Specification for Drilling and Production Hoisting Equipment

API SPECIFICATION 8A
THIRTEENTH EDITION, DECEMBER 1997

EFFECTIVE DATE: MAY 1998

American Petroleum Institute

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Exploration and Production Department

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FOREWORD

This specification is under the jurisdiction of the API Subcommittee on Standardization of Drilling and Servicing Equipment.

A new standard for Drilling and Production Hoisting Equipment, Spec 8C, has been issued to provide two higher levels of production specifications for hoisting equipment than now covered by Spec 8A.

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Suggested revisions are invited and should be submitted to the director of the Exploration and Production Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

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Specification for Drilling and Production Hoisting Equipment

1 Scope

1.1 DESIGN RATING BASIS

This specification provides a basis for establishing the ratings of main load carrying components of certain hoisting equipment used in drilling and production operations as follows:

1.1.1 Maximum Load Rating

This is a calculated maximum load rating using a prescribed design safety factor on the minimum yield strength of the material used in the equipment. This load rating is not intended to fix the expected service life other than by providing a reasonable margin of safety against failure.

CAUTION: The terms safety factor or design safety factor are intended as design criteria and should not under any circumstances be construed as allowing loads in excess of the maximum load rating as established under this specification.

1.1.2 Bearing Load Rating

This is a calculated maximum load main-bearing rating for traveling blocks, and swivels. This bearing rating is intended primarily to achieve consistency of ratings, but is also intended to provide a reasonable service life for such main bearings when used at loads within the equipment rating.

1.1.3 Design Criteria

This specification provides for a method of rating main load carrying components of certain hoisting equipment used in drilling and production operations, predicated on normal field loading in which the following conditions are assumed to exist:

a. The maximum load rating includes all static loads encountered in the operation of the equipment. It should be recognized that dynamic loads exist and if the combined static and dynamic loads exceed the maximum safe working load, the safety factor will be reduced accordingly.

b. The fatigue limit of the material in the equipment and the effect of stress risers are recognized as important factors in design.

c. The ratings determined herein are intended to apply to new equipment only.

d. Modification, including welding, can be detrimental to and substantially reduce the rating of the equipment and shall not be done without the approval of the manufacturer.

e. Low temperature effects are recognized as described in 5.9.

1.2 RATING ASSURANCE—MANUFACTURED UNITS

This specification provides the manufacturer with a means for adequately assuring that manufactured units will meet the design load ratings established in accordance with 1.1 as follows:

1.2.1 Material Controls

The use of material controls by the manufacturer provides assurance that the materials used in the equipment will be suitable for its intended use. Material controls verify compliance with the requirements of Section 4, Materials.

1.2.2 Process Controls

The use of process controls by the manufacturer provides assurance that the equipment has been manufactured in a manner resulting in a consistent level of quality and reliability.

1.2.3 Non-Destructive Examination (NDE)

NDE and/or test controls provide for uniformity in methods, procedures and standards of acceptance.

1.3 SUPPLEMENTARY REQUIREMENTS

This specification also covers a group of supplementary requirements which may be applied to equipment manufactured under the provisions of this specification. These are meant to be used when additional testing or inspection is desired and apply only when specified individually by the purchaser in the inquiry, contract, and order. Details of these requirements shall be as agreed to by the manufacturer and purchaser.

1.4 EQUIPMENT COVERED

Items of drilling and production hoisting equipment covered by the specification are:

a. Crown block sheaves and bearings.
b. Traveling blocks.
c. Block-to-hook adapters.
d. Connectors and link adapters.
e. Drilling hooks.
f. Tubing and sucker rod hooks.
g. Elevator links.
h. Casing, tubing, and drill pipe elevators.
i. Sucker rod elevators.
j. Rotary swivel bail adapters.
k. Rotary swivels.

l. Spiders, when capable of being used as elevators.
m. Deadline tie-downs.
n. Heave compensators
o. Kelly spinners, when capable of being used as tension member
p. Tension members of sub-sea handling equipment

2 References

API

Spec 5B	*Threading, Gauging, and Thread Inspection of Casing, Tubing, and Line Pipe Threads*
Spec 5CT	*Casing and Tubing (U.S. Customary Units)*
Spec 7	*Rotary Drill Stem Elements*
RP 9B	*Recommended Practice on Application, Care, and Use of Wire Rope for Oilfield Service*

ASME[1]

ASME IX	*Welding and Brazing Qualifications*

ASTM[2]

A370	*Methods and Definitions for Mechanical Testing of Steel Products*
A488	*Recommemded Practice for Qualification of Procedures and Personnel for the Welding of Steel Castings*
A668	*Steel Forgings, Carbon and Alloy, for General Industrial Use*
A781	*Common Requirements for Steel and Alloy Castings for General Industrial Use*
A788	*Steel Forgings, General Requirements*
E-4	*Force Verification of Testing Machines*
E165	*Recommended Practice for the Liquid Penetrant Examination Method*
E709	*Recommended Practice for Magnetic Particle Examination*

AWS[3]

AWS D.1.1	*Structural Welding Code*

3 Definitions

Note: These definitions apply to this specification only.

3.1 may: indicates that a provision is optional.

3.2 shall: indicates that a provision is mandatory.

3.3 should: indicates that a provision is not mandatory, but recommended as good practice.

[1]American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017.
[2]American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959.
[3]American Welding Society, 550 LeJeune Road, N.W., P.O. Box 351040, Miami, Florida 33135.

4 Material Requirements

4.1 CASTINGS

Steel castings used in the manufacture of the main load carrying components of the equipment covered in this specification shall conform to ASTM A781: *Common Requirements for Steel and Alloy Castings for General Industrial Use*, and either an individual material specification listed therein or a proprietary material specification that as a minimum conforms to ASTM A781.

4.2 FORGINGS

Steel forgings used in the manufacture of the main load carrying components of the equipment covered in this specification shall conform to ASTM A668: *Steel Forgings, Carbon and Alloy, for General Industrial Use* and ASTM A788: *Steel Forgings, General Requirements.* A material specification listed in ASTM A788 or a proprietary specification conforming to the minimum requirements of ASTM A788 may be used.

4.3 PLATES, SHAPES, AND BAR STOCK

Structural material used in the manufacture of main load carrying components of the equipment covered in this specification shall conform to applicable ASTM or API specifications covering steel shapes, plates, bars, or pipe, or a proprietary specification conforming to the minimum requirements of applicable ASTM or appropriate standard. Structural steel shapes having a specified minimum yield strength less than 33,000 psi, or steel pipe having a specified minimum yield strength less than 35,000 psi shall not be used.

4.4 OTHER MATERIALS

Other materials may be used in the main load carrying components of equipment, provided the suitability of the material for a particular use has been verified by testing and the material conforms to a written specification.

5 Design Rating and Testing

5.1 RATING

All hoisting equipment furnished under this specification shall be rated in accordance with the requirements specified herein. Such ratings shall consist of a maximum load rating for all items, and a main-bearing rating for traveling blocks and swivels. The traveling block ratings are independent of wire rope size and strength.

Note: Such ratings shall be calculated as specified herein and in accordance with good engineering practices. The ratings determined herein are intended to apply to new equipment only.

