MOTION & CONTROL

NSK

Roll unit bearings for tension levelers

Backup roll unit bearings
Work roll · intermediate roll unit bearings

Roll unit bearings made from the newly developed AWS material, have a substantially extended effective life and enhanced reliability. Contributing to rationalization of the high quality of the thin steel sheet manufacturing process and maintenance-free operation of the surface treatment line.

Epoch-making new unit bearings achieve simultaneously both low torque and high sealability. These bearings are a result of our comprehensive studies ranging from development of materials to grease in order to support advanced surface treatment lines.

High sealability, low torque, and long life

Backup roll unit bearings

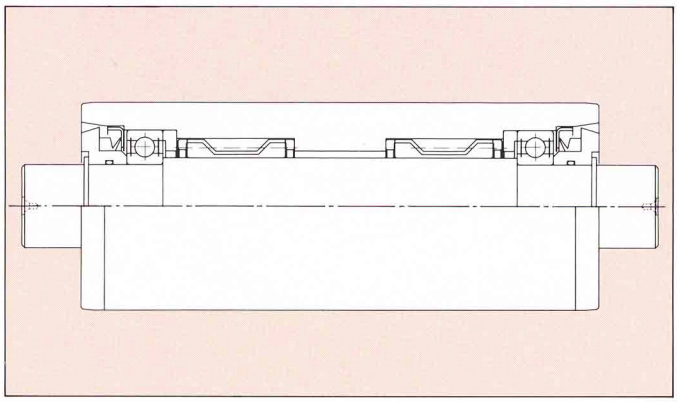
High-accuracy, high reliability

Work roll · intermediate roll unit bearings

Newly introduced are new unit bearings which are indispensable for rationalized production of high quality thin steel sheets and maintenance-free operation of surface treatment lines. Development of new material (AWS = Anti Wear Stainless Steel) guarantees long life as a roll material to be used in rolling oil and water. Substantial improvement of wear resistance through a special heat treatment and fruitful results of other research and development activities have been incorporated into these bearings. These unit bearings for tension levelers are created from NSK's high level technological resources and experience and know-how on all facets of industrial machinery. These are new products superior in long life and high reliability.

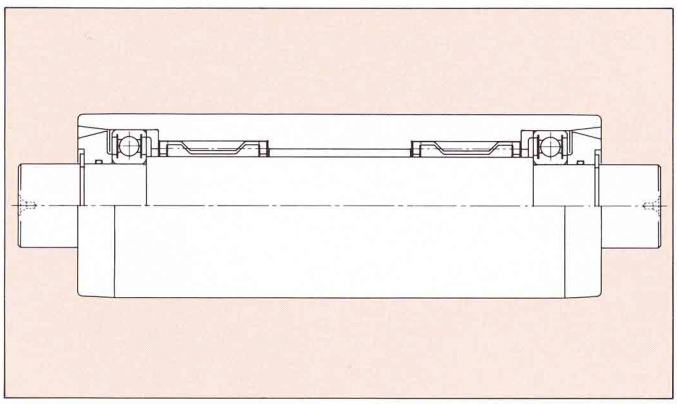
Backup roll unit bearings

Construction and specifications of standard backup rolls



Bearings used	Needle roller bearing+Deep groove ball bearing
Seal	Side seal+Labyrinth seal+Bearing seal
Line speed	0~400m/min
Standard size (mm) [35UMB63]	Roll dia. × Roll length × Overall length 75 × 155 × 205

Construction and specifications of high speed backup rolls (Low torque type)



Bearings used	Needle roller bearing+Deep groove ball bearing
Seal	Labyrinth seal + Bearing seal
Line speed	0~1500m/min
Standard size (mm) [40UMB30]	Roll dia. × Roll length × Overall length 75 × 215 × 264

Features

●Highly reliable seal construction

Since the bearing can be used in wet conditions with a large quantity of water and rolling oil, the seal structure consists of a labyrinth seal and side seal. This seal construction ensures high sealability.

●Low torque

Backup rolls are driven by frictional force between work rolls. Low torque is essential because large torque causes slip between rolls. The use of the newly developed seal construction guarantees low torque.

●Roll material AWS superior in corrosion and wear resistance

If rolls are used in an adverse environment exposed to rolling oil and water, then the roll surface may develop premature corrosion and wear. AWS (Anti Wear Stainless Steel), developed as a roll material, has achieved substantial improvement of corrosion and wear resistance.

●High performance grease

Grease, superior in durability and water resistance, is filled to an adequate quantity to ensure longer, maintenance-free operation.

●Increase in the roll strengh

The needle roller bearings are used to secure the roll thickness within the limited roll dimensions and to enhance the roll strength.

●Appropriate crowning

The backup rolls are provided with adequate crowning to prevent damage on the work roll surface under edge load.

