MIL-STD-421A
4 December 1967

SUPERSEDING
MIL-STD-421
4 April 1958

MILITARY STANDARD

CHAIN, ROLLER; POWER TRANSMISSION AND CONVEYOR, FLAT LINK PLATES; BASE PITCH, SINGLE AND MULTIPLE STRAND; CONNECTING LINKS AND ATTACHMENT LINKS

FSC 3020

DEPARTMENT OF DEFENSE

WASHINGTON, D. C. 20301

Chain, Roller; Power Transmission and
Conveyor, Flat Link Plates; Base Pitch,
Single and Multiple Strand; Connecting
Links and Attachment Links

MIL-STD-421A

1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions or deletions should be addressed to the Commanding Officer, U. S. Army Mobility Equipment Command, Research Development, and Engineering Directorate. ATTN: SMEFB-RDE-KM Fort Belvoir, Virginia 22060.

FOREWORD

The American Standards Association Sectional Committee B29, Transmission Chain, Sprockets and Cutters was organized in 1924, redesignated the United States of America Standards Institute in 1966. The USA Standard B29.1 Transmission Roller Chains and Sprocket Teeth, and B29.5 Attachments for Roller Chains represents many years of study and research. Prior to organizing sectional committees the original design of precision roller chains dates back to the 1890's, although various types of drive chains have been used for centuries.

Chain attachments have been in use for many years with numerous configurations and applications, however, the attachments were not interchangeable from one manufacturers chain to another, restricting the user to one source of supply. The need for standardization of dimensions and tolerances to accomplish interchangeability for attachments for roller chain was reviewed and a subcommittee of the Roller Chain Technical Committee of the Association was established in 1947 to propose standards that would obtain interchangeability. The result of this work was reviewed and approved by the sectional committee B29.

USA B29.1 is broad in scope, covering base pitch single and multiple strand chains of straight link design, lending themselves to a great number of transmission conveying useage.

USA B29.5 Attachments for Transmission Roller Chains are modifications of standard chain components to adapt chains for use in conveying, elevating and timing operations. The components most commonly modified are the pin link plate, roller link plate and chain pin.

The developed standards, USA B29.1 and USA B29.5 insure physical and functional interchangeability, with very few exceptions. The uses for industry and the Government are identical.

CONTENTS

FIGURES

TABLES

1. SCOPE

1.1 Coverage. This is a design standard covering type 1 RC, Chain, Roller: Power Transmission and Conveyor, Flat Link Plates; Base Pitch, Single and Multiple Strand and Connecting Links (CL) and Attachment Links.

1.2 Application. Chains and components covered by this standard and possessing technical characteristics as given shall be installed on all new equipment where such types are applicable. This standard does not apply to equipment presently in the military supply system, except as technical characteristics will permit. This standard, however, shall be used for chain replacement.

2. REFERENCED DOCUMENTS

2.1 The issue of the following documents in effect on date of invitation for bids form a part of this standard to the extent specified herein.

GOVERNMENTAL SPECIFICATION

Military Specification

MIL-C-52058 - Chains, Roller; Power Transmission and Conveyor.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

NONGOVERNMENTAL STANDARDS

UNITED STATES OF AMERICA STANDARDS INSTITUTE

USA B29.1 Transmission Roller Chains and Sprocket Teeth.
USA B29.5 Attachments for Transmission Roller Chains.

(Application for copies should be addressed to the United States of America Standards Institute, 10 East 40th Street, New York, N. Y. 10016.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. DEFINITIONS

3.1 All military and USA chain numbers referenced herein are based on chain numbers of USA B29.1 and attachment numbers from USA B29.5.

4. GENERAL REQUIREMENTS

Not applicable.

5. DETAILED REQUIREMENTS

5.1 Requirements and technical characteristics shall be as specified on pages 4 through 14 of this standard and MIL-C-52058.

Custodians:

Army - ME
Navy - YD

Review activity:

Navy - YD

User activities:

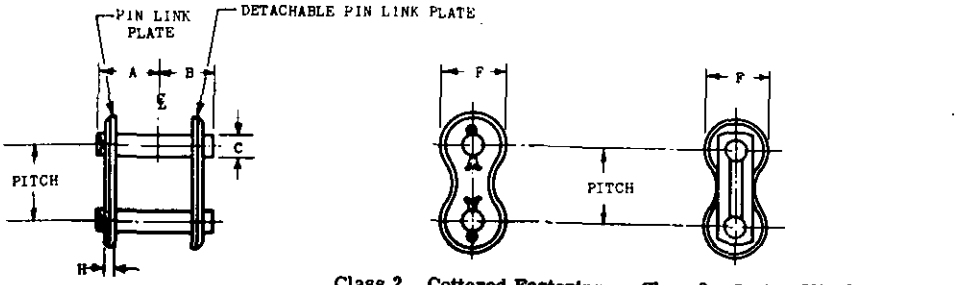
Army - AT
Navy - SH

Preparing activity:

Army - ME

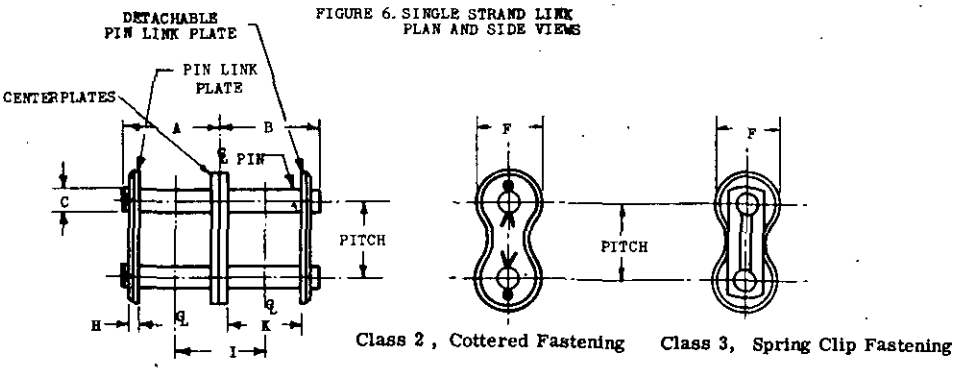
Code "C"

Project No. 3020-0048



Class 2, Cottered Fastening Class 3, Spring Clip Fastening

FIGURE 6. SINGLE STRAND LINK PLAN AND SIDE VIEWS



Class 2, Cottered Fastening Class 3, Spring Clip Fastening

FIGURE 7. MULTIPLE STRAND LINK PLAN AND SIDE VIEWS

LEGEND:

A = Nominal distance from pin head to center line.
B = Nominal distance from pin end to center line.
C = Nominal diameter of pin.
E = Nominal chain width between roller link plates, dimension used here for determining distance between pin link plates and transverse pitch.
F = Maximum width of pin link plates.
H = Nominal thickness of link plates.
I = Transverse pitch.
K = Minimum distance between pin link plates.

REQUIREMENTS:

1. Tolerances:
   Maximum A = A + 0.020
   Maximum B = B + 0.020
   Maximum C = C + 0.0005
   Nominal I = E + (4.22 x H)
   Minimum K = E + (2.12 x H) + 0.002
2. Grade A, carbon and alloy steel-connecting links.
3. Grade B, Austenitic steel-corrosive resistant connecting links.
4. Grade C, Martensitic steel - corrosive resistant - magnetic - connecting links.
5. Type 2, connecting links, Grades B and C, for USA chain numbers 35 through 80 shall be provided with Class 2, cottered fastening, with two cotters as shown in figures 6 and 7 above.

NOTES:

1. See Table III for dimensions.
2. All dimensions are in inches.
3. Type 2 connecting links, Grade A, for USA chain number 25 through 50 supplied with Class 3, spring clip fastening.
4. Type 2 connecting links, Grade A, for USA chain numbers 60 through 240 supplied with Class 2, cottered fastening. Class 2, cottered fastening may consist of a single cotter through pin holes, *or a double cotter as shown in figures 6 and 7 above, positioned at the option of the manufacturer.*
5. Dash numbers (e.g. -2) affixed to USA Chain numbers (e.g. 40-2) indicate number of strands.

TYPE 2CL, LINK CONNECTING, ROLLER CHAIN: POWER TRANSMISSION AND CONVEYOR, FLAT LINK PLATES, BASE PITCH, SINGLE AND MULTIPLE STRANDS X962

TABLE III

TYPE 2CL, LINK CONNECTING, ROLLER CHAIN: POWER TRANSMISSION AND CONVEYOR, FLAT LINK PLATES, BASE PITCH, SINGLE AND MULTIPLE STRANDS