5.2 MAXIMUM LOAD RATING

The maximum load ratings shall be given in tons (2,000 lbs units).

The size class designation shall represent the dimensional interchangeability and the maximum rated load of equipment specified herein. The recommended size classes are as follows:

5	65	300	750
10	100	350	1000
15	150	400	
25	200	500	
40	250	650	

For purpose of interchangeability contact radii shall comply with Table 3.

5.3 MAXIMUM LOAD RATING BASES

The maximum load rating will be based on (a) the design safety factor as specified in 5.6 and (b) the yield strength of the material as specified in 5.7 and 5.8.

5.4 SPACER PLATES

Spacer plates of traveling blocks, not specifically designed to lend support to the sheave pin, shall not be considered in calculating the rated capacity of the block.

5.5 SHEAVE PINS

In calculations transferring the individual sheave loads to the pins of traveling blocks, these loads shall be considered as uniformly distributed over a length of pin equal to the length of the inner bearing race, or over an equivalent length if an inner race is not provided.

5.6 DESIGN FACTOR

The design safety factors shall be calculated as follows (See Figure 1) for the relationship between the design safety factor and rating:

Calculated Rating, Tons	Yield Strength Design Safety Factor, SF_D
150 and less	3.00
Over 150 to 500, incl.	$3.00 - \frac{0.75\,(R-150)}{350}$
Over 500	2.25

Where:

R = rating, in tons (2000 lbs units)

5.7 MECHANICAL PROPERTIES

The mechanical properties used for design purposes shall be the minimum values allowed by the applicable material specification or shall be the minimum values determined by the manufacturer in accordance with the test procedures specified in ASTM A370: *Methods and Definitions for Mechanical Testing of Steel Products*, or by mill certification for mill products. The yield point shall be used in lieu of yield strength for those materials exhibiting a yield point. Yield strength shall be determined at 0.2 percent offset.

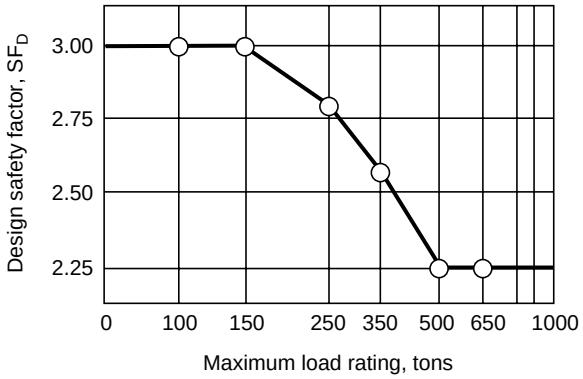


Figure 1—Design Safety Factor and Rating Relationships

5.8 SHEAR STRENGTH

For the purpose of calculations involving shear, the ratio of yield strength in shear to yield strength in tension shall be 0.58.

5.9 EXTREME LOW TEMPERATURE

Maximum load ratings shall be established at room temperature and shall be valid down to 0°F (–18°C).

CAUTION: Use of the equipment covered by this specification at rated loads at temperature less than 0°F is not recommended unless provided for by the supplemental requirements of this specification. When operating at lower temperatures, care must be exercised to take into account the lower impact absorbing characteristics of many steels.

5.10 TEST UNIT

To assure the integrity of design calculations a test shall be made on one full-size unit (or main load carrying component(s) thereof), which in all respects represents the typical product. For a family of units of the same design concept but of varying sizes, or ratings, one test will be sufficient to verify the accuracy of the calculation method used, if the item tested is approximately midway of the size and rating range of the family, and the test results are applicable equally to all units in that family. The following changes shall require supportive load testing:

a. Design changes that result in a redistribution of stress among the various parts of the unit.
b. Design changes that result in higher stress levels in the unit.
c. Changes that affect the maximum load rating of the unit.

5.11 PARTS TESTING

Individual parts of a unit may be tested separately if the holding fixtures duplicate the load conditions applicable to the part in the assembled unit.

5.12 TEST FIXTURES

Test fixtures shall support the unit (or part) in the same manner as in actual service, and with the same areas of contact on the load-bearing surfaces.

5.13 TEST PROCEDURE

5.13.1 The test unit shall be loaded to the maximum rated load. After this load has been released, the unit shall be checked for intended design functions. The intended design function of all equipment parts shall not be impaired by this loading.

5.13.2 Strain gauges may be applied to the test unit at all points where high stresses are anticipated, provided that the configuration of the units permits such techniques.

Note: The use of finite element analysis, models, brittle lacquer, etc., is recommended to confirm the proper location of strain gauges. Three-element strain gauges are recommended in critical areas to permit determination of the shear stresses and to eliminate the need for exact orientation of the gauges.

5.13.3 The maximum test load to be applied to the test unit shall be determined as follows:

Test load = 0.80 x R x SF_D, but not less than 2R.

Where:

R = the calculated load rating in tons.
SF_D = design safety factor used (see 5.6).

5.13.4 The unit shall be loaded to the maximum test load.

Note: The test load should be applied carefully, reading strain gauge values and observing for yielding. The test unit may be loaded as many times as necessary to obtain adequate test data.

5.13.5 Upon completion of the load test, the unit shall be disassembled and the dimensions of each part checked carefully for evidence of permanent deformation.

5.14 DETERMINATION OF LOAD RATING

Note: The maximum load rating may be determined from either design and stress distribution calculations or from data acquired during a load test (see 5.15).

The stresses at that rating shall not exceed the values allowed in 3.7. Localized yielding shall be permitted at areas of contact. In a unit that has been load tested, the critical permanent deformation determined by strain gauges or other suitable means shall not exceed 0.002 inch per inch. If the stresses exceed the allowed values, the affected part or parts must be revised to obtain the desired rating. Stress distribution calculations may be used to load rate the equipment only if the stress values determined in the analysis are no less than the stresses observed during a load test of one member of the family of units.

5.15 ALTERNATE TEST PROCEDURE AND RATING

Destructive load testing may be used provided the ultimate tensile strength and yield strength of the actual material (same heat and heat treat lot) used in the test unit has been determined.

This may be accomplished by using tensile test specimens cut from parts of the test unit, or from data provided by the material and/or heat treatment supplier on a mill test report.

The mechanical testing procedure used to determine the properties shall be as required by ASTM A370, *Mechanical Testing of Steel Products*, for the form tested (e.g., casting, forging, bar, etc.).

The mechanical properties are then used to rate the equipment by the following equation:

$$R = \frac{(YS/TS) \times L_B}{SF_D} \quad (1)$$

Where:

SF_D = Yield Strength Design Safety Factor.
YS = Yield Strength, psi.
TS = Ultimate Tensile Strength, psi.
L_B = Breaking Load, tons.
R = Rating, tons.

5.16 LOAD TESTING APPARATUS

The loading apparatus used to simulate the working load on the test unit shall be calibrated in accordance with ASTM E-4, *Force Verification of Testing Machines*, so as to insure that the prescribed test load is obtained. For loads exceeding 400 tons (363 metric tonnes), the load testing apparatus may be verified with calibration devices traceable to a Class A calibration device and having an uncertainty of less than 2.5 percent.