●Roll surface roughness

The surface roughness of the backup roll has been improved to prevent surface damage of the work roll.

●High precision roll runout

As the backup rolls are divided, the roll height difference has been minimized to ensure even load distribution among rolls, thereby suppressing roll runout.

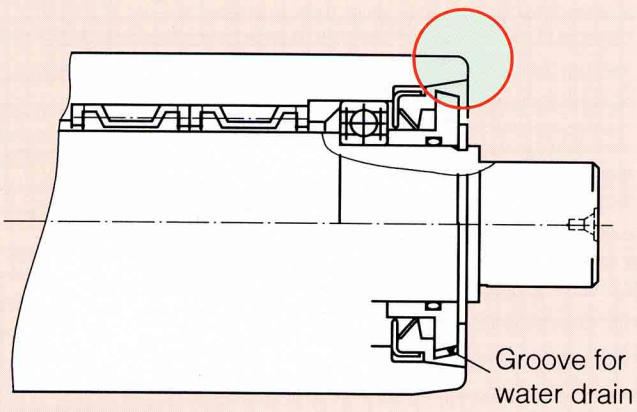
Backup roll unit bearings

NSK's newly developed seal (Utility model pending S62-004422)

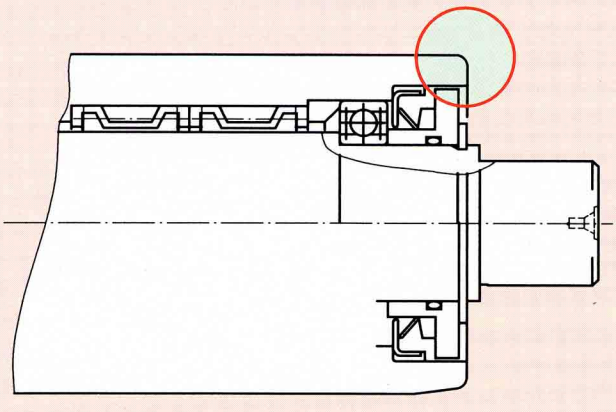
Low torque and sealability are features required in backup rolls and have a contrary relationship.

The use of our newly developed seal construction has resolved such problems.

Newly developed seal contruction

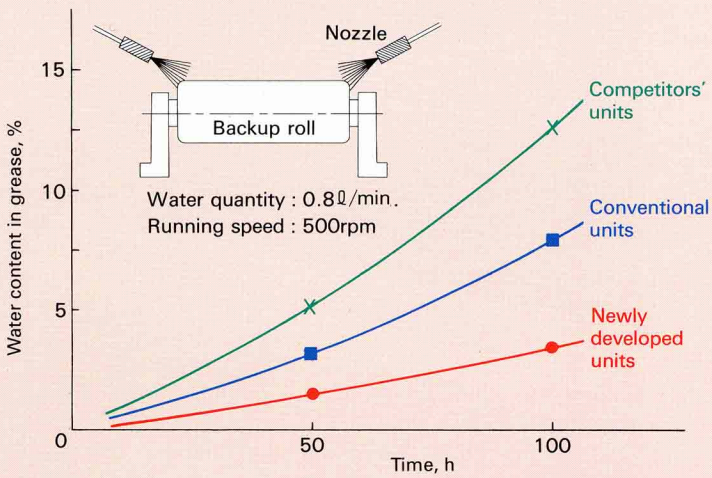


Conventional seal construction

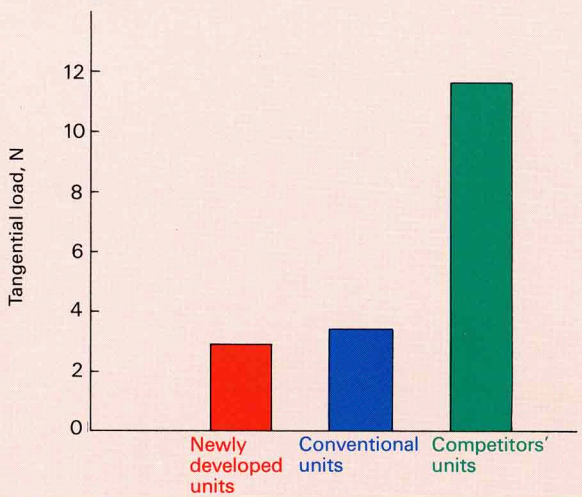


Remarks Regarding the boundary dimensions, please refer to the dimension table in Pages 5 and 6.

