	53	53	50
1 000	95	95	95	79	79	79	79	79	79	79	64	64	64	64	64	59	59	56
1 050	98	98	98	82	82	82	82	82	82	82	66	66	66	66	66	62	62	58
1 200	113	113	113	94	94	94	94	94	94	94	76	76	76	76	76	71	71	67
1 400	133	133	133	111	111	111	111	111	111	111	89	89	89	89	89	83	83	78
1 500	141	141	141	118	118	118	118	118	118	118	94	94	94	94	94	89	89	83
1 600	151	151	151	126	126	126	126	126	126	126	101	101	101	101	101	95	95	89
1 800	171	171	171	143	143	143	143	143	143	143	114	114	114	114	114	107	107	101
2 000	191	191	191	159	159	159	159	159	159	159	128	128	128	128	128	120	120	113
2 200	211	211	211	176	176	176	176	176	176	176	141	141	141	141	141	132	132	125
2 400	231	231	231	193	193	193	193	193	193	193	154	154	154	154	154	145	145	136
2 600	251	251	251	209	209	209	209	209	209	209	168	168	168	168	168	157	157	148
2 800	271	271	271	226	226	226	226	226	226	226	181	181	181	181	181	170	170	160
3 000	291	291	291	243	243	243	243	243	243	243	194	194	194	194	194	182	182	172
3 200	311	311	311	259	259	259	259	259	259	259	208	208	208	208	208	195	195	183
NOTE: —: Not applicable because of troughing performance.																		