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Standard Specification for
Machine and Coil Chain[1]

This standard is issued under the fixed designation A467/A467M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers welded carbon steel machine chain and coil chain. Although these chains are not intended for pocket wheel use, they can be used for pocket and sprocket wheel use. This chain shall never be used for overhead lifting applications.

1.2 There are two classes each of machine and coil chain:

1.2.1 *Class MS*—Machine, straight-link steel chain,

1.2.2 *Class MT*—Machine, twist-link steel chain,

1.2.3 *Class CS*—Coil, straight-link chain, and

1.2.4 *Class CT*—Coil, twist-link steel chain.

1.3 The values stated in either inch-pound units or SI units shall be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system ~~may~~are not ~~be~~necessarily exact equivalents; therefore, to ensure conformance with the standard, each system ~~must~~shall be used independently of the other, ~~without combining values in any way.~~ and values from the two systems shall not be combined.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A29/A29M Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *breaking force, minimum, n*—minimum force in pounds or newtons at which the chain, during manufacture, has been found by representative testing to break when a constantly increasing force is applied in direct tension.

3.1.1.1 *Discussion*—

This test is a ~~manufacturer's~~manufacturer's attribute acceptance test and shall not be used as criteria for service.

3.1.2 *lot, n*—for the purpose of acceptance testing, a lot shall consist of 3000 ft [1000 m], or fraction thereof, of the same grade and size chain. If a continuous length of chain exceeds 3000 ft [1000 m], it shall also be considered a lot.

3.1.3 *overhead lifting, n*—process of lifting that would elevate a freely suspended load such that dropping the load would present a possibility of bodily injury or property damage.

3.1.4 *proof test, n*—quality control tensile test applied to chain for the purpose of verifying weld and material quality.

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*A Summary of Changes section appears at the end of this standard

3.1.4.1 *Discussion*—

It is the minimum force in pounds or newtons which the chain has withstood at the time it left the producer, under a test in which a constantly increasing force has been applied in direct tension to a straight length of chain. Proof test loads are a manufacturing integrity test and shall not be used as criteria for service or design purposes.

3.1.5 *working load limit (WLL), n*—maximum combined static and dynamic load in pounds or kilograms that shall be applied in direct tension to an undamaged, straight length of chain.

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Such requirements to be considered include, but are not limited to, the following:

4.1.1 ASTM Specification A467/A467M and year of issue,

4.1.2 Trade size of chain,

4.1.3 Class of chain,

4.1.4 Quantity of chain in feet or metres,

4.1.5 Length of each piece, if required,

4.1.6 Finish, if required,

4.1.7 Certification of test(s), if required, and

4.1.8 Acceptance of inspection by purchaser, if required.

5. Manufacture

5.1 *Melting Process*—The steel shall be made by the open-hearth, electric-furnace, or basic-oxygen process.

5.2 *Welding Process*—Classes MS, MT, CS, and CT shall be electric welded.

6. Chemical Requirements

6.1 *Product Analysis*—The material used shall conform to the following chemical requirements:

Elements, max, %	Classes MS, MT, CS, and CT
Carbon	0.37
Phosphorus	0.048
Sulfur	0.058

6.2 The analysis may be made by the purchaser from the bars or finished chain. Samples for analysis shall represent the full cross section of the specimen. (See Specification A29/A29M.)

6.3 For referee purposes, Test Methods, Practices, and Terminology A751 shall be used.

7. Mechanical Properties Requirements

7.1 *Proof Test*—All Every link of chain in Classes MS and CS shall be proof tested to at least the proof load prescribed in Table 1 and Table 2 for the appropriate size and class chain. When so tested, it shall withstand these loads without loss of chain integrity. Links or chain segments not withstanding the proof test load shall be removed from the chain.

NOTE 1—Chain Classes MT and CT do not require proof testing since the twist operation is an adequate verification of link integrity.

7.2 *Breaking Force Test:*

7.2.1 The tension test specimen shall consist of a length from the lot containing at least the number of links specified in 7.3.1.

TABLE 1 Machine Chain—Straight Link
(Not to be used in overhead lifting applications)

Trade Size		Material Diameter		Working Load Limit, max		Proof Test,[A] min		Breaking Force,[A] min		Nominal Inside Length[B]		Nominal Inside Width[B]	
mm		in.	mm	lb	kg	lb	kN	lb	kN	in.	mm	in.	mm
3.0	4	0.120	3.0	215	98	430	1.91	860	3.82	0.55	14.0	0.21	5.3
3.4	3	0.135	3.4	270	122	540	2.40	1080	4.80	0.59	15.0	0.24	6.1
3.8	2	0.148	3.8	325	147	650	2.89	1300	5.78	0.61	15.5	0.26	6.6
4.1	1	0.162	4.1	390	177	780	3.47	1560	6.93	0.63	16.0	0.28	7.1
4.5	1/0	0.177	4.5	465	211	930	4.14	1860	8.27	0.74	18.8	0.31	7.9
4.9	2/0	0.192	4.9	545	247	1090	4.85	2180	9.69	0.78	19.8	0.34	8.6
5.3	3/0	0.207	5.3	635	288	1270	5.65	2540	11.29	0.85	21.6	0.36	9.1
5.5	4/0	0.218	5.5	700	318	1400	6.23	2800	12.44	0.99	25.1	0.38	9.6
6.4	5/0	0.250	6.4	925	420	1850	8.23	3700	16.44	1.07	27.2	0.44	11.2

[A] The Proof Test and Minimum Breaking Force *shall not* be used as criteria for service or design purposes. See Section 3.
[B] Actual inside lengths and widths should not vary more than ±5 % from nominal dimensions.