Test fixtures shall load the unit (or part) in essentially the same manner as in actual service and with essentially the same areas of contact on the load bearing surface. All equipment used to load the unit (or part) shall be verified as to its capability to perform the test.

5.17 BLOCK BEARING RATING

The bearing rating of crown and traveling blocks shall be determined by the formula:

$$W_b = \frac{NW_r}{714} \quad (2)$$

Where:

W_b = calculated block bearing rating, tons.
N = number of sheaves in the block.
W_r = Individual sheave bearing rating, pounds at 100 rpm for 3,000-hr minimum life for 90 percent of bearings.

5.18 SWIVEL BEARING RATING

The bearing rating of swivels shall be determined by the formula:

$$W_s = \frac{W_r}{1600} \quad (3)$$

Where:

W_s = calculated main thrust-bearing rating, tons at 100 rpm.
W_r = main bearing thrust rating, pounds at 100 rpm for 3000-hr minimum life for 90 percent of bearings.

5.19 ANTI-FRICTION BEARINGS

Anti-friction bearings used as load path components shall be designed and manufactured in accordance with a recognized bearing industry or proprietary code or standard. Anti-friction bearings shall be exempt from the requirements of Sections 4 and 5 of this specification.

5.20 TRAVELING BLOCK HOOD EYE OPENING RATING

The traveling block top handling member shall, for 500 ton size class and larger, have a static load rating established based on safety factors given in 5.6.

5.21 DESIGN CHANGES

When any change in design or manufacture is made which changes the calculated load rating, supportive design verification testing in conformance with this specification shall be carried out. The manufacturer shall evaluate all changes in design or manufacture to determine whether the calculated load ratings are affected. This evaluation shall be documented.

5.22 RECORDS

Full records of all calculations and tests shall be maintained by the manufacturer. When requested by an actual prospective purchaser of the equipment, or by a user of the equipment, the manufacturer shall make available for examination details of computations, drawings, tests, or such other supporting data as may be necessary to demonstrate compliance with this specification. It shall be understood that such information is for the sole use of the user or prospective purchaser for the purpose of checking the API rating, and that the manufacturer shall not be required to release the information from his custody.

6 Elevators

Drill pipe elevators for use with taper shoulder and square shoulder weld-on tool joints shall have bore dimensions as specified in Table 1A.

Casing and tubing elevators shall be suitable to use with casing and tubing manufactured in accordance with API Specification 5CT and shall have bore dimensions as specified in new Tables 1B and 1C respectively.

Note: The permissible tolerance on the outside diameter immediately behind the tubing upset may cause problems with slip-type elevators.

Table 1A—Drill Pipe Elevator Bores

1	2	3		4		5		6		7
		Weld-On Tool Joints								
		Taper Shoulder				Square Shoulder				
Tool Joint Designation Reference	Drill Pipe Size and Style (All Weights and Grades)	Neck Diam. D_{TE} Max.[1]		Elev. Bore		Neck Diam.	D_{SE} Max.[2]	Elev. Bore		Elev. Marking
		in.	mm	in.	mm	in.	mm	in.	mm	
NC 26(2 3/8 IF)	2 3/8 EU	2 9/16	65.09	2 21/32	67.47	*		*		2 3/8 EU
NC 31(2 7/8 IF)	2 7/8 EU	3 3/16	80.96	3 9/32	83.34	3 3/16	80.96	3 3/8	87.73	2 7/8 EU
NC 38(3 1/2 IF)	3 1/2 EU	3 7/8	98.43	3 31/32	100.81	3 7/8	98.43	4 1/16	103.19	3 1/2 EU
NC 40(4 FH)	3 1/2 EU	3 7/8	98.43	3 31/32	100.81	3 7/8	98.43	4 1/16	103.19	
NC 40(4 FH)	4 IU	4 3/16	106.36	4 9/32	101.86	4 1/8	104.78	4 5/16	109.54	4 IU
NC 46(4 IF)	4 EU	4 1/2	114.30	4 25/32	121.44	4 1/2	114.30	4 13/16	122.24	
	4 1/2 IU	4 11/16	119.06	4 25/32	121.44	4 5/8	117.48	4 13/16	122.24	4 EU
	4 1/2 IEU	4 11/16	119.06	4 25/32	121.44	4 5/8	117.48	4 13/16	122.24	4 1/2 IU
4 1/2 FH	4 1/2 IU	4 11/16	119.06	4 25/32	121.44	4 5/8	117.48	4 13/16	122.24	4 1/2 IEU
	4 1/2 IEU	4 11/16	119.06	4 25/32	121.44	4 5/8	117.48	4 13/16	122.24	
NC 50(4 1/2 IF)	4 1/2 EU	5	127.00	5 1/4	133.35	5	127.00	5 5/16	134.94	4 1/2 EU
	5 IEU	5 1/8	130.18	5 1/4	133.35	5 1/8	130.18	5 5/16	134.94	5 IEU
5 1/2 FH	5 IEU	5 1/8	130.18	5 1/4	133.35	5 1/8	130.18	5 5/16	134.94	
5 1/2 FH	5 1/2 IEU	5 11/16	144.46	5 13/16	147.64	5 11/16	144.46	5 7/8	149.23	5 1/2 IEU
6 5/8 FH	6 IEU	6 15/16	175.02	7 1/32	178.66					6 5/8 IEU

Note: Elevators with the same bores are the same elevators.
* Not manufactured.
[1]Dimension D_{TE} from API Specification 7.
[2]Dimension D_{SE} from API Specification 7.

Table 1B—Casing Elevator Bores

Casing		Elevator Bores			
"D" Casing Dia.		"T_B" Top Bore		"B_B" Bottom Bore	
		±1/64	±.40	+1/32 –1/64	+.79 –.40
in.	mm	in.	mm	in.	mm
$4^1/_2$	114.30	4.594	116.69	4.594	116.69
5	127.00	5.125	130.18	5.125	130.18
$5^1/_2$	139.70	5.625	142.88	5.625	142.88
$6^5/_8$	168.28	6.750	171.45	6.750	171.45
7	177.80	7.125	180.98	7.125	180.98
$7^5/_8$	193.68	7.781	197.64	7.781	197.64
$7^3/_4$	196.85	7.906	200.81	7.908	200.81
$8^5/_8$	219.08	8.781	223.04	8.781	223.04
$9^5/_8$	244.48	9.781	248.44	9.781	248.44
$9^7/_8$	250.83	10.031	254.79	10.031	254.79
$10^3/_4$	273.05	10.938	277.83	10.938	277.83
$11^3/_4$	298.45	11.938	303.23	11.938	303.23
$12^7/_8$	327.03	13.063	331.80	13.063	331.80
$13^3/_8$	339.73	13.563	344.50	13.582	344.50
$13^5/_8$	346.08	13.813	350.85	13.813	350.85
14	355.60	14.203	360.76	14.203	360.76
16	406.40	16.219	411.96	16.219	411.96
$18^5/_8$	473.08	18.875	479.43	18.875	479.43
20	508.00	20.281	515.14	20.281	515.14
$21^1/_2$	546.10	21.781	553.24	21.781	553.24
22	558.80	22.281	565.94	22.281	565.94
24	609.60	24.313	617.55	24.313	617.55
$24^1/_2$	622.30	24.813	630.25	24.813	630.25
26	660.40	26.344	669.14	26.344	669.14
27	685.80	27.344	694.54	27.344	694.54
28	711.20	28.359	720.32	28.359	720.32
30	762.00	30.375	771.53	30.375	771.53
32	812.80	32.391	822.73	32.391	822.73
36	914.40	36.438	925.53	36.438	925.53

Note 1: Bottom bore "B_B" is optional; some elevator designs do not have a bottom bore.
Note 2: Bore sizes take in account a casing tolerance of +1 percent,–0.5 percent on casing outside diameter. If casing diameter including the circumferential weld is within the standard tolerance, these bores can be used.
Note 3: Longitudinal, circumferential, or spiral welds should be considered for grinding flush in the area of possible slip or elevator contact if one or more slips can be set on the weld seam.

