

SPECIFICATION FOR RING-JOINT FLANGES FOR DRILLING AND PRODUCTION SERVICE FOR 15,000 PSI WORKING PRESSURE

**TECHNICAL REPORT TR5701
Revision New**

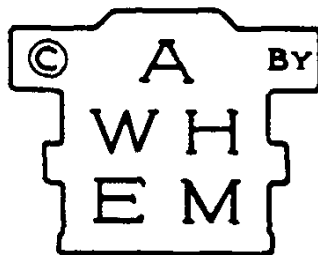
AWHEM publications may be used by anyone desiring to do so. Every effort has been made by the Association to assure the accuracy and reliability of the data contained in them; however, the Association makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state or municipal regulation with which this publication may conflict.

**Association of Well Head
Equipment Manufacturers
Post Office Box 1166
Bellaire, Texas 77401**



AWHEM STD. NO. 6
FIRST EDITION
JUNE, 1957

AWHEM
SPECIFICATION
FOR
RING-JOINT FLANGES
FOR DRILLING AND PRODUCTION SERVICE
FOR 15,000 PSI WORKING PRESSURE



Official
Monogram



Official
Seal

Issued by
Association of Well Head
Equipment Manufacturers
Houston 2, Texas

COPYRIGHT 1957 BY ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS.

PRICE: 50c

NOTE: COPIES OF THIS SPECIFICATION ARE AVAILABLE FROM ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS, HOUSTON, TEXAS.

TABLE OF CONTENTS

	PAGE
FOREWORD -----	3
SCOPE -----	4
MATERIALS -----	4
DESIGN -----	5
DIMENSIONS AND TABLES -----	6
MARKING -----	7
INSPECTION -----	7
APPENDIX "A" (RING-JOINT GASKETS) -----	8 - 9
APPENDIX "B" (AWHEM REPRESENTATIVES) -----	10

FOREWORD

THE AWHEM STANDARD No. 6 IS THE RESULT OF A PROJECT INITIATED BY THE ASSOCIATION OF WELLHEAD EQUIPMENT MANUFACTURERS IN AUGUST OF 1952, SPECIFICALLY, TO DEVELOP CONNECTIONS FOR WORKING PRESSURES GREATER THAN 10,000 PSI. DURING THIS DEVELOPMENT PROGRAM THE ASSOCIATION PUBLISHED SUMMARY REPORTS No. 1, No. 2 AND No. 3 DETAILING THE MANY ASPECTS OF THE PROBLEM AND THE DATA JUSTIFYING THE CONCLUSIONS REACHED. THESE REPORTS ARE ALSO REPRODUCED IN THE BULLETINS OF THE AMERICAN PETROLEUM INSTITUTE TITLED "THE REPORTS OF MEETINGS OF COMMITTEES ON STANDARDIZATION OF OILFIELD EQUIPMENT". IN ADDITION, AWHEM BULLETIN No. 6A ISSUED IN JUNE OF 1957 REPORTS IN DETAIL THE EXPERIMENTAL STRESS ANALYSIS OF TWO HIGH-PRESSURE (15,000 PSI) AWHEM FLANGES AS CONDUCTED BY AN INDEPENDENT TESTING LABORATORY. THE ASSOCIATION IS INDEBTED TO API AND THE MANY COMPANIES AS WELL AS INDIVIDUALS FOR THE SUPPORT THIS INDUSTRY-WIDE ENDEAVOR HAS RECEIVED.

SECTION I.

SCOPE:

1. THIS SPECIFICATION COVERS MATERIALS AND DIMENSIONS FOR END FLANGED CONNECTIONS FOR WELLHEAD EQUIPMENT INTENDED FOR USE IN DRILLING AND PRODUCTION WELL CONTROL, REPRESSURING, AND CYCLING SERVICES IN PRESSURE RANGES UP TO 15,000 PSI WORKING PRESSURE.
2. ONLY INTEGRAL FLANGES FOR VALVES, FITTINGS AND WELLHEADS ARE COVERED BY THIS STANDARD.
3. THIS STANDARD ALSO COVERS RING-JOINT GASKETS AND FLANGE BOLTING, BUT NEITHER SHALL BE FURNISHED UNLESS THE PURCHASE ORDER SO STATES.
4. NOTHING CONTAINED IN THIS SPECIFICATION IS TO BE CONSTRUED AS GRANTING ANY RIGHT, BY IMPLICATION OR OTHERWISE, FOR MANUFACTURE, SALE, OR USE IN CONNECTION WITH ANY METHOD, APPARATUS, OR PRODUCT COVERED BY LETTERS PATENT, NOR AS INSURING ANYONE AGAINST LIABILITY FOR INFRINGEMENT OF LETTERS PATENT.