Seal performance test



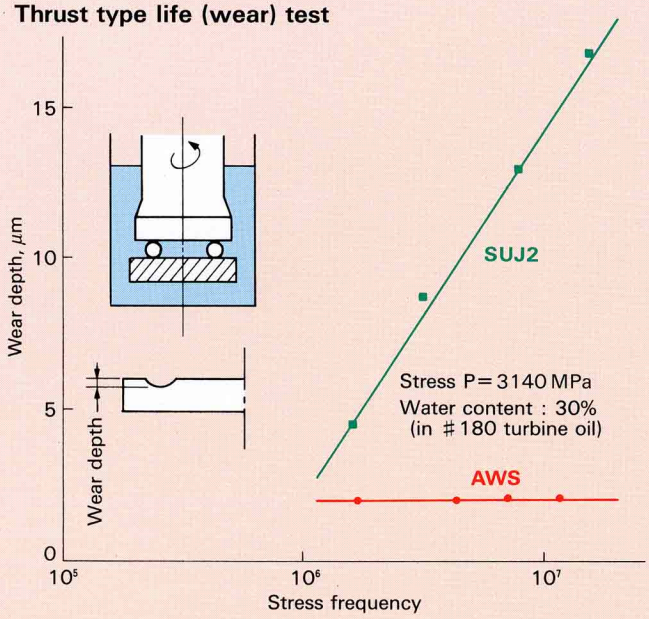
Starting torque test



NSK's newly developed roll material AWS (Anti Wear Stainless Steel)

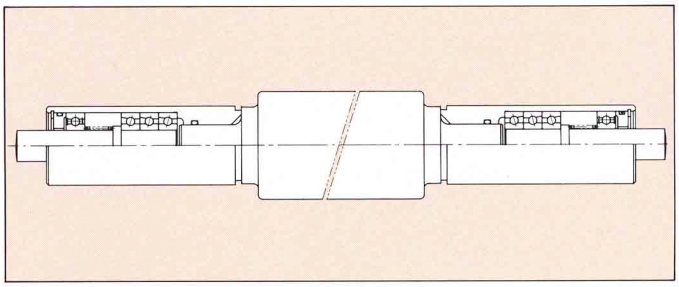
The use of newly developed AWS has achieved substantial improvement of corrosion resistance. Special heat treatment to enhance the hardness of the roll surface layer has achieved substantially improved wear resistance.

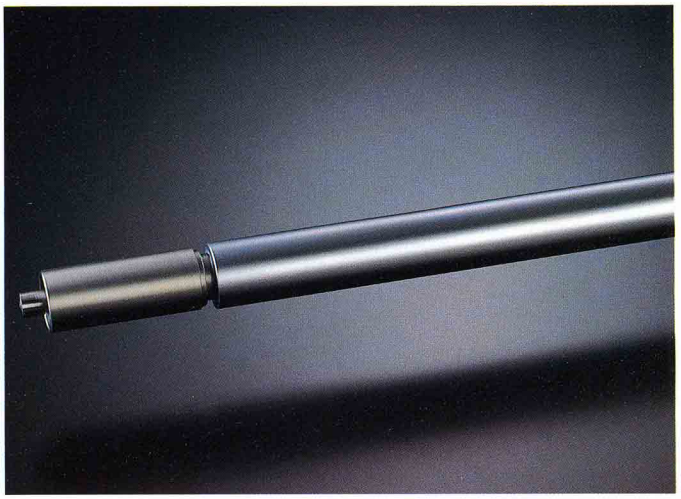
Thrust type life (wear) test



Work roll·intermediate roll unit bearings

Construction and specifications of work roll·intermediate roll units





Bearings used	Combined angular contact ball bearings+Deep groove ball bearing
Seal	Labyrinth seal + Bearing seal
Line speed	0~1500m/min
Standard size (mm) [12UMB08+WX3015]	Roll dia. × Roll length × Overall length 30 × 1530 × 1730

Features

●High precision roll runout

Small diameter and long roll with high running accuracy.

●High load capacity

Multi-row angular-contact ball bearings are used to increase the load capacity.

●High performance grease

Filling of an adequate quantity of grease, which is superior in durability and water resistance, has enabled an extension of maintenance-free operation.

●Roll surface roughness

To prevent surface damage of the products, the surface roughness of the work roll has been improved.

●High sealability

The labyrinth seal and seal in the deep groove ball bearings have achieved the high sealability.