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TABLE 2 Coil Chain—Straight Link
(Not to be used in overhead lifting applications)

Trade Size		Material Diameter		Working Load Limit, max		Proof Test,[A] min		Breaking Force,[A] min		Nominal Inside Length[B]		Nominal Inside Width[B]	
mm		in.	mm	lb	kg	lb	kN	lb	kN	in.	mm	in.	mm
3.0	4	0.120	3.0	205	93	410	1.82	820	3.64	1.11	28.1	0.21	5.32
3.4	3	0.135	3.4	255	116	510	2.27	1020	4.53	1.17	29.6	0.24	6.09
3.8	2	0.148	3.8	310	141	620	2.76	1240	5.51	1.18	29.9	0.26	6.59
4.1	1	0.162	4.1	370	168	740	3.29	1480	6.58	1.25	31.7	0.28	7.10
4.5	1/0	0.177	4.5	440	200	880	3.91	1760	7.82	1.25	31.7	0.31	7.86
4.9	2/0	0.192	4.9	520	236	1040	4.63	2080	9.24	1.26	31.9	0.34	8.62
5.3	3/0	0.207	5.3	605	274	1210	5.38	2420	10.76	1.30	32.9	0.36	9.13
5.5	4/0	0.218	5.5	670	304	1340	5.96	2680	11.91	1.39	35.2	0.38	9.64
6.4	5/0	0.250	6.4	880	399	1760	7.83	3520	15.64	1.52	38.5	0.44	11.20

[A] The Proof Test and Minimum Breaking Force *shall not* be used as criteria for service or design purposes. See Section 3.
[B] Actual inside lengths and widths should not vary more than ±5 % from nominal dimensions.

7.2.2 Fixtures for securing chain in a testing machine shall be properly designed to securely support the shoulder of the link (Note 2). The opening in the fixture shall not be more than 125 % of the stock diameter being tested. Links engaged in the testing fixture shall not be considered part of the test specimen.

Note 2—U-bolts of the same or larger diameter and the same or greater strength than the chain may be used to secure the chain to the jaws of the testing machine.

7.2.3 Test specimens from the finished chain shall conform to the minimum breaking force requirements as prescribed in Tables 1-4 for their respective sizes and classes.

7.3 *Elongation:*

7.3.1 The elongation test specimen shall consist of a length from the lot containing at least the number of links in Table 5.

7.3.2 A positive load not exceeding 10 % of the proof test shall be applied for determining the original gauge length ($L\{0\}$).

7.3.3 The elongation shall be based on the total extension at fracture. This is expressed as a percentage of the change in length (ΔL) divided by the original gauge length ($L\{0\}$). The elongation may be determined by the equation below or by autographic recorder or side scale.

$$\text{Elongation }(\%) = \{\Delta L/L\{0\}\} \times 100$$

where:

ΔL = test specimen final length at fracture – test specimen original gauge length $L\{0\}$, and
$L\{0\}$ = original gauge length (sum or the inside lengths of the test chain links, not counting the fixture links, or as determined in 7.3.2).

7.3.4 The elongation shall be a minimum of 10 %.

7.4 One test for breaking strength and elongation shall be made from each lot. The elongation and breaking force tests may be performed at the same time on the same test specimen.

8. Dimensional Requirements

8.1 The chain shall conform to the dimensional requirements specified in Tables 1-4 for the appropriate class and size chain. Inside widths and lengths are not to exceed ±5 % from the nominal dimensions.

TABLE 3 Machine Chain—Twist Link
(Not to be used in overhead lifting applications)

Trade Size		Material Diameter		Working Load Limit, max		Breaking Force,[A] min		Nominal Inside Length[B]		Nominal Inside Width[B]	
mm		in.	mm	lb	kg	lb	kN	in.	mm	in.	mm
3.0	4	0.120	3.0	205	93	820	3.64	0.52	13.1	0.17	4.3
3.4	3	0.135	3.4	255	116	1020	4.53	0.56	14.2	0.20	5.1
3.8	2	0.148	3.8	310	141	1240	5.51	0.58	14.7	0.21	5.3
4.1	1	0.162	4.1	370	168	1480	6.58	0.59	15.0	0.24	6.1
4.5	1/0	0.177	4.5	440	200	1760	7.82	0.68	17.2	0.26	6.6
4.9	2/0	0.192	4.9	520	236	2080	9.24	0.73	18.5	0.28	7.1
5.3	3/0	0.207	5.3	605	274	2420	10.76	0.80	20.3	0.31	7.9
5.5	4/0	0.218	5.5	670	304	2680	11.91	0.89	22.5	0.32	8.1
6.4	5/0	0.250	6.4	880	400	3520	15.64	1.00	25.3	0.37	9.4

[A] The Minimum Breaking Force values *shall not* be used as criteria for service or design purposes. See Section 3.
[B] Actual inside lengths and widths should not vary more than ±5 % from nominal dimensions.