SECTION II.

MATERIALS:

5. GENERAL. THIS SPECIFICATION IS INTENDED TO COVER MINIMUM PHYSICAL REQUIREMENTS AND MATERIALS OF SUPERIOR QUALITY MAY BE SUBSTITUTED.
6. INTEGRAL FLANGES FOR VALVES, FITTINGS, AND WELLHEADS SHALL BE FABRICATED OF STEEL HAVING PHYSICAL PROPERTIES, AS REPRESENTED BY TEST COUPONS,* EQUAL TO OR EXCEEDING THOSE SPECIFIED BELOW:

*AS REPRESENTED BY A TEST COUPON OF THE MATERIAL TAKEN FROM A SEPARATE BLOCK, WHICH SHALL BE REPRESENTATIVE OF PHYSICALS OF THE MATERIAL OF THE PRODUCT.

YIELD STRENGTH, PSI (MINIMUM) -----	75,000
YIELD STRENGTH, PSI (MAXIMUM) -----	90,000
ELONGATION, PERCENT IN 2 IN. (MINIMUM)-----	18
REDUCTION OF AREA, PERCENT (MINIMUM) -----	30

NOTE: CHEMICAL ANALYSES ARE PURPOSELY OMITTED FROM THIS SPECIFICATION IN ORDER TO PROVIDE THE MANUFACTURER WITH COMPLETE FREEDOM TO DEVELOP STEELS MOST SUITABLE FOR THE MULTIPLICITY OF REQUIREMENTS ENCOUNTERED IN THIS VERY CRITICAL SERVICE.

7. RING-JOINT GASKETS. RING-JOINT GASKETS SHALL BE OF MATERIALS AS SPECIFIED IN APPENDIX "A".
8. BOLTING. BOLTING MATERIALS SHALL BE OF A QUALITY AND STRENGTH NOT LESS THAN SPECIFIED BY ASTM A-354 GRADE BC. NUTS SHALL BE OF A QUALITY NOT LESS THAN ASTM A-194 GRADE 2H.

SECTION III

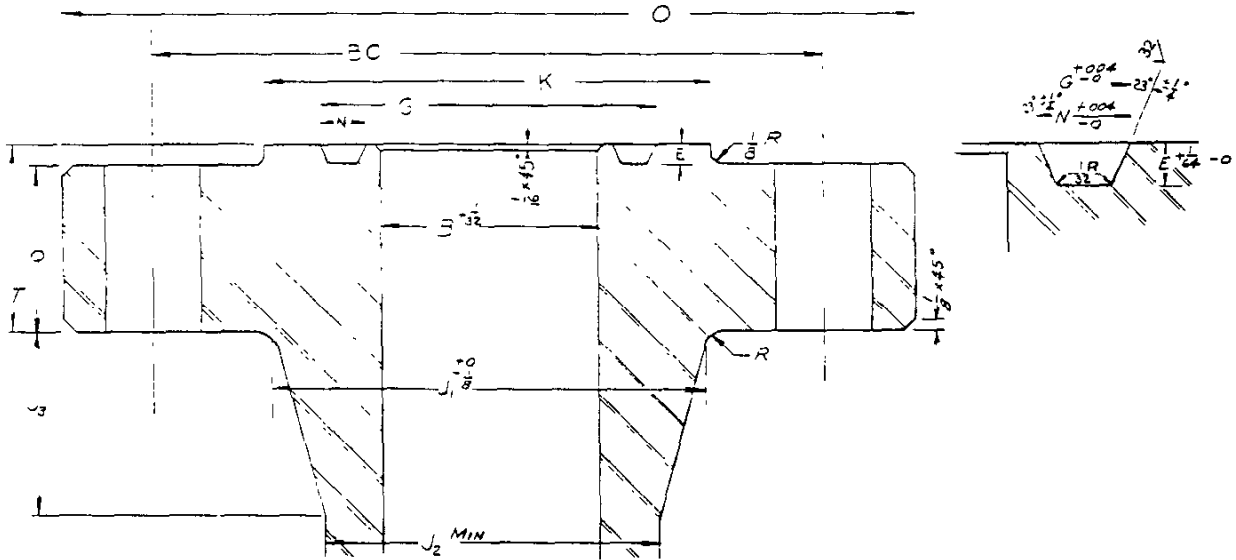
DESIGN:

9. FLANGE DIMENSIONS. FLANGES SHALL CONFORM TO THE DIMENSIONS SPECIFIED IN TABLE I.
10. FLANGE FACING. FLANGES SHALL BE FULLY MACHINED ON THE RING-JOINT SIDE, AND THE RING GROOVE SIDES, CONTACT SURFACES, SHALL BE FREE FROM ANY OBJECTIONABLE RIDGES, TOOL, AND CHATTER MARKS WHICH MAY CAUSE LEAKAGE.
11. SPOT FACING. ALL FLANGES, WHETHER OF CAST STEEL OR FORGED STEEL, SHALL BE SPOT FACED OR BACK FACED PARALLEL TO THE FLANGE FACE. THE FLANGE THICKNESS AFTER FACING SHALL CONFORM TO THE MINIMUM DIMENSIONS GIVEN IN TABLE I.
12. RING-JOINT GASKETS. RING-JOINT GASKETS SHALL CONFORM DIMENSIONALLY TO THOSE SHOWN IN APPENDIX "A".
13. BOLTING. FLANGE BOLTS SHALL BE OF THE BOLT-STUD TYPE, FITTED WITH SEMI-FINISHED HEXAGON NUTS OF THE AMERICAN STANDARD HEAVY SERIES, AS DIMENSIONED IN ASA B18.2. BOLT-STUDS AND NUTS SHALL BE THREADED IN ACCORDANCE WITH AMERICAN STANDARD FOR SCREW THREADS FOR HIGH STRENGTH BOLTING, ASA B1.4. BOLT DIAMETERS SHALL BE AS GIVEN IN THE FLANGE TABLES HEREIN. THE ENDS OF ALL BOLT-STUDS SHALL BE POINTED.
14. BOLTING LENGTHS. BOLT-STUD LENGTHS SHALL CONFORM TO DIMENSIONS GIVEN IN THE TABLE No. 1. THE LENGTH DIMENSION INCLUDES THE THICKNESS OF TWO NUTS AND THE HEIGHT OF TWO POINTS. A POINT IS THAT PART OF A BOLT-STUD BEYOND THE THREAD AND MAY BE CHAMFERED OR ROUNDED. THE HEIGHT OF EACH POINT SHALL NOT EXCEED:

<u>BOLT DIAMETER, IN.</u>	<u>MAX. POINT HEIGHT, IN.</u>
1/2 to 7/8	1/8
Over 7/8 to 1-1/8	3/16
Over 1-1/8 to 1-5/8	1/4
Over 1-5/8 to 1-7/8	5/16
Over 1-7/8 to 2-1/4	3/8

NOTE: THESE LENGTHS ARE ESTABLISHED AS A STANDARD FOR THE CONVENIENCE OF INDUSTRY TO SIMPLIFY THE ASSEMBLY OF THESE PARTS ON CONSTRUCTION WORK, BUT CONSUMERS MAY SELECT BOLT LENGTHS TO SUIT THEIR NEEDS.

FLANGES FOR 15000 PSI MAXIMUM
SERVICE PRESSURE RATING

TABLE I

BASIC FLANGE DIMENSIONS								BOLTING DIMENSIONS				FACING & GROOVE DIMENSIONS			
NOMINAL SIZE & BORE	OUTSIDE DIAMETER	TOTAL THICKNESS	BASIC THICKNESS	LARGE DIA OF HUB	SMALL DIA OF HUB	LENGTH OF HUB	RADIUS AT HUB & FLANGE	DIAMETER OF BOLT CIRCLE	NUMBER OF BOLTS	DIAMETER OF BOLTS	LENGTH OF BOLTS	DIAMETER OF FACE	OUTSIDE DIA OF GROOVE	WIDTH OF GROOVE	DEPTH OF GROOVE
B	O	T	O	J ₁	J ₂	J ₃	R	BC		D ₁	L	K	G	N	E
1 11/16	7 5/8	1 3/4	1 1/2	3 11/16	2 11/16	1 7/8	3/8	6	8	3/4	5 3/4	3 5/8	2893	.450	7/32
1 13/16	8 3/16	1 25/32	1 9/16	3 27/32	2 13/16	1 7/8	3/8	6 5/16	8	7/8	5 3/4	3 7/8	3062	.466	7/32
2 1/16	8 3/4	2	1 3/4	4 3/8	3 1/4	2 1/8	3/8	6 7/8	8	7/8	6 1/4	4 1/2	3395	.4975	15/64
2 3/16	10	2 1/4	2	5 1/16	3 15/16	2 1/4	3/8	7 7/8	8	1	7	5 1/4	4046	.554	17/64
3 1/16	11 5/16	2 17/32	2 1/4	6 1/16	4 13/16	2 1/2	3/8	9 1/16	8	1 1/8	8	6 1/16	4685	.606	19/64
7 1/16	19 7/8	4 11/16	4 1/4	12 13/16	10 7/8	3 5/8	5/8	16 7/8	16	1 1/2	13	12	9521	.9206	7/16