MIL-STD CONNECTING LINK NUMBER	LINK FOR U. S. A. CHAIN NUMBER	PITCH	MINIMUM ULTIMATE TENSILE STRENGTH POUNDS	APPROX WT/FT POUNDS	NOMINAL WIDTH A	NOMINAL WIDTH B	PIN DIA C NOM.	WIDTH E NOM.	LINK PLATES WIDTH F MAX.	LINK PLATES THICK H NOM.	GRADE
25-1RC-2CL-A	25	1/4	780	0.01	0.16	0.19	.0905	.125	.205	.030	A
35-1RC-2CL-A	35		1,760	0.01	0.24	0.34					A
35-1RC-2CL-B	35		1,450	0.01	0.24	0.34					B
35-1RC-2CL-C	35	3/8	1,450	0.01	0.24	0.34	.141	.187	.307	.050	C
35-2-1RC-2CL	35-2		3,520	0.02	0.44	0.50					A
35-3-1RC-2CL	35-3		5,280	0.02	0.64	0.70					A
35-4-1RC-2CL	35-4		7,040	0.03	0.84	0.90					A
40-1RC-2CL-A	40		3,125	0.02	0.33	0.42					A
40-1RC-2CL-A	40		2,600	0.02	0.33	0.42					B
40-1RC-2CL-C	40	1/2	2,600	0.02	0.33	0.42	.156	.312	.418	.060	C
40-2-1RC-2CL	40-2		6,250	0.03	0.61	0.68					A
40-3-1RC-2CL	40-3		9,375	0.05	0.90	0.97					A
40-4-1RC-2CL	40-4		12,500	0.07	1.18	1.25					A
41-1RC-2CL-A	41		1,500	0.01	0.28	0.37					A
41-1RC-2CL-B	41	1/2	1,450	0.01	0.28	0.37	.141	.250	.340	.050	B
41-1RC-2CL-C	41		1,450	0.01	0.28	0.37					C
50-1RC-2CL-A	50		4,880	0.04	0.41	0.48					A
50-1RC-2CL-B	50		4,100	0.04	0.41	0.48					B
50-1RC-2CL-C	50		4,100	0.04	0.41	0.48					C
50-2-1RC-2CL	50-2	5/8	9,760	0.07	0.76	0.84	.200	.375	.512	.080	A
50-3-1RC-2CL	50-3		14,640	0.12	1.12	1.20					A
50-4-1RC-2CL	50-4		19,520	0.15	1.48	1.55					A
50-5-1RC-2CL	50-5		24,400	0.18	1.84	1.91					A
50-6-1RC-2CL	50-6		29,280	0.21	2.19	2.27					A
60-1RC-2CL-A	60		7,050	0.06	0.51	0.64					A
60-1RC-2CL-B	60		5,900	0.06	0.51	0.64					B
60-1RC-2CL-C	60		5,900	0.06	0.51	0.64					C
60-2-1RC-2CL	60-2	3/4	14,100	0.13	0.96	1.07	.234	.500	.615	.094	A
60-3-1RC-2CL	60-3		21,150	0.19	1.40	1.52					A
60-4-1RC-2CL	60-4		28,200	0.25	1.85	1.97					A
60-5-1RC-2CL	60-5		35,250	0.32	2.30	2.42					A
60-6-1RC-2CL	60-6		42,300	0.38	2.75	2.89					A
80-1RC-2CL-A	80		12,500	0.14	0.64	0.79					A
80-1RC-2CL-B	80		10,500	0.14	0.64	0.79					B
80-1RC-2CL-C	80		10,500	0.14	0.64	0.79					C
80-2-1RC-2CL	80-2	1--	25,000	0.27	1.23	1.37	.312	.625	.820	.125	A
80-3-1RC-2CL	80-3		37,500	0.41	1.81	1.95					A
80-4-1RC-2CL	80-4		50,000	0.56	2.39	2.52					A
80-5-1RC-2CL	80-5		62,500	0.68	2.96	3.10					A
80-6-1RC-2CL	80-6		75,000	0.82	3.54	3.67					A
100-1RC-2CL	100		19,500	0.28	0.79	0.95					A
100-2-1RC-2CL	100-2	1-1/4	39,000	0.54	1.50	1.65	.375	.750	1.025	.156	A
100-3-1RC-2CL	100-3		58,500	0.81	2.20	2.36					A
100-4-1RC-2CL	100-4		78,000	1.08	2.91	3.06					A
120-1RC-2CL	120		28,100	0.50	0.98	1.15					A
120-2-1RC-2CL	120-2	1-1/2	56,200	0.99	1.88	2.05	.437	1.000	1.230	.187	A
120-3-1RC-2CL	120-3		84,300	1.38	2.78	2.94					A
120-4-1RC-2CL	120-4		112,400	1.84	3.68	3.84					A
140-1RC-2CL	140		38,300	0.76	1.06	1.27					A
140-2-1RC-2CL	140-2	1-3/4	76,600	1.47	2.03	2.23	.500	1.000	1.435	.219	A
140-3-1RC-2CL	140-3		114,900	2.00	3.00	3.19					A
140-4-1RC-2CL	140-4		153,200	2.92	3.95	4.15					A
160-1RC-2CL	160		50,000	1.13	1.27	1.47					A
160-2-1RC-2CL	160-2	2--	100,000	2.14	2.42	2.63	.562	1.250	1.640	.250	A
160-3-1RC-2CL	160-3		150,000	3.20	3.57	3.78					A
160-4-1RC-2CL	160-4		200,000	4.26	4.73	4.93					A
180-1RC-2CL	180		63,300	1.74	1.43	1.77					A
180-2-1RC-2CL	180-2	2-1/4	126,600	3.42	2.73	3.00	.687	1.406	1.845	.281	A
180-3-1RC-2CL	180-3		189,900	5.10	4.02	4.30					A
180-4-1RC-2CL	180-4		253,200	6.81	5.32	5.59					A
200-1RC-2CL	200		78,000	2.31	1.56	1.91					A
200-2-1RC-2CL	200-2	2-1/2	156,000	4.55	2.96	3.31	.781	1.500	2.050	.312	A
200-3-1RC-2CL	200-3		234,000	6.77	4.45	4.80					A
200-4-1RC-2CL	200-4		312,000	9.00	5.80	6.15					A
240-1RC-2CL	240		112,500	3.56	1.85	2.20					A
240-2-1RC-2CL	240-2	3--	225,000	7.12	3.58	3.93	.937	1.875	2.46	.375	A
240-3-1RC-2CL	240-3		337,500	10.68	5.31	5.66					A
240-4-1RC-2CL	240-4		450,000	14.24	7.04	7.38					A