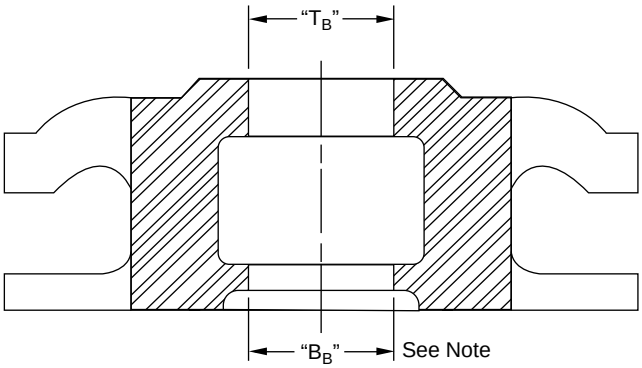
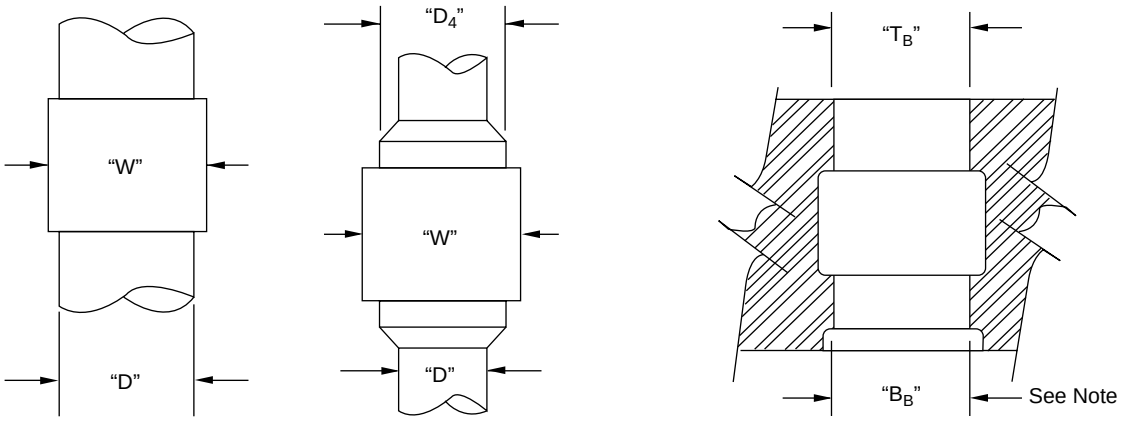


Table 1C—Tubing Elevator Bores

Tubing		Non-Upset Tubing						External Upset Tubing							
"D" Size O.D.		"W" Collar Dia.		"T_B" Top Bore		"B_B" Bottom Bore		"W" Collar Dia.		"D_4" Upset Dia.		"T_B" Top Bore		"B_B" Bottom Bore	
						+1/32	+.79							+1/32	+.79
				+1.64	±.40mm	–1/64	–.40					+1.64	±.40mm	–1/64	–.40
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1.050	26.67	1.313	33.35	1.125	28.58	1.125	28.58	1.680	42.16	1.315	33.40	1.422	36.12	1.422	36.12
1.315	33.40	1.660	42.16	1.390	35.31	1.390	35.31	1.900	48.26	1.469	37.31	1.578	40.08	1.578	40.08
1.660	42.16	2.054	52.17	1.734	44.04	1.734	44.04	2.200	55.88	1.812	46.02	1.922	48.82	1.922	48.82
1.900	48.26	2.200	55.88	1.984	50.39	1.984	50.39	2.500	63.50	2.094	53.19	2.203	55.96	2.203	55.96
$2^3/_8$	60.33	2.875	73.03	2.453	62.31	2.453	62.31	3.063	77.80	2.593	65.89	2.703	68.66	2.703	68.66
$2^7/_8$	73.03	3.500	88.90	2.953	75.01	2.953	75.01	3.668	93.17	3.094	78.59	3.203	81.36	3.203	81.36
$3^1/_2$	88.90	4.250	107.95	3.578	90.88	3.578	90.88	4.500	114.30	3.750	95.25	3.859	98.02	3.859	98.02
4	101.60	4.750	120.65	4.078	103.58	4.078	103.58	5.000	127.00	4.250	107.95	4.359	110.74	4.359	110.74
$4^1/_2$	114.30	5.200	132.08	4.593	116.66	4.593	116.66	5.563	141.30	4.750	120.65	4.859	123.42	4.859	123.42

CAUTION: DO NOT USE EXTERNAL UPSET TUBING ELEVATORS ON NON-UPSET TUBING.

Note: Bottom bore "B_B" is optional; some elevator designs do not have a bottom bore.



7 Rotary Swivels

7.1 ROTARY SWIVEL PRESSURE TESTING

7.1.1 Pilot Model

The assembled pilot model of rotary swivels shall be statically pressure tested.

7.1.2 Castings

All cast members in the rotary swivel hydraulic circuit shall be pressure tested in production. This test pressure shall be shown on the cast member.

7.1.3 Test Pressure

The test pressure shall be twice the working pressure up to and including 5,000 psi. For working pressures above 5,000 psi, the test pressure shall be one and one-half times the working pressure.