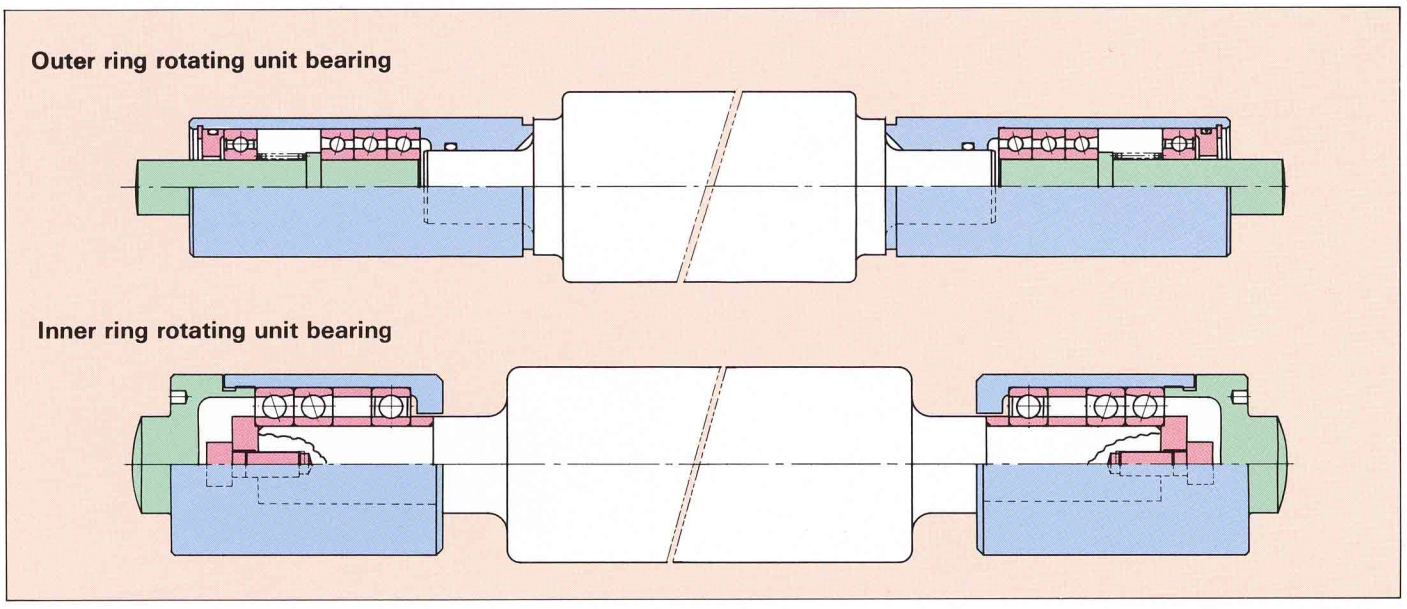
●Low torque

Low torque angular contact and deep groove ball bearings are used with low torque grease.

●Corrosion resistant thrust block

Rolls exposed to rolling oil and water, result in rusting of the thrust block. Stainless steel has been used to enhance corrosion resistance and ensure longer life.

Inner ring and outer ring rotating unit bearings



●Handling of the thrust blocks

The thrust blocks color-identified in the figure above are also available as a single unit. For boundary dimensions, refer to the dimension table in Pages 7 and 8.

Please contact NSK for details.

●Re-grinding service

High performance, small diameter, and high accuracy work units with high speed thrust blocks on both sides are easy to handle. We offer after-sales care by providing a re-grinding service.

The same service is available for backup rolls.

Standard re-grinding amount : 0.1mm

Standard number of re-grinds : 3~4times

Note that the re-grinding amount and times may be modified depending on the state of the roll surface.