X963

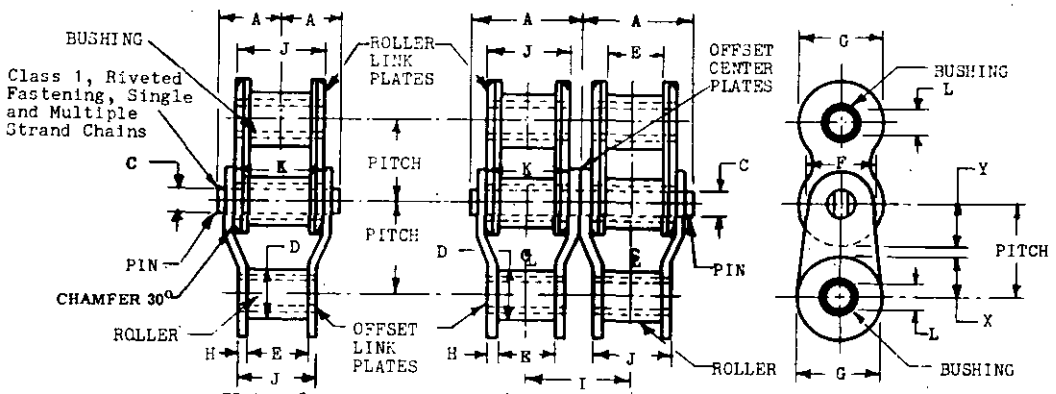


FIGURE 8
SINGLE STRAND LINK
PLAN VIEW

FIGURE 9
MULTIPLE STRAND LINK
PLAN VIEW

FIGURE 10
SIDE VIEW OF SINGLE
AND MULTIPLE STRAND LINK

LEGEND:

A = Nominal distance from pin head to center line of chain.
C = Nominal diameter of pin.
D = Nominal diameter of roller.
E = Nominal chain width between offset link plates at end where bushing is installed and nominal width between roller link plates.
F = Maximum width of offset link plate at end of plate where pin is installed.
G = Maximum width of offset link plate at end of plate where bushing is installed.
H = Nominal thickness of link plates.
I = Transverse pitch.
J = Maximum width of roller link and maximum width of offset link at end of link where bushing is installed.
K = Minimum distance between offset link plates.
L = Minimum hole in bushing.
X = Distance from center of bushing to point of offset.
Y = Distance from center of pin to point of offset.

REQUIREMENTS:

1. Tolerances;

Maximum A = A + 0.020	Minimum K = J + 0.002
Maximum C = C + 0.0005	Minimum L = C + 0.0015
Maximum D = Nominal D	Minimum X = 0.41 x pitch + 0.008
Nominal I = E + (4.22 x H)	Minimum Y = 0.475 x pitch + 0.008
Maximum J = E + (2.12 x H)	

2. Grade A, carbon and alloy steel - connecting links.
3. Grade B, Austenitic steel - corrosive resistant offset links.

NOTES:

1. See Table IV for dimensions.
2. All dimensions are in inches.
3. Type 3 connecting links for USA chain numbers 25 and 35 are rollerless.
4. Dash numbers (e.g. -2) affixed to USA chain numbers (e.g. 40-2) indicate number of strands.
5. Where type 3 offset links are required for use with Grade C chains, Grade B offset links may be used.

