Designation: A 467/A 467M – 07

Standard Specification for Machine and Coil Chain[1]

This standard is issued under the fixed designation A 467/A 467M; 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 not be exact equivalents; therefore, each system must be used independently of the other, without combining values in any way.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 751 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 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.

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 A 467/A 467M 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.

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.27 on Steel Chain.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

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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.

6.3 For referee purposes, Test Methods, Practices, and Terminology A 751 shall be used.

7. Mechanical Properties Requirements

7.1 *Proof Test*—All 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.

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.

8.2 *Diameter*—The diameter of the material from which the chain is manufactured shall not be smaller than the material diameter listed in Table 1 and Table 2 within a tolerance of −7 %. Oversized wire may be used for all applications.

9. Finish

9.1 The manufacturer may apply a surface treatment or finish of his own choice for identification or corrosion resistance unless the customer specifies otherwise. The surface treatment or finish shall not alter the chain properties in a manner that would cause the chain to not meet the other provisions of this standard.

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.

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.

TABLE 4 Coil 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	195	88	780	3.47	1.09	27.6	0.18	4.56
3.4	3	0.135	3.4	240	109	970	4.31	1.14	28.9	0.21	5.32
3.8	2	0.148	3.8	295	134	1180	5.25	1.15	29.1	0.22	5.58
4.1	1	0.162	4.1	350	159	1405	6.24	1.22	30.9	0.25	6.34
4.5	1/0	0.177	4.5	415	188	1670	7.43	1.22	30.9	0.27	6.85
4.9	2/0	0.192	4.9	495	225	1975	8.78	1.24	31.4	0.29	7.36
5.3	3/0	0.207	5.3	575	261	2300	10.23	1.26	31.9	0.32	8.12
5.5	4/0	0.218	5.5	635	288	2545	11.32	1.34	34.0	0.33	8.32
6.4	5/0	0.250	6.4	835	379	3345	14.86	1.47	37.3	0.38	9.65

[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.

TABLE 5 Mechanical Test Sample Length Requirements

Size of Chain	Minimum Number of Links in Test Specimen
2/0 and smaller	9
3/0 and larger	7

10. Retests

10.1 If the original test specimen fails to conform to the requirements of 7.2.3, two additional test specimens from the same lot may be tested. If both additional tests are satisfactory, the chain will be considered acceptable.

11. Rework and Retreatment

11.1 Chain that fails to comply to the requirements of this specification my be reworked and resubmitted.

12. Inspection

12.1 When requested on the purchase order or contract, the chain shall be free of paint or other coatings which could mask surface discontinuities at the time of inspection.

12.2 The manufacturer shall afford the purchaser's inspector all reasonable facilities necessary to verify that the material is being furnished in accordance with this specification. Inspection by the purchaser shall not unnecessarily interfere with the manufacturer's operations. All tests and inspection shall be made at the place of manufacture, unless otherwise agreed upon between the manufacturer and the purchaser.

12.3 The purchaser may make the tests to govern acceptance or rejection of the material at their own laboratory or elsewhere. Tests and acceptance criteria shall conform to the requirements contained in this specification unless otherwise

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stated in the purchase order or contract. Tests at the purchaser's laboratory or elsewhere shall be made at the expense of the purchaser.

13. Rejection and Rehearing

13.1 Materials that fail to conform to the requirements of this specification may be rejected. Rejection shall be promptly reported, in writing, to the producer or supplier. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

13.2 In the case of dissatisfaction with the results of any test in 12.3, the manufacturer may make claim for a rehearing.

14. Certification

14.1 A manufacturer's certification that the chain conforms to ASTM Specification A 467/A 467M of the year of issue specified shall be furnished when requested on the purchase order or contract.

14.2 When requested on the purchase order or contract, the manufacturer shall furnish a certificate of proof test to the producer or his representative.

15. Product Marking

15.1 The chain may be marked at the discretion of the manufacturer.

15.2 Chain shall not be marked with indented characters.

16. Keywords

16.1 steel chain

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 467/A 467M – 01 (2006)) that may impact the use of this standard. (Approved Nov. 1, 2007.)

(*1*) Revised Section 2.
(*2*) Added new referenced standard citation to 6.3.
(*3*) Changed tolerance value in 8.2.
(*4*) Revised Section 9.

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