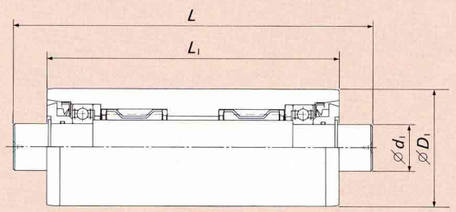
Backup roll unit bearings

Composition of bearing numbers

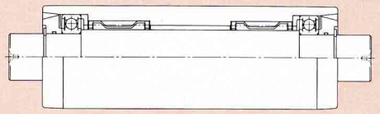
25 UMB 02

- 25 — Bearing bore dia.
- UMB — Special unit
- 02 — Serial number

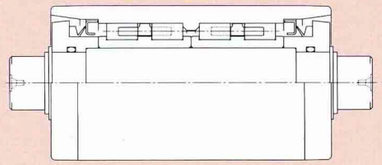
Type1



Type2

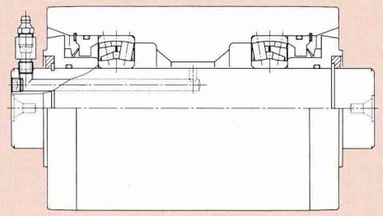


Type3



Type4

Type5



Unit bearing numbers	Type	Boundary dimensions (mm) D_1	L	L_1	d_1
25UMB02	4	63.5	189	140	22.085
25UMB03	4	63.5	150.5	101.5	22.085
25UMB12	4	63.5	189.5	139.5	22.000
25UMB13	4	63.5	151	101	22.000
25UMB14	4	63.5	140	90	22.000
27UMB07	1	50.0	163	135	22.000
27UMB08	1	50.0	213	185	22.000
30UMB04	2	65.0	173	140	22.000
30UMB05	2	65.0	261	228	22.000
34UMB23	3	75.0	264	215	26.000
34UMB24	3	75.0	359	310	26.000
35UMB42	1	63.0	214	173	22.000
35UMB43	1	63.0	321	280	22.000
35UMB63	1	75.0	205	155	30.000
35UMB64	1	75.0	308	258	30.000
40UMB08	3	90.0	218	170	31.000
40UMB09	3	90.0	328	280	31.000
40UMB21	1	75.0	230	180	30.000
40UMB22	1	75.0	342	292	30.000
40UMB30	2	75.0	264	215	26.000
40UMB31	2	75.0	359	310	26.000
44UMB08	2	75.0	215	170	30.000
44UMB09	2	75.0	310	265	30.000
55UMB11	5	140.0	249	200	55.000
55UMB12	5	140.0	349	300	55.000
60UMB11	1	101.0	246	206	45.000
60UMB12	1	101.0	354	314	45.000
80UMB04	1	130.0	513	450	69.500
80UMB05	1	130.0	328	265	69.500

Basic load ratings (N) C_rH	$C_{or}H$	(kgf) C_rH	$C_{or}H$	Allowable speed (rpm)	Mass approx (kg)	(lb)
22 800	15 700	2 320	1 600	6 000	3.3	7.3
22 800	15 700	2 320	1 600	6 000	2.5	5.5
22 800	15 700	2 320	1 600	6 000	2.3	5.1
22 800	15 700	2 320	1 600	6 000	3.2	7.0
22 800	15 700	2 320	1 600	6 000	2.1	4.6
89 000	143 000	9 100	14 600	6 000	1.9	4.2
89 000	143 000	9 100	14 600	6 000	2.6	5.7
107 000	171 000	10 900	17 500	7 300	3.3	7.3
107 000	171 000	10 900	17 500	7 300	5.4	11.9
147 000	234 000	15 000	23 900	4 100	6.5	14.3
147 000	234 000	15 000	23 900	4 100	9.1	20.0
87 000	165 000	8 900	16 800	4 900	3.9	8.6
87 000	165 000	8 900	16 800	4 900	6.3	13.9
119 000	184 000	12 100	18 700	4 500	5.0	11.0
119 000	184 000	12 100	18 700	4 500	8.5	18.7
141 000	208 000	14 400	21 200	4 500	6.8	15.0
141 000	208 000	14 400	21 200	4 500	10.5	23.1
136 000	237 000	13 900	24 200	4 100	4.8	10.6
136 000	237 000	13 900	24 200	4 100	8.3	18.3
136 000	237 000	13 900	24 200	5 700	7.4	16.3
136 000	237 000	13 900	24 200	5 700	10.6	23.3
133 000	294 000	13 600	30 000	5 700	5.6	12.3
133 000	294 000	13 600	30 000	5 700	8.7	19.1
209 000	285 000	21 300	29 100	2 700	21.2	46.6
209 000	285 000	21 300	29 100	2 700	32.5	71.5
229 000	450 000	23 300	46 000	3 000	11.9	26.2
229 000	450 000	23 300	46 000	2.700	18.2	40.0
315 000	825 000	32 000	84 000	2 600	42.8	94.2
261 000	695 000	26 600	71 000	2 600	26.0	57.2

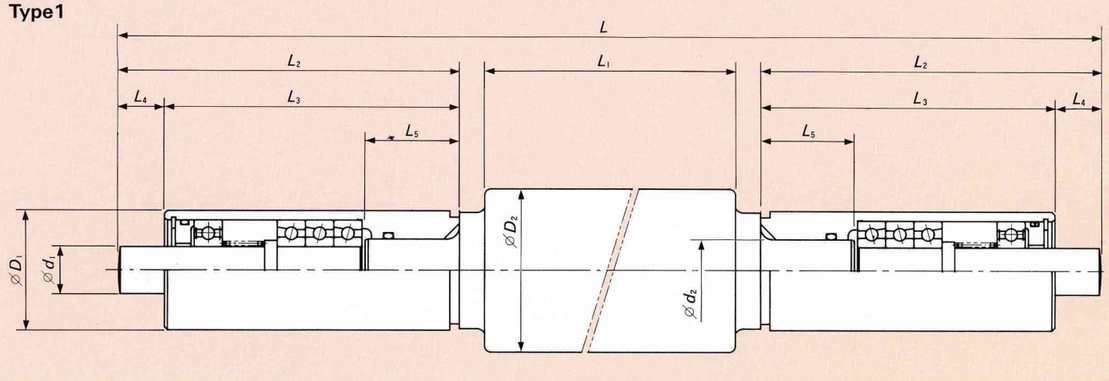
Work roll·intermediate roll unit bearings

Composition of bearing numbers

8 UMB 04 + WX 2519

- 8 — Bearing bore dia.
- UMB — Special unit
- 04 — Serial number
- WX — Roll type: WX : Work roll; IX : Intermediate roll
- 25 — Roll barrel dia.
- 19 — Roll barrel length