TYPE 3CL, LINK COMBINATION OFFSET, ROLLER CHAIN: POWER TRANSMISSION AND CONVEYOR, BASE PITCH, SINGLE AND MULTIPLE STRAND X964

TABLE IV

TYPE 3CL, LINK COMBINATION OFFSET, ROLLER CHAIN: POWER TRANSMISSION AND CONVEYOR BASE PITCH, SINGLE AND MULTIPLE STRAND

MIL-STD CONNECTING LINK NUMBER	LINK FOR U. S. A. CHAIN NUMBER	PITCH	MINIMUM ULTIMATE TENSILE STRENGTH POUNDS	APPROX WT/FT POUNDS	NOMINAL WIDTH	PIN DIA.	ROLLER DIA.	WIDTH	LINK PLATES			GRADE
									WIDTH		THICK	
					A	C NOM.	D NOM.	E NOM.	F MAX.	G MAX.	H NOM.	
25-1RC-3CL-A	25	1/4	780	0.01	0.16	.0905	.130	.125	.205	.238	.030	A
35-1RC-3CL-A	35	3/8	1,760	0.02	0.24	.141	.200	.187	.307	.356	.050	A
35-1RC-3CL-B	35		1,300	0.02	0.24							B
35-2-1RC-3CL	35-2		3,520	0.03	.435							A
35-3-1RC-3CL	35-3		5,280	0.04	.634							A
35-4-1RC-3CL	35-4		7,040	0.05	.834							A
40-1RC-3CL-A	40	1/2	3,125	0.04	0.33	.156	.312	.312	.410	.475	.060	A
40-1RC-3CL-B	40		2,350	0.04	0.33							B
40-2-1RC-3CL	40-2		6,250	0.06	0.61							A
40-3-1RC-3CL	40-3		9,375	0.10	0.90							A
40-4-1RC-3CL	40-4		12,500	0.14	1.18							A
41-1RC-3CL-A	41	1/2	1,500	0.02	0.28	.141	.306	.250	.340	.390	.050	A
41-1RC-3CL-B	41		1,300	0.02	0.28							B
50-1RC-3CL-A	50	5/8	4,880	0.08	0.41	.200	.400	.375	.512	.594	.080	A
50-1RC-3CL-B	50		2,350	0.08	0.41							B
50-2-1RC-3CL	50-2		9,760	0.14	0.76							A
50-3-1RC-3CL	50-3		14,640	0.24	1.12							A
50-4-1RC-3CL	50-4		19,520	0.30	1.48							A
50-5-1RC-3CL	50-5		24,400	0.36	1.84							A
50-6-1RC-3CL	50-6		29,280	0.42	2.19							A
60-1RC-3CL	60	3/4	7,050	0.12	0.51	.234	.469	.500	.615	.712	.094	A
60-2-1RC-3CL	60-2		14,100	0.26	0.96							A
60-3-1RC-3CL	60-3		21,150	0.38	1.40							A
60-4-1RC-3CL	60-4		28,200	0.50	1.85							A
60-5-1RC-3CL	60-5		35,250	0.64	2.30							A
60-6-1RC-3CL	60-6		42,300	0.76	2.75							A
80-1RC-3CL	80	1---	12,500	0.28	0.64	.312	.625	.625	.820	.950	.125	A
80-2-1RC-3CL	80-2		25,000	0.54	1.23							A
80-3-1RC-3CL	80-3		37,500	0.82	1.81							A
80-4-1RC-3CL	80-4		50,000	1.12	2.39							A
80-5-1RC-3CL	80-5		62,500	1.36	2.96							A
80-6-1RC-3CL	80-6		75,000	1.64	3.54							A
100-1RC-3CL	100	1-1/4	19,500	0.56	0.79	.375	.750	.750	1.025	1.188	.156	A
100-2-1RC-3CL	100-2		39,000	1.08	1.50							A
100-3-1RC-3CL	100-3		58,500	1.62	2.20							A
100-4-1RC-3CL	100-4		78,000	2.16	2.91							A
120-1RC-3CL	120	1-1/2	28,100	1.00	0.98	.437	.875	1.000	1.230	1.425	.187	A
120-2-1RC-3CL	120-2		56,200	1.98	1.88							A
120-3-1RC-3CL	120-3		84,300	2.76	2.78							A
120-4-1RC-3CL	120-4		112,400	3.68	3.68							A
140-1RC-3CL	140	1-3/4	38,300	1.52	1.06	.500	1.000	1.000	1.435	1.662	.219	A
140-2-1RC-3CL	140-2		76,600	2.94	2.03							A
140-3-1RC-3CL	140-3		114,900	4.00	3.00							A
140-4-1RC-3CL	140-4		153,200	5.84	3.96							A
160-1RC-3CL	160	2---	50,000	2.26	1.27	.562	1.125	1.250	1.640	1.900	.250	A
160-2-1RC-3CL	160-2		100,000	4.38	2.42							A
160-3-1RC-3CL	160-3		150,000	6.40	3.57							A
160-4-1RC-3CL	160-4		200,000	8.52	4.73							A
180-1RC-3CL	180	2-1/4	63,300	3.48	1.43	.687	1.406	1.406	1.845	2.137	.281	A
180-2-1RC-3CL	180-2		126,600	6.84	2.73							A
180-3-1RC-3CL	180-3		189,900	10.20	4.02							A
180-4-1RC-3CL	180-4		253,200	13.62	5.32							A
200-1RC-3CL	200	2-1/2	78,000	4.62	1.56	.781	1.562	1.500	2.050	2.375	.312	A
200-2-1RC-3CL	200-2		156,000	9.10	2.96							A
200-3-1RC-3CL	200-3		234,000	13.54	4.45							A
200-4-1RC-3CL	200-4		312,000	18.00	5.80							A
240-1RC-3CL	240	3---	112,500	8.12	1.85	.937	1.875	1.875	2.46	2.85	.375	A
240-2-1RC-3CL	240-2		225,000	16.24	3.58							A
240-3-1RC-3CL	240-3		337,500	24.36	5.31							A
240-4-1RC-3CL	240-4		450,000	32.48	7.04							A

