International Standard 5613

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Mining — Drive sprocket assemblies for chain conveyors

Exploitation minière — Tourteaux d'entraînement à empreintes pour convoyeurs à chaînes

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5613 was developed by Technical Committee ISO/TC 82, *Mining*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Australia	Egypt, Arab Rep. of	Poland
Austria	France	Romania
Belgium	Germany, F.R.	Spain
Brazil	India	United Kingdom
Bulgaria	Korea, Dem. P. Rep. of	USSR
China	Mexico	
Czechoslovakia	New Zealand	

No member body expressed disapproval of the document.

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Mining — Drive sprocket assemblies for chain conveyors

1 Scope and field of application

This International Standard specifies the requirements for a range of sprocket assemblies for use with twin outboard chain assemblies for chain conveyors. These assemblies incorporate sprocket rings designed to accept chains complying with ISO 610, shackle type connectors complying with ISO 1082 and scraper bars complying with ISO 5612.

2 References

ISO 610, *High-tensile steel chains (round link) for chain conveyors and coal ploughs.*

ISO 1082, *Mining — Shackle type connector units for chain conveyors.*

ISO 5612, *Mining — Scraper bars for chain conveyors.*

3 Definitions

For the purpose of this International Standard, the following definitions apply:

3.1 drive sprocket assembly: An arrangement which comprises the drive sprocket rings and connecting barrel, shown in figure 1, or a barrel incorporating integral drive sprocket rings.

3.2 drive sprocket ring: A toothed wheel by which the chain of a chain conveyor is driven.

3.3 connecting barrel: A cylindrical spacer between two drive sprocket rings.

3.4 sprocket pocket: That part of a complete sprocket ring into which either a chain link or shackle type connector sits.

3.5 inspector: The representative of the purchaser.

4 Drive sprocket assembly

4.1 Design

Drive sprocket assemblies as shown in figure 1 shall conform to the dimensions and tolerances stated in tables 1 and 2 which are based on the design formulae given in the annex. Unless otherwise specified by the purchaser and having regard to these limitations, it is the manufacturer's responsibility to ensure that the assembly and its components shall be of adequate strength for the duty which they are required to perform, when related to the dimensions and mechanical properties of the appropriate chain (see ISO 610).

4.2 Assembly

When constructing the drive sprocket assembly shown in figure 1, the profiles of each complete sprocket ring shall be aligned with the other within the permitted tolerances stated in 5.1. Where applicable, care shall be taken to adopt the correct welding procedure for the steels used for the sprocket rings and the barrel.

4.3 Dimensional tests

The dimensions for each sprocket assembly given in table 2 shall be verified by methods agreed between the purchaser and the manufacturer.

NOTE — An associated guidance document on methods of verifying sprocket dimensions is being prepared.

4.4 Workmanship

Where applicable, all welds shall be smoothly finished, and on visual examination, have no harmful fissures, notches or other imperfections.

Magnetic and/or fluorescent crack deflection, gamma radiography or other forms of non-destructive testing shall be specified only by agreement between purchaser and manufacturer. Such methods of testing and the criteria to be applied shall be clearly defined and agreed at the time of the enquiry and order.

4.5 Marking

Each sprocket assembly shall be visibly and permanently marked with

a) the manufacturer's registered trade name or trade mark;

b) the size and pitch of chain and the chain centres (see table 1);

c) any other marking as agreed between the purchaser and the manufacturer.

4.6 General inspection

For the purpose of witnessing the specified tests and inspecting the testing machines and methods of examination, the inspector shall be given access to the relevant parts of the works of the manufacturer at all reasonable times.

5 Sprocket ring and barrel

5.1 Dimensions

Drive sprocket rings as shown in figure 2 shall comply with the dimensions and tolerances stated in table 2. The compatibility between chain and sprocket shall be verified by methods agreed between the purchaser and the manufacturer (see note to 4.3).

5.2 Construction

Drive sprocket rings shall comply with one of the following methods of construction:

a) cast in one piece;

b) machined from the solid;

c) a pair of forged or cast inner and outer half rings.