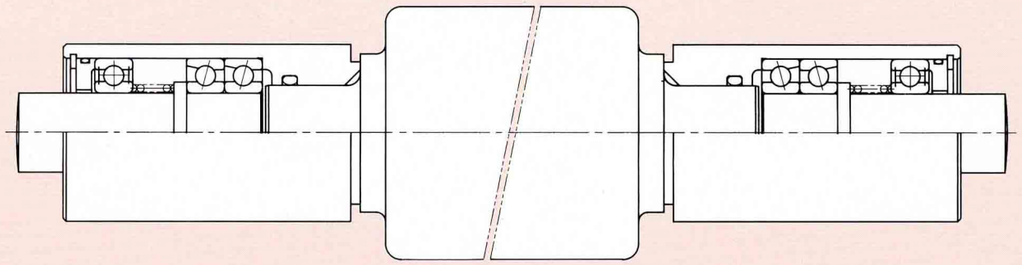
Type1



Unit bearing numbers	Type	Boundary dimensions (mm) d_1	D_1	D_2	L	L_1	d_2
8UMB04+WX2519 〔IX2519〕	2	8	26	25	2132	1900	15
8UMB05+WX3013 〔IX3013〕	1	8	26	30	1466	1250	15
10UMB10+WX2518 〔IX2518〕	2	10	24	25	2033.5	1800	10
12UMB08+WX3015 〔IX3015〕	2	12	28	30	1730	1500	18
12UMB17+WX3019 〔IX3019〕	2	12	32	30	2132	1900	20
12UMB22+WX3015 〔IX3015〕	1	12	32	30	1733.5	1500	18
15UMB02+WX4015 〔IX4015〕	2	15	38	40	1730	1500	22
15UMB08+WX4022 〔IX4022〕	1	15	38	40	2433.5	2200	20
15UMB14+WX4018 〔IX4018〕	1	15	38	40	2100	1850	22
25UMB23+WX8022 〔IX8022〕	2	25	56	80	2433.5	2200	30

Note: D_2, L, and L_1 are actual dimensions. Fabrication is made according to the user's request. Specify when ordering.

Type2



Boundary dimensions (mm) L_2	L_3	L_4	L_5	Allowable axial load (N)	{kgf}	Allowable speed (rpm)	Mass approx (kg)	{lb}
110	100	10	31	3 700	380	40 000	7.6	16.8
102	92	10	27	5 600	570	35 000	7.5	16.5
91.75	80	11.75	15	2 390	244	32 000	7.4	16.3
100	85	15	25	4 150	420	30 000	9.1	20.0
110	100	10	33	6 850	700	28 000	10.5	23.1
108.75	94	14.75	30	10 300	1 050	25 600	9.2	20.3
100	85	15	25	7 500	765	28 000	16.2	35.7
108.75	94	14.75	30	11 300	1 150	22 400	23.0	50.7
110	95	15	25	11 300	1 150	22 400	17.2	37.9
108.75	94	14.75	30	14 800	1 510	15 000	90.0	198.4

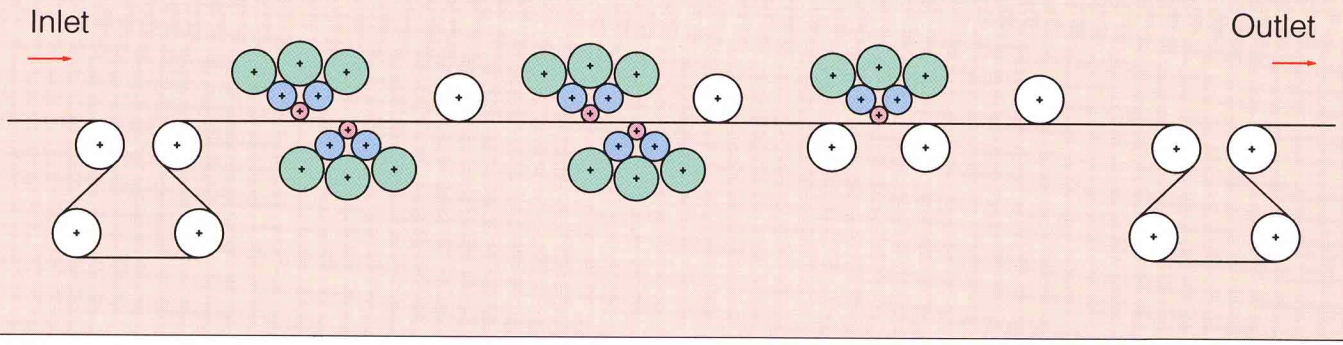
Note: Thrust block, work roll, and intermediate roll may be fabricated separately. Specify when ordering.