X965

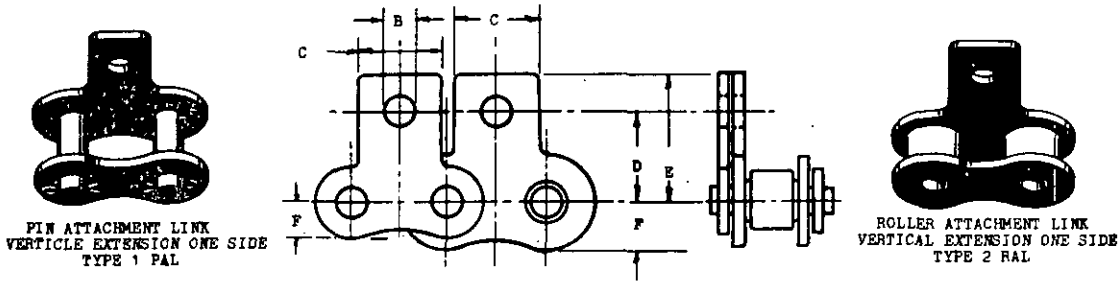


FIGURE 11

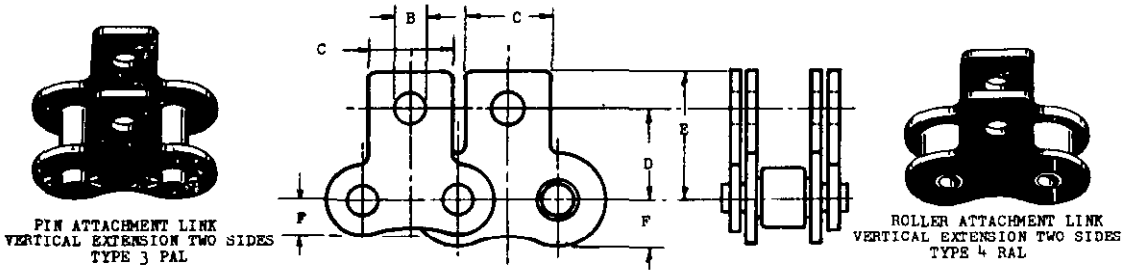


FIGURE 12

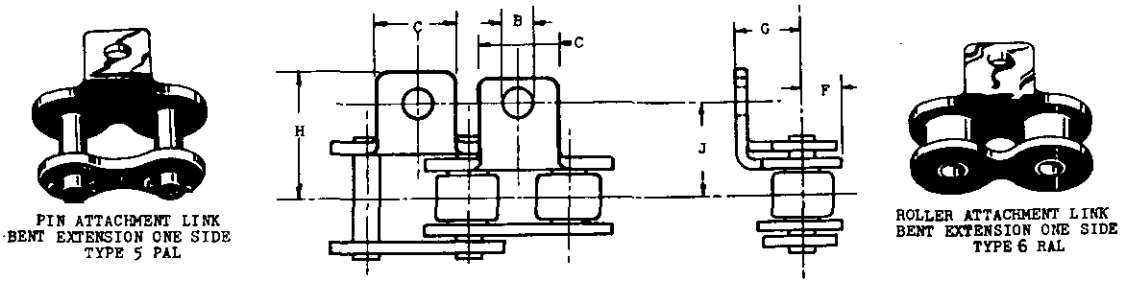
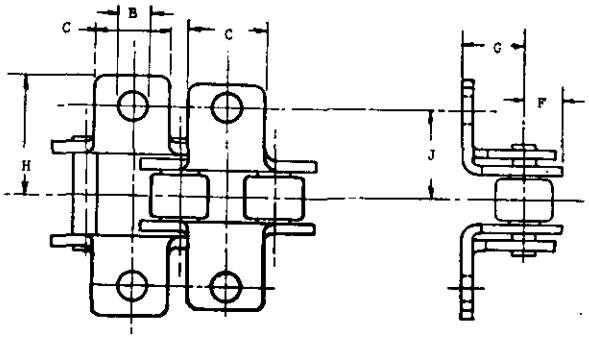


FIGURE 13

PIN AND ROLLER ATTACHMENT LINKS
FOR
TYPE 1 ROLLER CHAINS

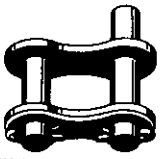
X966

PIN ATTACHMENT LINK
BENT EXTENSION TWO SIDES
TYPE 7 PAL

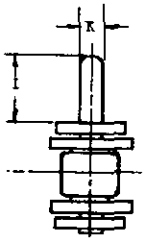


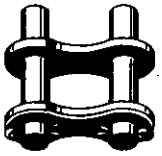
ROLLER ATTACHMENT LINK
BENT EXTENSION TWO SIDES
TYPE 8 RAL

FIGURE 14



PIN ATTACHMENT LINK
ONE EXTENDED PIN ONE SIDE
TYPE 9 PAL





PIN ATTACHMENT LINK
TWO EXTENDED PINS ONE SIDE
TYPE 10 PAL

FIGURE 15

TABLE V

USA CHAIN NUMBER	CHAIN PITCH	B* NOM.	C NOM.	D	E MAX.	F MAX.	G NOM.	H MAX.	I	J NOM.	K NOM.
35	3/8	3/32	5/16	3/8	37/64	0.178	1/4	35/64	3/8	3/8	.141
40	1/2	1/8	3/8	1/2	47/64	0.237	5/16	45/64	3/8	1/2	.156
50	5/8	3/16	1/2	5/8	1--1/32	0.297	13/32	15/16	15/32	5/8	.200
60	3/4	3/16	5/8	23/32	1-11/64	0.356	15/32	1--7/64	9/16	3/4	.234
80	1----	1/4	3/4	31/32	1-33/64	0.475	5/8	1--1/2	3/4	1----	.312