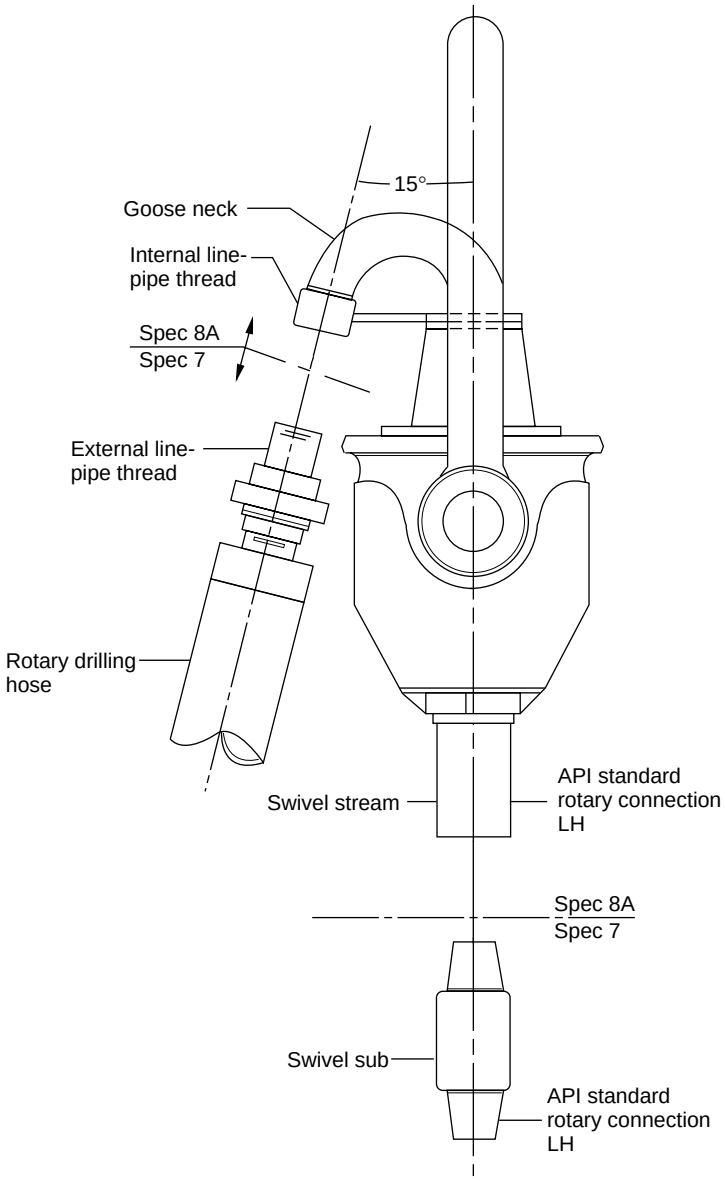
7.2 SWIVEL GOOSENECK CONNECTION

7.2.1 Dimensions

The angle between the gooseneck centerline and vertical shall be 15 degrees. The size of swivel gooseneck connections shall be 2, $2^1/_2$, 3, $3^1/_2$, 4, or 5 in. nominal line pipe size as specified on the purchase order (see Fig. 2).

7.2.2 Threads

Threads on the gooseneck connection shall be internal line pipe threads conforming to API Specification 5B: *Threading, Gauging, and Thread Inspection of Casing, Tubing and Line Pipe Threads.*



Notes:
1. No field welding is to be done between the coupling nipple and the goose neck.
2. A coupling union of adequate capacity to match the pressure capability of the goose neck should be used between the goose neck and the rotary hose. Properly clean and lubricate the joint, then make up with sufficient torque to assure a properly assembled joint.

Figure 2—Rotary Swivel Connections

7.2.3 Gooseneck Connection Marking

Rotary swivel gooseneck connections conforming to this specification shall be marked with the size and type of thread as shown in the following example:

3 API LP THD

(See Section 10 for further marking requirements)

7.3 ROTARY SWIVEL SUB CONNECTION

7.3.1 The lower connection of rotary swivels shall accept API gauges and be interchangeable with API connections.

7.3.2 The connection shall conform to the applicable requirements including gauging and marking, as specified in API Specification 7.

7.4 ROTARY HOSE SAFETY CHAIN ATTACHMENT

Swivels having gooseneck connections of 2 inches and larger shall be provided with a suitable lug containing a $1^{1}/_{8}$-inch hole to accommodate the clevis of a chain having a breaking strength of 16,000 pounds.

8 Sheaves for Hoisting Blocks

8.1 SHEAVE DIAMETER

The sheave diameter shall be the overall diameter D shown in Fig. 3. Sheave diameters shall, wherever practicable, be determined in accordance with recommendations given in API RP 9B: *Recommended Practice on Application, Care, and Use of Wire Rope for Oilfield Service.*

8.2 DRILLING AND CASING LINE SHEAVES

Grooves for drilling and casing line sheaves shall be made for the rope size specified by the purchaser. The bottom of the groove shall have a radius *R*, Table 2, subtending an arc of 150 degrees. The sides of the groove shall be tangent to the ends of the bottom arc. Total groove depth shall be a minimum of 1.33d and a maximum of 1.75d, where d is the nominal rope diameter shown in Fig. 3.

8.3 SAND-LINE SHEAVES

Grooves for sand-line sheaves shall be made for the rope size specified by the purchaser. The bottom of the groove shall have a radius *R*, Table 2, subtending an arc of 150 degrees. The sides of the groove shall be tangent to the ends of the bottom arc. Total groove depth shall be a minimum of 1.75d and a maximum of 3d, where d is nominal rope diameter (see Fig. 3, Detail B).

8.4 MARKING

Sheaves conforming to this specification shall be marked with the manufacturer's name or mark, the sheave groove size, and the sheave O.D. These markings shall be cast or stamped on the side of the outer rim of the sheave.

Example: A 36 in. sheave with $1^{1}/_{8}$ in. groove shall be marked:

AB CO $1^{1}/_{8}$ Specification 8A 36

Note: See API RP 9B for details of sheave groove gauging practice and worn sheave data.