Roll unit bearings for tension levelers

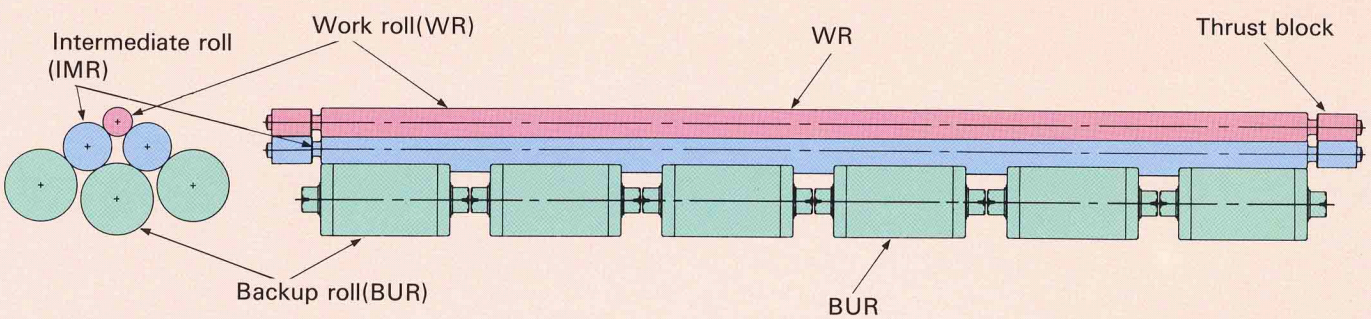
Outline of tension leveler

The leveler applies bending and tension simultaneously to original sheets to develop plastic elongation in order to straighten the material concerned (thin steel sheet) and to ensure uniform strip lengths. Normally, the elongation leveler has one block of three rows for one work roll, two intermediate rolls, and a few backup rolls.

