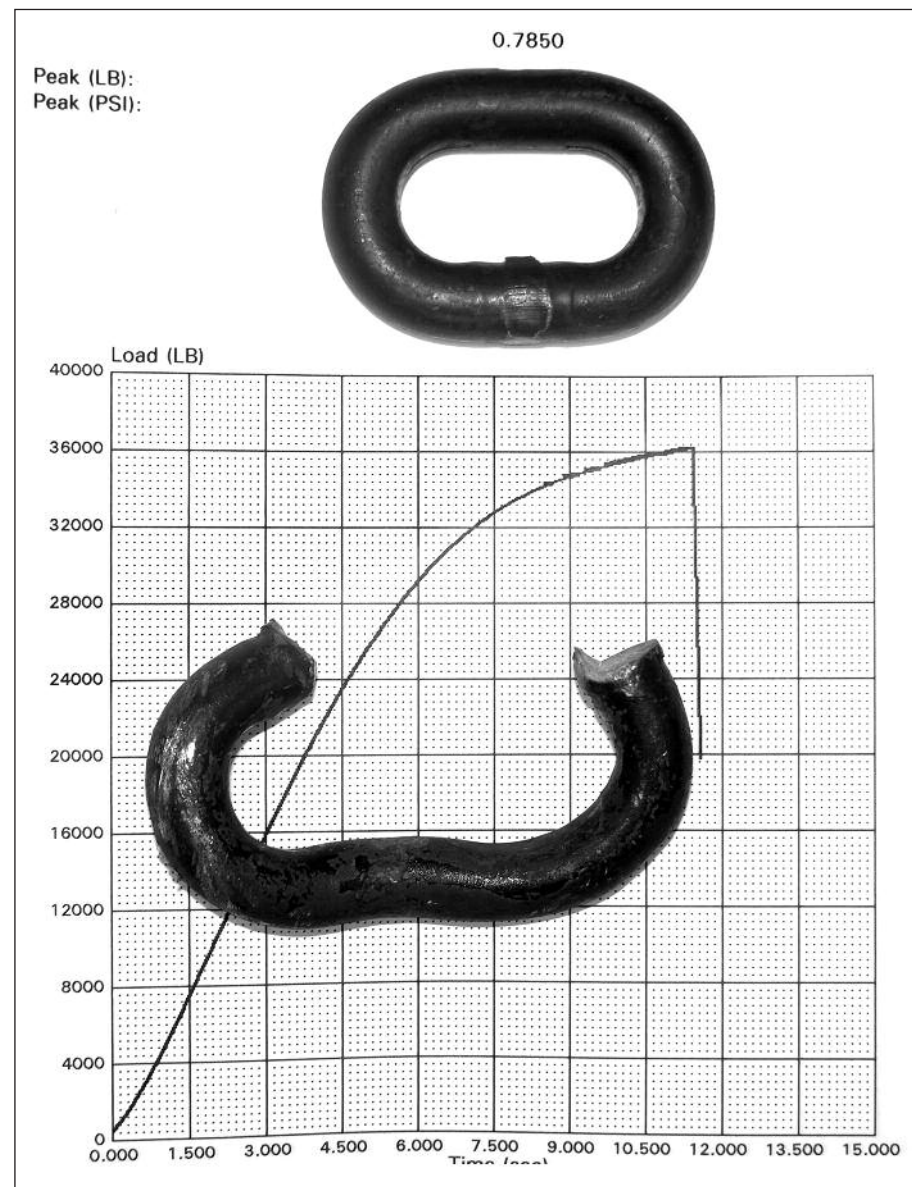


Chain Doesn't "Just Break" For No Reason

BY CHIP KAUFFMAN

I've been in the chain business in one capacity or another for over 30 years. Every now and then, we will have a piece of chain returned to us with the explanation that it "just broke." The fact is, chain is made to very specific and stringent standards adhered to by every U.S. chain manufacturer, making "just broke" a statistical improbability.



This graph from testing equipment at B/A Products Company – and the tested chain link – shows the results of a piece of 3/8-inch Grade 80 chain pulled to destruction. The minimum break strength on that grade and size of chain is 28,400 lbs. The graph documents it breaking at 36,000 lbs. The link above the graph is a "new" untested sample for comparison.