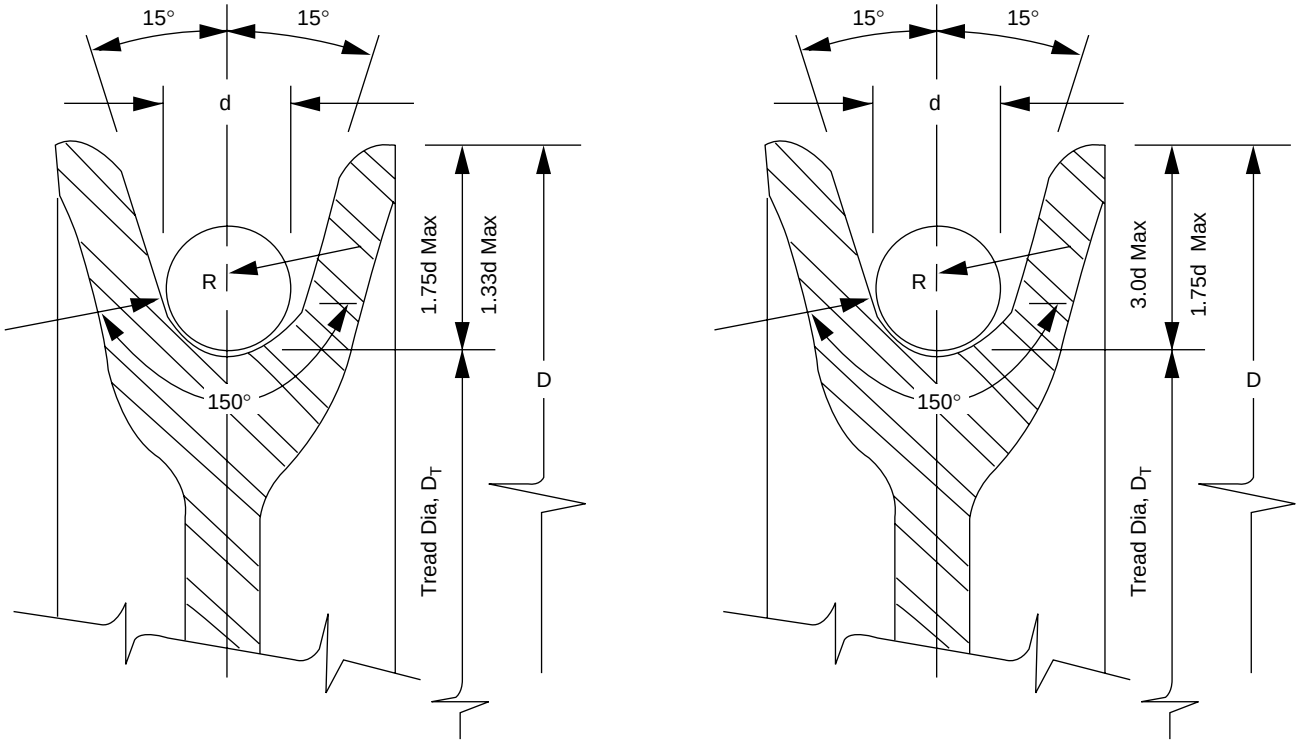
9 Contact Surface Radii

Figures 4A, 4B, 5, and Tables 3A and 3B show recommended radii of hoisting tool contact surfaces. These recommendations cover hoisting tools used in drilling; tubing hooks are included, but all other workover tools are excluded.

Table 2—Groove Radii for New and Reconditioned Sheaves and Drums

Nominal Wire Rope Diameter		Groove Radius Minimum		Groove Radius Maximum	
in.	mm	in.	mm	in.	mm
0.250	6.5	0.134	3.40	0.138	3.51
0.313	8	0.167	4.24	0.172	4.37
0.375	9.5	0.199	5.05	0.206	5.23
0.438	11	0.232	5.89	0.241	6.12
0.500	13	0.265	6.73	0.275	6.99
0.563	14.5	0.298	7.57	0.309	7.85
0.625	16	0.331	8.41	0.344	8.74
0.750	19	0.398	10.11	0.413	10.49
0.875	22	0.464	11.79	0.481	12.22
1.000	26	0.530	13.46	0.550	13.97
1.125	29	0.596	15.14	0.619	15.72
1.250	32	0.663	16.84	0.688	17.48
1.375	35	0.729	18.52	0.756	19.20
1.500	38	0.795	20.19	0.825	20.96
1.625	42	0.861	21.87	0.894	22.71
1.750	45	0.928	23.57	0.963	24.46
1.875	48	0.994	25.25	1.031	26.19
2.000	52	1.060	26.92	1.100	27.94
2.125	54	1.126	28.60	1.169	29.69
2.250	58	1.193	30.30	1.238	31.45
2.375	60	1.259	31.98	1.306	33.17
2.500	64	1.325	33.66	1.375	34.93
2.625	67	1.391	35.33	1.444	36.68
2.750	71	1.458	37.03	1.513	38.43
2.875	74	1.524	38.71	1.581	40.16
3.000	77	1.590	40.39	1.650	41.91
3.125	80	1.656	42.06	1.719	43.66
3.250	83	1.723	43.76	1.788	45.42
3.375	86	1.789	45.44	1.856	47.14
3.500	90	1.855	47.12	1.925	48.89
3.750	96	1.988	50.50	2.063	52.40
4.000	103	2.120	53.85	2.200	55.88
4.250	109	2.253	57.23	2.338	59.39
4.500	115	2.385	60.58	2.475	62.87
4.750	122	2.518	63.96	2.613	66.37
5.000	128	2.650	67.31	2.750	69.85
5.250	135	2.783	70.69	2.888	73.36
5.500	141	2.915	74.04	3.025	76.84
5.750	148	3.048	77.42	3.163	80.34
6.000	154	3.180	80.77	3.300	83.82

Note: For wire rope sizes 0.375 inch (9.5 mm) and larger not found on this table use the following equations:
Minimum new grove radius = nominal rope radius + 6%
Maximum groove radius = nominal rope radius + 10%



Drilling Line & Casing Line Sheaves

DETAIL A

Sand-Line Sheave

DETAIL B

Figure 3—Sheave Grooves

Table 3A—Recommended Hoisting Tool Contact Surface Radii (Inches)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Rating	Traveling Block & Hook Bail (See Fig. 4A)				Hook & Swivel Bail (See Fig. 4B)				Elevator Link & Hook Link Ear (See Fig. 5)				Elevator Link & Elevator Ear (See Fig. 5)			
Short Tons	A_1 Max	A_2 Min	B_1 Min	B_2 Max	E_1 Min	E_2 Max	F_1 Max	F_2 Min	C_1 Max	C_2 Min	D_1 Min	D_2 Max	G_1 Max	G_2 Min	H_1 Min	H_2 Max
25–40	$2^3/_4$	$2^3/_4$	$3^1/_4$	3	2	$1^1/_2$	3	3	$1^1/_2$	$1^1/_4$	$1^1/_4$	$^7/_8$		1		2
41–65	$2^3/_4$	$2^3/_4$	$3^1/_4$	3	2	$1^3/_4$	$3^1/_2$	$3^1/_2$	$2^1/_2$	$2^1/_2$	$1^1/_4$	$^7/_8$		1		2
66–100	$2^3/_4$	$2^3/_4$	$3^1/_4$	3	$2^1/_4$	2	4	4	$2^1/_2$	$2^1/_2$	$1^1/_2$	$1^1/_8$		1		2
101–150	$2^3/_4$	$2^3/_4$	$3^1/_4$	3	$2^1/_2$	$2^1/_4$	$4^1/_2$	$4^1/_2$	$2^1/_2$	$2^1/_2$	$1^1/_2$	$1^1/_8$	$^{15}/_{16}$	$1^1/_2$	2	2
151–250	4	4	$3^1/_4$	3	$2^3/_4$	$2^1/_2$	$4^1/_2$	$4^1/_2$	4	4	$1^3/_4$	$1^3/_8$	$1^7/_{32}$	$1^7/_8$	$2^3/_4$	$2^3/_4$
251–350	4	4	$3^1/_4$	3	3	$2^3/_4$	$4^1/_2$	$4^1/_2$	4	4	$1^3/_4$	$1^3/_8$	$1^{15}/_{32}$	$1^7/_8$	$2^3/_4$	$2^3/_4$
351–500	4	4	$3^1/_2$	$3^1/_4$	$3^1/_2$	$3^1/_4$	$4^1/_2$	$4^1/_2$	4	$4^3/_4$	$2^1/_4$	$1^7/_8$	$1^7/_8$	2	$3^1/_4$	$3^1/_4$
501–650	4	4	$3^1/_2$	$3^1/_4$	$3^1/_2$	$3^1/_4$	$4^1/_2$	$4^1/_2$	4	$4^3/_4$	$2^1/_4$	$1^7/_8$	$2^1/_4$	$2^3/_8$	5	5
651–750	6	6	$3^1/_4$	$3^1/_4$	$4^1/_4$	4	$4^1/_2$	$4^1/_2$	4	5	$2^1/_2$	$2^1/_2$	$2^1/_4$	$2^3/_8$	5	5
751–1000	6	6	$6^1/_4$	6	$5^1/_4$	5	5	5	$4^1/_2$	5	3	$2^3/_4$	$2^3/_4$	$2^7/_8$	$6^1/_4$	$6^1/_4$