100	1-1/4	5/16	1----	1--1/4	1-29/32	0.594	25/32	1-55/64	15/16	1-1/4	.375
120	1-1/2	3/8	1-1/8	1--7/16	2--9/64	0.712	29/32	2-11/64	1--1/8	1-1/2	.437
140	1-3/4	7/16	1-3/8	1--3/4	2--3/4	0.831	1--1/8	2--5/8	1--5/16	1-3/4	.500
160	2----	1/2	1-1/2	2-----	3--7/32	0.950	1--1/4	3------	1--1/2	2----	.562

* Hole size will be larger than nominal size shown for bolt or rivet clearance

REQUIREMENTS:

1. With the exception of dimensions shown in table V, dimensions of link plates, rollers, bushing, and pins for attachment links shall conform to dimensions shown in table I for Type 1 Roller Chains.
2. Tolerances for attachment links are the same as tolerances shown for Type 1 Roller Chains.
3. Attachment links shall be grade A, (carbon and alloy steels) unless otherwise specified.
4. Attachment links carried in stock as separate supply items for USA chain Nos. 35 through 50 shall be supplied with Class 3, spring clip fastening and shall be so specified.
5. Attachment links carried in stock as separate supply items for USA chain Nos. 60 through 160 shall be supplied with Class 2, cotter fastening and shall be so specified.