Chain begins life as a coil of continuous wire that must meet specific chemical and physical property requirements. If it doesn't, the wire is rejected and never made into chain. Once the integrity of the base wire has been verified, the wire is pulled through a "wire drawer" that sizes the material to an exact diameter. After the wire is properly sized, it's run through a machine that straightens the wire and cuts "slugs" of the coil to an exact length. As the slugs are cut, they are embossed with grade and date code nomenclatures. The grade designation helps ensure you are using the correct chain. Date codes act as a permanent marking that makes it possible to trace the chain to the specific material used and the internal production and quality control records even years later. These slugs are then formed into continuous chain links, bent into shape and welded.

Proof Testing

Once welded, the chain is proof-tested to the industry standard. Proof testing is the procedure whereby each link is tested to twice its Working Load Limit (WLL). By definition, the WLL is the maximum load the chain is warranted to handle. In the case of the chains we are most accustomed to in the towing industry (Grades 70, 80 and 100), every link of the chain is pulled to twice the assigned WLL. For example, 5/16-inch Grade 70 chain, which has an industry-standard 4,700-lb. WLL, is pulled to 9,400 lbs. as part of internal quality control procedures.

Pulled to Destruction

Once the chain has been proof-tested, representative samples of each production lot are pulled to destruction. Performed in a controlled laboratory environment, this destructive testing is done at a minimum of four times the chain's Working Load Limit – twice

For No Reason



Date coding and embossing on half-inch Grade 70 chain. The first digit represents the month. The second represents the year. The third is an internal manufacturing number that allows identification of production test records all the way back to the steel mill that made the rod.

the proof test on the grades noted above. If any failures occur at proof testing or destructive testing, the entire batch of chain from that production date code run is scrapped. Every process in producing a piece of chain is designed to make sure it doesn't "just break."

This is a basic overview of some of the manufacturing and testing procedures that are built into every foot of chain produced in this country. More detailed explanations of other processes and more specific information on various chain products will follow in future issues of *Tow Times*.

About the author:

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Important: the Working Load Limit of the size and grade of chain you are using is never to be exceeded. Proof testing and destructive testing is done to ensure product integrity and should never be used as a design criterion when selecting a size and grade of chain for a particular application.

CHAIN PRODUCTS

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Camtrol System

Campbell's CAMTROL SYSTEM makes chain products easier to identify and understand. That's because all are based on engineering formulas computed according to ISO (International Organization for Standardization), NACM (National Association of Chain Manufacturers) and ASTM (American Society for Testing and Materials). Use the CAMTROL SYSTEM to make wise chain purchasing decisions. Use it to compare the various categories of chain, to choose the right chain for the job according to the price per thousand pounds of working load instead of buying on a price per foot. Consult your Campbell Chain distributor for current prices. Then refer to the chart below and divide the price per foot by the working load limit (in thousands of pounds) shown in the table. By using this comparison system you will discover that you can buy a smaller, easier to handle chain, and at less cost based on its working load limit.

Variations in finish or heat treatment
The mechanical properties shown on the Camtrol Chart apply only to the various chains in their standard finish and heat treated condition. Finishes such as galvanizing or electroplating may reduce strengths. The manufacturer's revised recommendations should be solicited when such treatments are desirable for specific applications.

Hallmarking (Identification)
All System 4, 7, 8, and 10 chains and all System 3 chains 5/16" (8 mm) and larger are marked with the grade identifier approximately every 12" or less. Please refer to the chain type of interest in this catalog for the specific hallmarks.