Table 3B—Recommended Hoisting Tool Contact Surface Radii (Millimeters)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Rating	Traveling Block & Hook Bail (See Fig. 4A)				Hook & Swivel Bail (See Fig. 4B)				Elevator Link & Hook Link Ear (See Fig. 5)				Elevator Link & Elevator Ear (See Fig. 5)			
Metric Tons	A_1 Max	A_2 Min	B_1 Min	B_2 Max	E_1 Min	E_2 Max	F_1 Max	F_2 Min	C_1 Max	C_2 Min	D_1 Min	D_2 Max	G_1 Max	G_2 Min	H_1 Min	H_2 Max
22.7–36.3	69.85	69.85	82.55	76.20	50.80	38.10	76.20	76.20	38.10	38.10	31.75	22.23		25.40		50.80
37.2–59	69.85	69.85	82.55	76.20	50.80	44.45	88.90	88.90	63.50	63.50	31.75	22.23		25.40		50.80
59.9–91	69.85	69.85	82.55	76.20	57.15	50.80	101.60	101.60	63.50	63.50	38.10	28.58		25.40		50.80
91.7–136	69.85	69.85	82.55	76.20	63.50	57.15	114.30	114.30	63.50	63.50	38.10	28.58	23.82	38.10	50.80	50.80
137.1–227	101.60	101.60	82.55	76.20	69.85	63.50	114.30	114.30	101.60	101.60	44.45	34.93	30.94	47.63	69.85	69.85
227.9–318	101.60	101.60	82.55	76.20	76.20	69.85	114.30	114.30	101.60	101.60	44.45	34.93	37.31	47.63	69.85	69.85
318.7–454	101.60	101.60	88.90	82.55	88.90	82.55	114.30	114.30	101.60	120.65	57.15	47.63	47.63	50.80	82.55	82.55
454.9–591	101.60	101.60	88.90	82.55	88.90	82.55	114.30	114.30	101.60	120.65	57.15	47.63	57.15	60.32	127.00	127.00
591.1–681	152.40	152.40	88.90	82.55	107.95	101.60	114.30	114.30	101.60	127.00	63.50	63.50	57.15	60.32	127.00	127.00
681.9–908	152.40	152.40	158.75	152.40	133.35	127.00	127.00	127.00	114.30	127.00	76.20	69.85	69.85	73.03	158.75	158.75

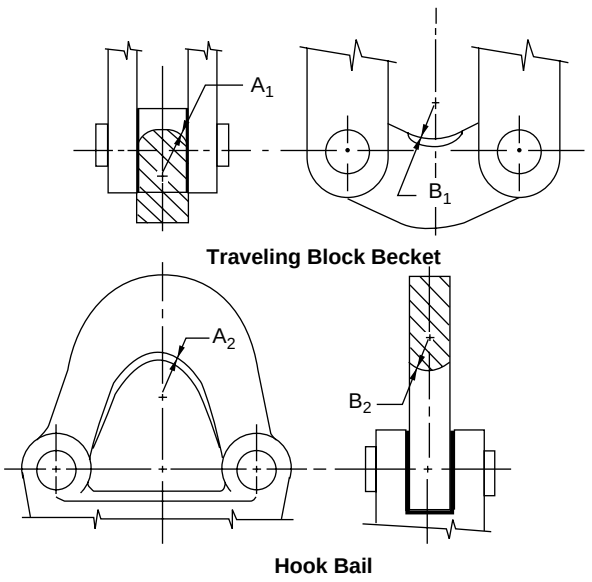


Figure 4A—Traveling Block And Hook Bail Contact Surface Radii (See Tables 3A and 3B)

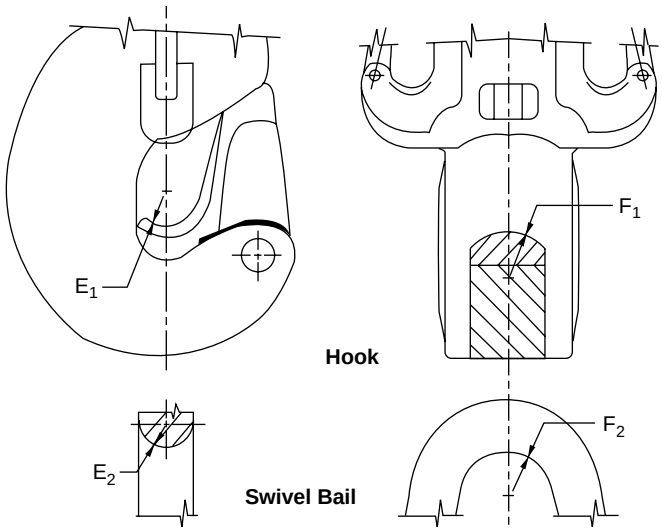
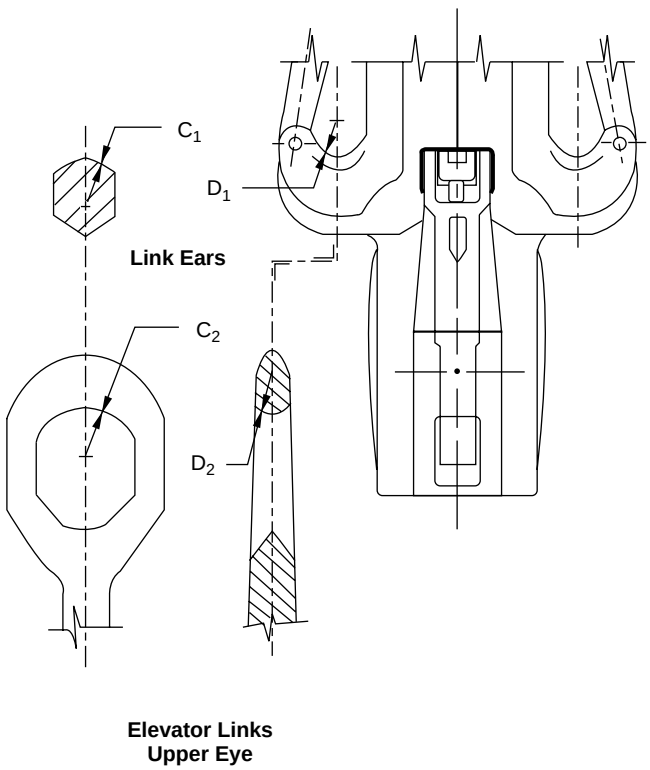


Figure 4B—Hook and Swivel Bail Contact Surface Radii (See Tables 3A and 3B)