Radial alignment between the profiles of the sprocket teeth of each ring in the finished drive sprocket assembly shall be within 1 mm measured at the centreline of the chain.

5.3 Design and materials

The selection of materials, any heat treatment and the method of construction shall be agreed between the purchaser and the manufacturer.

Table 1 — Sprocket assemblies and corresponding chain centres

Dimensions in millimetres

Nominal size and pitch of chain	Nominal dimension of chain centres [1], $A \pm 1$					
14 × 50	350	400	500			
18 × 64	400	500	600	650	700	
22 × 86	450	500	600	650	700	750
24 × 86	600					
24 × 87,5	600					
26 × 92	500	600	650	700	800	

1) See figure 1.

NOTE — These chain centres correspond to the nominal chain centres specified in ISO 5612.

Other chains centres may be specified by agreement between the manufacturer and purchaser.

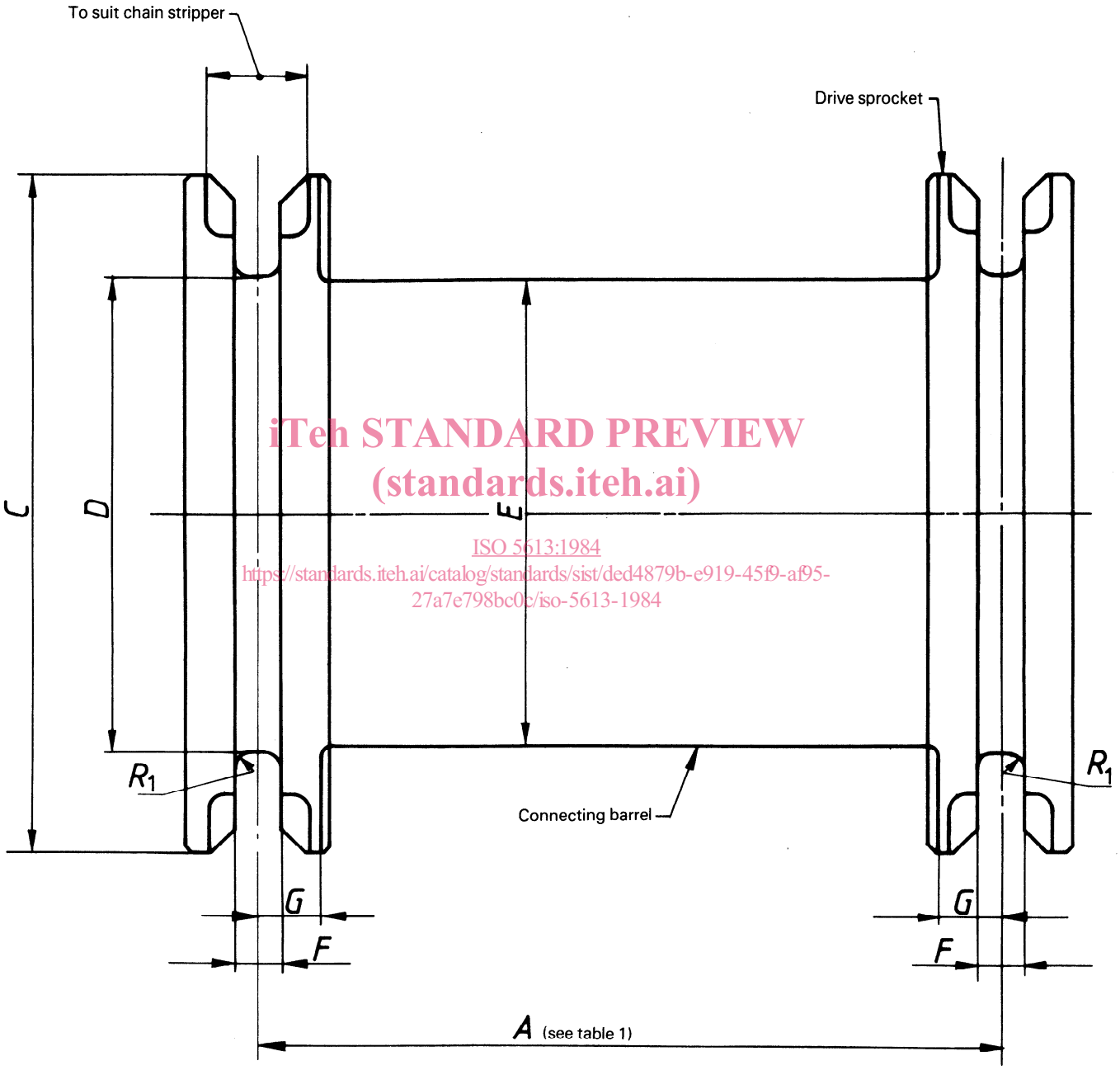
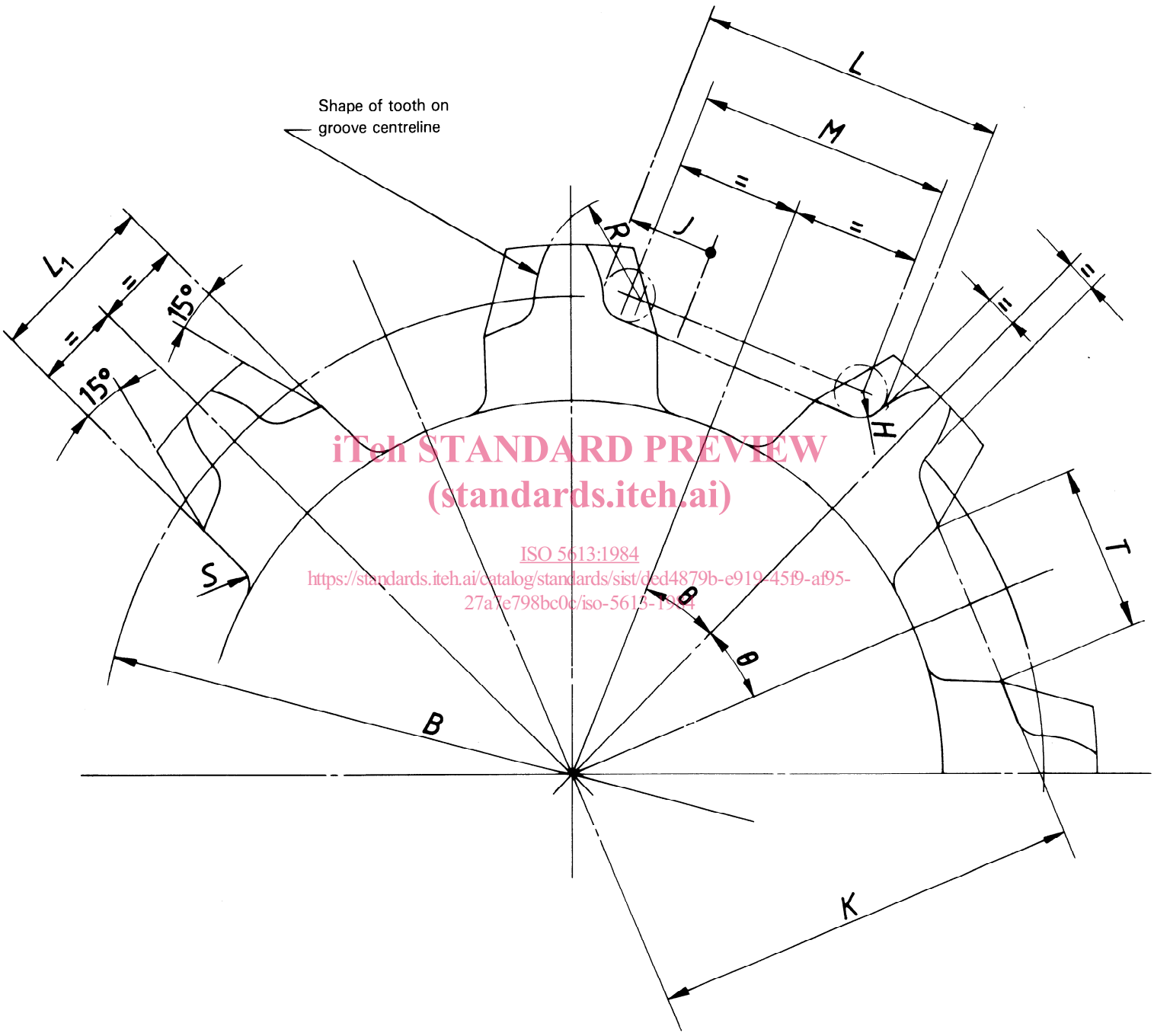


Figure 1 — Typical sprocket assembly



NOTE — See clause A.16 with reference to dimension *T*.