NOTES:

1. For MILITARY STANDARD ATTACHMENT LINK NUMBERS see TABLE VI
2. Attachment links for USA chain No. 35 are rollerless.

PIN AND ROLLER ATTACHMENT LINKS
FOR
TYPE 1 ROLLER CHAINS

X967

TABLE VI

PIN AND ROLLER ATTACHMENT LINKS FOR TYPE 1 ROLLER LINKS

MIL-STD ATTACHMENT LINK NUMBER	TYPE	FOR USA CHAIN NUMBER	MIL-STD ATTACHMENT LINK NUMBER	TYPE	FOR USA CHAIN NUMBER
35-1RC-1PAL	1 PAL		100-1RC-1PAL	1 PAL	
35-1RC-2RAL	2 RAL		100-1RC-2RAL	2 RAL	
35-1RC-3PAL	3 PAL		100-1RC-3PAL	3 PAL	
35-1RC-4RAL	4 RAL		100-1RC-4RAL	4 RAL	
35-1RC-5PAL	5 PAL	35	100-1RC-5PAL	5 PAL	100
35-1RC-6RAL	6 RAL		100-1RC-6RAL	6 RAL	
35-1RC-7PAL	7 PAL		100-1RC-7PAL	7 PAL	
35-1RC-8RAL	8 RAL		100-1RC-8RAL	8 RAL	
35-1RC-9PAL	9 PAL		100-1RC-9PAL	9 PAL	
35-1RC-10PAL	10 PAL		100-1RC-10PAL	10 PAL	
40-1RC-1PAL	1 PAL		120-1RC-1PAL	1 PAL	
40-1RC-2RAL	2 RAL		120-1RC-2RAL	2 RAL	
40-1RC-3PAL	3 PAL		120-1RC-3PAL	3 PAL	
40-1RC-4RAL	4 RAL		120-1RC-4RAL	4 RAL	
40-1RC-5PAL	5 PAL	40	120-1RC-5PAL	5 PAL	120
40-1RC-6RAL	6 RAL		120-1RC-6RAL	6 RAL	
40-1RC-7PAL	7 PAL		120-1RC-7PAL	7 PAL	
40-1RC-8RAL	8 RAL		120-1RC-8RAL	8 RAL	
40-1RC-9PAL	9 PAL		120-1RC-9PAL	9 PAL	
40-1RC-10PAL	10 PAL		120-1RC-10PAL	10 PAL	
50-1RC-1PAL	1 PAL		140-1RC-1PAL	1 PAL	
50-1RC-2RAL	2 RAL		140-1RC-2RAL	2 RAL	
50-1RC-3PAL	3 PAL		140-1RC-3PAL	3 PAL	
50-1RC-4RAL	4 RAL		140-1RC-4RAL	4 RAL	
50-1RC-5PAL	5 PAL	50	140-1RC-5PAL	5 PAL	140
50-1RC-6RAL	6 RAL		140-1RC-6RAL	6 RAL	
50-1RC-7PAL	7 PAL		140-1RC-7PAL	7 PAL	
50-1RC-8RAL	8 RAL		140-1RC-8RAL	8 RAL	
50-1RC-9PAL	9 PAL		140-1RC-9PAL	9 PAL	
50-1RC-10PAL	10 PAL		140-1RC-10PAL	10 PAL	
60-1RC-1PAL	1 PAL		160-1RC-1PAL	1 PAL	
60-1RC-2RAL	2 RAL		160-1RC-2RAL	2 RAL	
60-1RC-3PAL	3 PAL		160-1RC-3PAL	3 PAL	
60-1RC-4RAL	4 RAL		160-1RC-4RAL	4 RAL	
60-1RC-5PAL	5 PAL	60	160-1RC-5PAL	5 PAL	160
60-1RC-6RAL	6 RAL		160-1RC-6RAL	6 RAL	
60-1RC-7PAL	7 PAL		160-1RC-7PAL	7 PAL	
60-1RC-8RAL	8 RAL		160-1RC-8RAL	8 RAL	
60-1RC-9PAL	9 PAL		160-1RC-9PAL	9 PAL	
60-1RC-10PAL	10 PAL		160-1RC-10PAL	10 PAL	
80-1RC-1PAL	1 PAL				
80-1RC-2RAL	2 RAL				
80-1RC-3PAL	3 PAL				
80-1RC-4RAL	4 RAL				
80-1RC-5PAL	5 PAL	80			
80-1RC-6RAL	6 RAL				
80-1RC-7PAL	7 PAL				
80-1RC-8RAL	8 RAL				
80-1RC-9PAL	9 PAL				
80-1RC-10PAL	10 PAL				