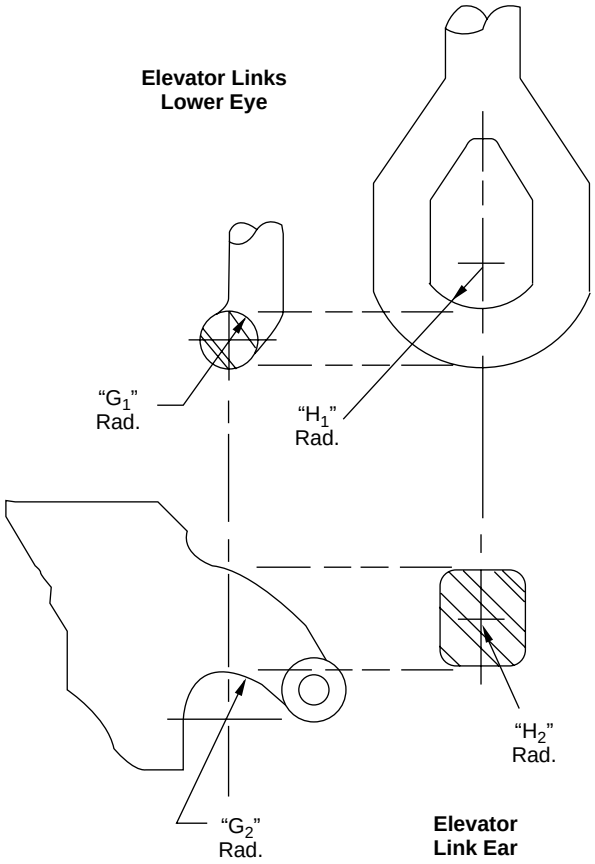


Figure 5—Elevator Link and Link Ear Contact Surface Radii (See Tables 3A and 3B)

10 Marking

10.1 USE OF API MONOGRAM

The API monogram may be applied only by manufacturers who have been granted such authority by the American Petroleum Institute. See Appendix A for regulations governing use of API monogram.

Note: Users of this specification should know that there is no longer a requirement for marking a product with the API monogram. The American Petroleum Institute continues to license use of the monogram on products covered by this specification but it is administered by the staff of the Institute separately from the specification. The policy describing use of the monogram is contained in Appendix A, herein. No other use of the monogram is permitted.

10.2 PRODUCT MARKING

Each item of hoisting equipment furnished in conformance with this specification shall be marked with the manufacturer's name or mark, and the rating marking specified hereafter and Specification 8A.

Note: Additional markings may be applied at the option of the manufacturer.

10.3 RATING MARKING

All items designed and manufactured to this specification shall be marked with a maximum load rating that does not exceed the rating determined in accordance with this specification.

Example: A traveling block rated 650 short tons should be marked:

AB CO 650 Specification 8A

10.4 ELEVATOR MARKING

In addition to the markings specified in 10.2, drill pipe elevators shall be marked as follows:

Drill pipe size and style from Column 2, Table 1A.

10.5 TRAVELING BLOCK HOOD EYE OPENING MARKING

Markings in accordance with 10.7 shall be placed near the top handling member of traveling blocks rated 500 tons or more, indicating the gross weight capability (including the traveling block), as determined from the load rating provisions of this specification.

10.6 TRAVELING BLOCK HOOD EYE OPENING MARKING

For assemblies having multi-purpose attachments, such as tubing blocks, hook-block combination, etc., each unit shall be marked separately with its maximum load rating.

10.7 MARKING METHOD

Markings shall be an integral part of the tool or die-stamped thereon, or shall be shown on a metal nameplate securely fastened to the equipment. Integral or stamped markings shall be at least $^{3}/_{8}$-inch high; markings on metal plates shall be at least $^{3}/_{16}$-inch high.

11 Nondestructive Examination

The manufacturer should have a reasonable written nondestructive examination program to assure that the equipment manufactured to this specification is suitable for its intended use.

12 Supplementary Requirements

One or more of the following supplementary requirements shall apply only when specified by the purchaser in the inquiry, contract, and order. Details of these supplementary requirements shall be as agreed upon by the manufacturer and the purchaser.

12.1 S1—MAGNETIC PARTICLE EXAMINATION

All accessible surfaces of the main load carrying components of the equipment shall be examined by a magnetic particle examination method or technique conforming to the requirements of ASTM E709: *Recommended Practice for Magnetic Particle Examination*. Acceptance limits shall be as agreed upon by the manufacturer and the purchaser.

12.2 S2—LIQUID PENETRANT EXAMINATION

All accessible surfaces of the main load carrying components of the equipment shall be examined by a liquid penetrant examination or technique conforming to the requirements of ASTM E165: *Recommended Practice for the Liquid Penetrant Examination Method*. Acceptance limits shall be as agreed upon by the manufacturer and the purchaser.

12.3 S3—ULTRASONIC EXAMINATION

Main load carrying components of the equipment shall be ultrasonically examined in accordance with applicable ASTM standards. The extent of examination, method of examination, and basis for acceptance shall be agreed upon by the manufacturer and purchaser.

12.4 S4—RADIOGRAPHIC EXAMINATION

Main load carrying components of the equipment shall be examined by means of gamma rays or x-rays. The procedure used shall be in accordance with an ASTM or other nationally recognized standard which covers ultrasonic examination of the product inspected (casting, forging, bar, plate, etc.). The extent of examination, method of examination, and the basis for acceptance shall be agreed upon by the manufacturer and purchaser.

12.5 S5—TRACEABILITY

The manufacturer shall have reports of chemical analysis, heat treatment and mechanical property tests for the main load carrying components of the equipment.

12.6 S6—WELDING

All welding undertaken on components shall be performed using welding procedures which are qualified in accordance with one of the following and/or other national standards:

a. ASME IX.
b. AWS D1.1.
c. ASTM A488.

This welding shall only be carried out by welders or welding operators who are qualified in accordance with the aforementioned standards.

Welding procedures for base metals which are not listed in the above standards shall be qualified individually or as a group based on weldability, tensile properties, or composition.

12.7 S7—EXTREME LOW TEMPERATURE

The acceptability of equipment intended for operation at temperatures below 0°F shall be agreed upon by the manufacturer and the purchaser.

12.8 S8—OTHER SUPPLEMENTARY REQUIREMENTS

Any additional supplementary requirements must be agreed upon by the purchaser and manufacturer.

APPENDIX A—USE OF API MONOGRAM

A.1 Marking

The following marking requirements apply to licensed manufacturers using the API monogram on products covered by this specification.

A.2 Sheave Marking

Sheaves conforming to this specification shall be marked with the manufacturer's name or mark, the sheave groove size, the API license number, monogram, and date of manufacture and the sheave O.D. These markings shall be cast or stamped on the side of the outer rim of the sheave. Example: A 36 in. sheave with l $^{1}/_{8}$-inch groove should be marked:

AB CO l $^{1}/_{8}$ 8A XXXX.X  **MO-YR 36**

A.3 Product Marking

Each item of hoisting equipment furnished in conformance with this specification shall be marked with the manufacturer's name or mark, and the rating or class designation marking specified. In addition, authorized manufacturers may mark all such items with the API monogram when preceded by the API license number and followed by the date of manufacture. Additional markings may be applied at the option of the manufacturer. Example: A traveling block rated 650 short tons should be marked:

AB CO 650 8A XXXX.X  **MO-YR**

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