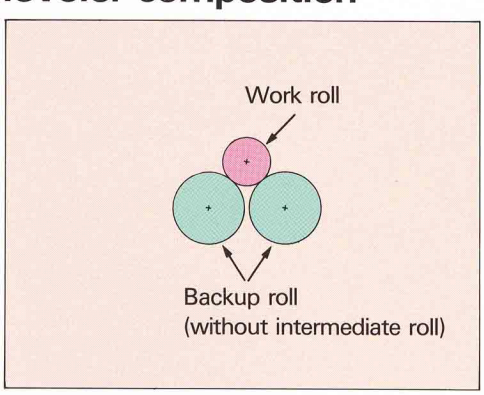
Line composition

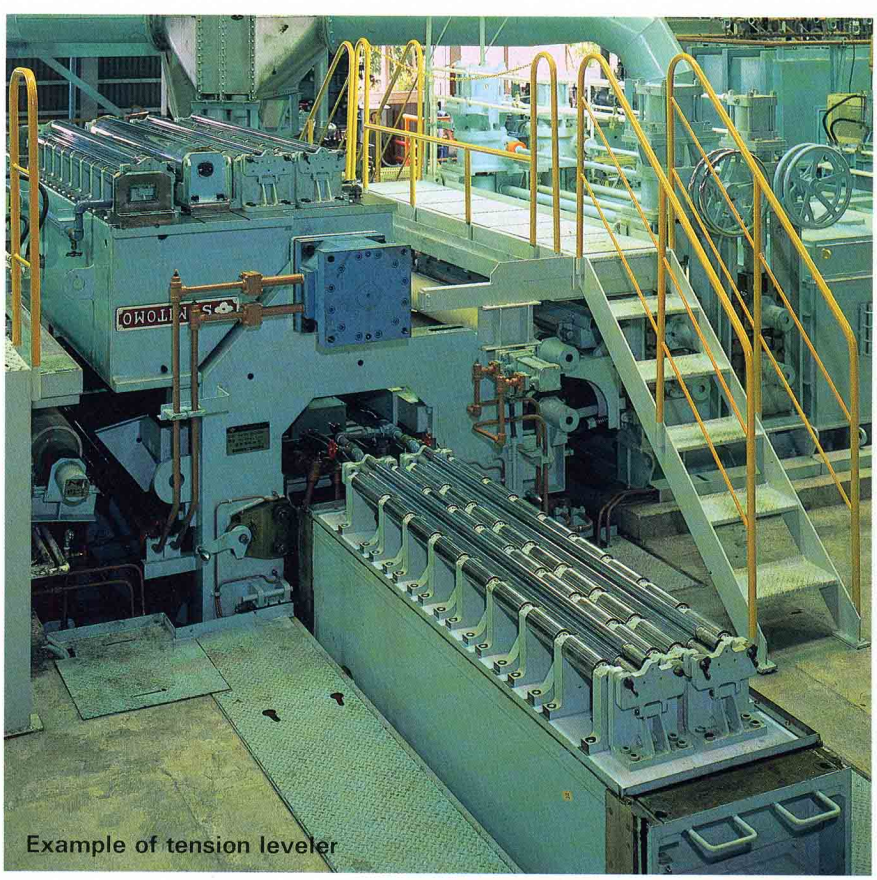


Leveler composition



Example of leveler composition

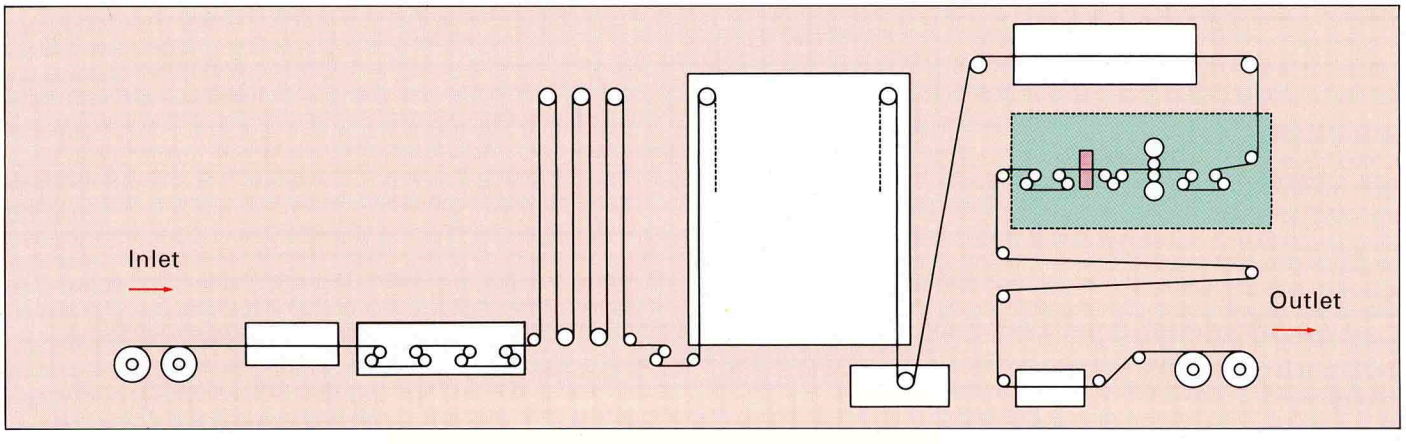




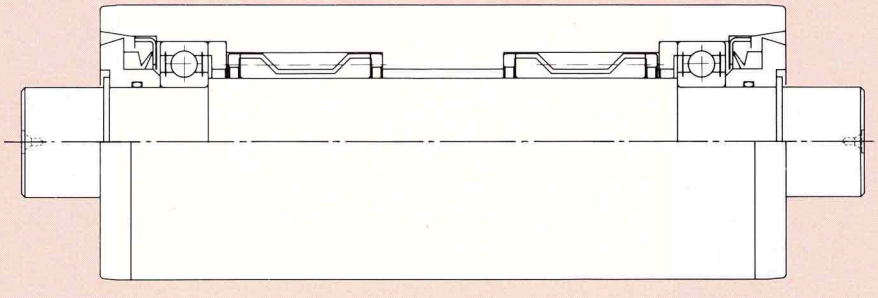
Example of tension leveler

Typical unit bearings for tension levelers

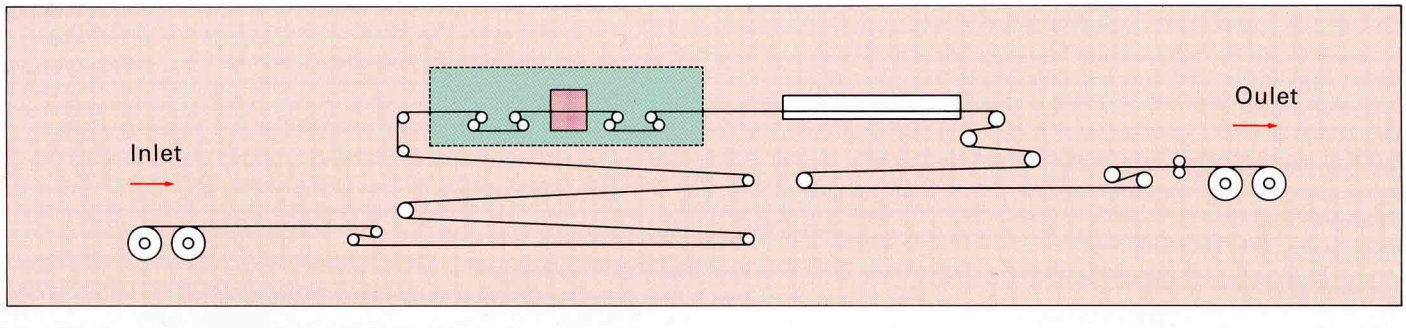
Galvanizing line



35UMB63



Continuous pickling line



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