Figure 2 — Tooth profile

Table 2 — Sprocket dimensions

Dimensions in millimetres

Nominal size and pitch of chain	Number of sprocket teeth	Pitch circle diameter of sprocket	Overall diameter	Groove diameter	Barrel diameter	Groove width		Centreline of groove to inside face	Root radius		Pocket plan radius	Height from centre to bottom of pocket		Length of pocket		Tooth stub thickness	Pocket centres	Tooth flank radius	Groove radius	Tooth stub root radius
	N	B	C	D	E	F		G	H		J	K		L		L_1	M	R	R_1	S
			ref.	max.	max.	min.	tol.	max.	nom.	tol.	max.	nom.	tol.	nom.	tol.	max.	ref.	ref.	ref.	ref.
14 × 50	5	162	190	104	92	16,0	$^{+1,5}_{0}$	33	7	$^{+0,5}_{0}$	24	67,5	$^{0}_{-1,5}$	82	$^{+2}_{0}$	46	68	29	7	7
	6	193	221	136	126							84,5								
	7	225	253	168	159							101								
	8	256	284	201	192							117,5								
	9	288	316	232	224							133,5								
	10	320	348	263	256							149,5								
18 × 64	5	208	244	135	122	21,0	$^{+1,5}_{0}$	34	9	$^{+0,5}_{0}$	30	86,5	$^{0}_{-1,5}$	105	$^{+2}_{0}$	60	87	37	9	9
	6	248	284	176	165							108								
	7	288	324	216	207							129								
	8	328	364	257	249							150								
	9	369	405	298	291							171								
22 × 86	5	279	323	188	172	26,0	$^{+1,5}_{0}$	50	11	$^{+0,5}_{0}$	37	118	$^{0}_{-1,5}$	136	$^{+2}_{0}$	81	114	53	11	11
	6	333	377	243	229							146,5								
	7	387	431	298	286							175								
	8	441	485	353	342							203								
	9	495	539	408	398							231								
24 × 86	5	279	327	182	164	28,0	$^{+1,5}_{0}$	53	12	$^{+0,5}_{0}$	40	116,5	$^{0}_{-1,5}$	140	$^{+2}_{0}$	81	116	50	12	12
	6	333	381	237	222							145,5								
	7	387	435	291	278							173,5								
	8	441	489	346	335							202								
	9	495	543	400	390							229,5								
24 × 87,5	5	284	332	186	168	28,0	$^{+1,5}_{0}$	53	12	$^{+0,5}_{0}$	40	118,5	$^{0}_{-1,5}$	142	$^{+2}_{0}$	82	118	51,5	12	12
	6	339	387	242	227							148								
	7	394	442	298	285							177								
	8	449	497	353	342							205,5								
	9	504	552	409	399							234								
26 × 92	5	299	350	194	175	30,0	$^{+1,5}_{0}$	57	13	$^{+0,5}_{0}$	43	124,5	$^{0}_{-1,5}$	151	$^{+2}_{0}$	86	125	53	13	13
	6	356	408	252	236							155								
	7	414	466	311	297							185,5								
	8	472	524	369	357							215,5								
	9	530	582	428	417							245,5								

Annex

Design formulae

A.1 Pitch circle diameter (theoretical), B

The pitch circle diameter (PCD) is given by the equation

$$B = \left[\frac{P^2}{\sin^2 (\theta/2)} + \frac{d^2}{\cos^2 (\theta/2)} \right]^{1/2}$$

where

P is the nominal pitch of the chain link;

$$\theta = \frac{360°}{2N}$$

where N is the number of teeth in the sprocket;

d is the nominal diameter of the chain link material.