Grade	System Number	Trade Size		Diameter		Inside Length		Inside Width		Weight Per 100 Feet		Working Load Limit	
		in.	mm	in.	mm	in.	mm	in.	mm	lb	kg	lb	kg
30	3	1/8	4	.156	4.0	.89	22.61	.29	7.33	22	10	400	180
30	3	3/16	5.5	.205	5.5	.95	24.13	.34	8.63	35	16	800	365
30	3	1/4	7	.260	7.0	1.20	30.50	.45	11.40	56	25	1,300	580
30	3	5/16	8	.312	8.0	1.27	32.27	.47	11.93	63	28	1,900	860
30	3	3/8	10	.368	10.0	1.36	34.46	.57	14.47	125	57	2,650	1,200
30	3	1/2	13	.460	13.0	1.70	43.18	.75	19.00	237	108	4,500	2,030
30	3	5/8	16	.556	16.7	2.10	53.34	.87	22.09	390	177	6,900	3,130
30	3	3/4	20	.761	19.8	2.70	68.58	1.02	26.00	535	243	10,600	4,810
30	3	7/8	22	.906	23.0	2.34	59.44	1.37	34.80	770	349	12,800	5,810
43	4	1/4	7	.276	7.0	1.20	30.50	.45	11.40	63	28	2,600	1,180
43	4	5/16	8	.330	8.4	1.27	32.27	.47	11.94	102	46	3,900	1,770
43	4	3/8	10	.394	10.0	1.15	29.21	.58	14.73	160	73	5,400	2,450
43	4	7/16	11.9	.468	11.9	1.29	32.77	.67	17.02	216	98	7,200	3,270
43	4	1/2	13	.531	13.0	1.70	43.18	.75	19.00	260	118	9,200	4,170
43	4	5/8	16	.656	16.7	1.94	49.27	.93	23.62	356	161	13,000	5,910
43	4	3/4	20	.761	23.0	2.21	56.13	1.10	27.94	535	243	20,200	9,180
70	7	1/4	7	.312	7.9	.94	23.88	.46	11.68	91	41	3,150	1,430
70	7	5/16	8.7	.343	8.7	1.01	25.65	.48	11.68	111	50	4,700	2,130
70	7	3/8	10	.406	10	1.36	34.46	.57	14.47	150	68	6,600	2,990
70	7	7/16	11.9	.468	11.9	1.29	32.77	.67	17.02	212	96	8,750	3,970
70	7	1/2	13	.531	13.0	1.70	43.18	.75	19.00	260	118	11,200	5,130
70	7	5/8	16	.630	16.0	1.93	49.02	.87	22.10	375	170	15,800	7,170
80	8	7/32	5.5	.218	5.5	.69	17.53	.30	7.62	43	20	2,100	970
80	8	5/16	8	.315	8.0	.94	23.86	.46	11.68	92	42	4,500	2,000
80	8	1	26	1.000	25.4	2.80	71.12	1.40	35.56	965	438	47,700	21,600
80	8	1 1/4	32	1.250	31.8	3.50	88.90	1.75	44.45	1525	692	72,300	32,800
80	8	1 1/2	38	1.500	38.1	4.49	114.04	1.94	49.27	2140	971	80,000	36,400
100	10	9/32	7	.265	7.2	.86	21.80	.41	11.40	74	34	4,300	1,950
100	10	3/8	10	.402	10.2	1.22	31.00	.55	14.00	148	67	8,800	3,990
100	10	1/2	13	.522	13.2	1.54	39.50	.65	19.10	250	113	15,000	6,800
100	10	5/8	16	.643	16.3	1.93	49.00	.87	22.10	379	172	22,600	10,250
100	10	3/4	20	.802	20.4	2.42	61.50	1.09	27.70	698	316	35,300	16,000
100	10	7/8	22	.882	22.4	2.70	68.52	1.28	32.48	775	351	42,700	19,400

ADVERTENCIA	WARNING
<p>Para prevenir la posibilidad de una lesión personal seria:</p> <ul style="list-style-type: none"> • NO EXCEDA los límites de carga de las cadenas o componentes. • NO LA UTILICE para cargar hacia arriba o para izar. • NO LA UTILICE si la cadena o los componentes están visualmente distorsionados o gastados. 	<p>To prevent the possibility of serious bodily injury:</p> <ul style="list-style-type: none"> • DO NOT EXCEED the working load limits for chain or components. • DO NOT USE for overhead lifting or hoisting. • DO NOT USE if the chain or components are visibly distorted or worn.

Very specific manufacturing specifications used by Campbell Chain of York, Pennsylvania. The specs are industry standards followed by domestic chain manufacturers with regard to dimensions and Working Load Limits. The only variation is how chain is embossed. Each manufacturer has its own embossing that ensures the manufacturer of a specific piece of chain can be identified.