The value for B obtained shall be taken to the nearest lower whole number.

A.2 Overall diameter (reference), C

The overall diameter is given by the equation

$$C = B + 2d$$

NOTE — The actual diameter shall be agreed between the purchaser and the manufacturer.

A.3 Groove diameter, D

The groove diameter, D, is the diameter under the vertical chain links minus a diametral clearance.

The values given in table 1 are based on the following diametral clearances, in millimetres:

a) for a chain of 14 × 50 : 6

b) for a chain of 18 × 64 : 8

c) for a chain of 22 × 86 : 10

d) for a chain of 24 × 86 : 11

e) for a chain of 24 × 87,5: 11

f) for a chain of 26 × 92 : 12

NOTE — The actual diameter shall be agreed between the purchaser and the manufacturer.

A.4 Barrel diameter, E

The barrel diameter is given by the equation

$$E = 2K + d - 2x - 5$$

where

K is the height from the sprocket centre to the bottom of the pocket (see A.9);

x is the distance from the bolt centre to the bottom of the scraper bar.

This equation is based on a diametral clearance between the sprocket barrel and the scraper bar of 5 mm. The actual clearance may be reduced by agreement between the manufacturer and the purchaser.

A.5 Sprocket groove width, F

The sprocket groove width is given by the following equations:

a) for a 14 mm chain:
$F = d + 2,0$

b) for a 18 mm chain:
$F = d + 3,0$

c) for 22, 24 and 26 mm chains:
$F = d + 4,0$

A.6 Groove centreline to the inside face of the sprocket recess, G

The distance from the groove centreline to the inside face of the sprocket recess is given by the equation

$$G = b_t - (0,5e + 0,5V_u + 3,5)$$

where

b_t is the distance from the chain centre to the hole centre of the shackle connector;

e is the diameter of the nut across opposing corners;

V_u is the clearance between the bolt and hole of the shackle connector.

Dimension G shall be maintained in the vicinity of the nut and bolt only.

A.7 Root radius, H

The root radius is given by the equation

$$H = 0,5d$$

A.8 Pocket plan radius (nominal), J

The nominal pocket plan radius, J, is the maximum outer radius of the shackle connector, measured on a line $K + 0{,}5d$ from the sprocket centreline.

NOTE — If a working clearance is required it will be provided by agreement between the purchaser and the manufacturer.

A.9 Height from the sprocket centre to the bottom of the pocket, K

The height from the sprocket centre to the bottom of the pocket is given by the equation

$$K = 0{,}5 \left[\frac{P}{\tan(\theta/2)} - d \tan(\theta/2) \right] - 0{,}5d$$

The values for K obtained shall be taken to the nearest half millimetre.

A.10 Length of pocket, L

The length of pocket is given by the equation

$$L = 1{,}075\,P + 2d$$

A.11 Tooth stub thickness (reference dimension only), L_1

The tooth stub thickness is given by the equation

$$L_1 = (2K + d) \sin\theta - M \cos\theta + d$$

where M gives the centres of the pockets (see clause A.12).

A.12 Pocket centres (reference), M

The pocket centres are given by the equation

$$M = 1{,}075\,P + d$$

A.13 Tooth flank radius (reference), R

The tooth flank radius is given by the equation

$$R = P - 1{,}5d$$

The radius shall be measured from a line which is a distance $K + 0{,}5d$ from the sprocket centreline.

A.14 Groove radius, R_1

The groove radius is given by the equation

$$R_1 = 0{,}5d$$

A.15 Radius at the root of the tooth stub, S

The radius at the root of the tooth stub is given by the equation

$$S = 0{,}5d$$

A.16 Pocket gap, T

Sprockets complying with this International Standard provide adequate support for the links in the pockets and clearance for connectors and scraper bars, by specifying maximum values for L_1. However, for certain heavy duty drives, it may be necessary to increase the link-bearing surfaces.

In such cases, dimension T may be introduced and specified, with overriding, resultant adjustments to the value L_1, subject to agreement between the purchaser and manufacturer.