NOTE: BOLT HOLES SHALL BE DRILLED 1/8" LARGER IN DIAMETER THAN THE BOLT SIZE

SECTION IV

MARKING:

15. FLANGES. ALL FLANGES SHALL BE MARKED IN ACCORDANCE WITH STIPULATIONS AS GIVEN BELOW. OTHER MARKINGS MAY BE APPLIED AT THE OPTION OF MANUFACTURER.
 - A. NAME. THE MANUFACTURER'S NAME OR TRADEMARK.
 - B. SIZE. NOMINAL FLANGE SIZE WILL BE THE ACTUAL BORE SIZE AS LISTED IN THE FIRST COLUMN OF THE TABLES.
 - C. SERVICE PRESSURE RATING. THE NUMERALS COMPRISING THE MAXIMUM SERVICE PRESSURE RATING OF 15,000 WILL BE PRECEDED BY THE MONOGRAM* OR LETTERS AWHEM.
16. RING GASKETS. RING GASKETS SHALL BE MARKED AS SPECIFIED IN APPENDIX "A".
17. BOLTING. BOLTING SHALL BE MARKED IN ACCORDANCE WITH THE GOVERNING ASTM SPECIFICATION.

*THE AUTHORITY TO USE THE OFFICIAL MONOGRAM CAN BE GRANTED ONLY BY THE ASSOCIATION OF WELLHEAD EQUIPMENT MANUFACTURERS.

SECTION V

INSPECTION:

18. THE TEST RACKS AND WORKS OF THE MANUFACTURER WHERE MATERIAL IS BEING MADE IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE OPEN TO REPRESENTATIVES OF THE PURCHASER.

THE MANUFACTURER SHALL AFFORD THESE REPRESENTATIVES WITHOUT CHARGE, ALL REASONABLE FACILITIES TO SATISFY THEM THAT MATERIAL IS BEING MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION. ALL INSPECTIONS SHALL BE MADE AT THE PLACE OF MANUFACTURE PRIOR TO SHIPMENT, AND SHALL BE CONDUCTED SO AS NOT TO INTERFERE UNNECESSARILY WITH THE OPERATION OF THE WORKS.
19. TEST PRESSURE. FLANGES FURNISHED UNDER THIS SPECIFICATION WILL IN ALL CASES BE SHOP TESTED AND THEY SHALL BE CAPABLE OF WITHSTANDING HYDROSTATIC TEST PRESSURES EQUAL TO 1-1/2 TIMES THE MAXIMUM SERVICE PRESSURE RATING. (22,500 PSI TEST).
20. COMPLIANCE. THE MANUFACTURER IS RESPONSIBLE FOR COMPLYING WITH ALL THE PROVISIONS OF THIS SPECIFICATION. THE PURCHASER MAY MAKE ANY INVESTIGATION NECESSARY TO SATISFY HIMSELF OF COMPLIANCE BY THE MANUFACTURER AND MAY REJECT ANY MATERIAL THAT DOES NOT COMPLY WITH THIS SPECIFICATION.

APPENDIX "A"

MATERIALS:

1. RING-JOINT GASKETS. RING-JOINT GASKETS SHALL BE OF MATERIALS AS SPECIFIED BELOW AND SHALL BE FURNISHED WITH A HARDNESS EQUAL TO OR LESS THAN THAT SHOWN.

METAL	MAXIMUM HARDNESS		
	BHN	ROCK. "B"	MARK. IDENT.
SOFT IRON (0.2% MAX. CARBON)	*90	50	D
LOW CARBON STL. (0.2% MAX. CARBON)	120	68	S
TYPE 304 ALLOY (18% CHROME, 8% NI.)	160	83	S304
TYPE 316 ALLOY (18% CHROME, 12% NI.)	160	83	S316

NOTE: BRINELL MEASURED w/3000 KG LOAD.

*BRINELL MEASURED w/500 KG LOAD.

ROCK. "B" MEASURED w/100 KG LOAD, 1/16" DIA. BALL.

STEEL GASKETS TO BE CADMIUM PLATED .0002 - .0005" MAX.

DESIGN:

2. RING-JOINT GASKETS SHALL CONFORM DIMENSIONALLY TO THOSE SHOWN IN THE TABLE ON PAGE 9.

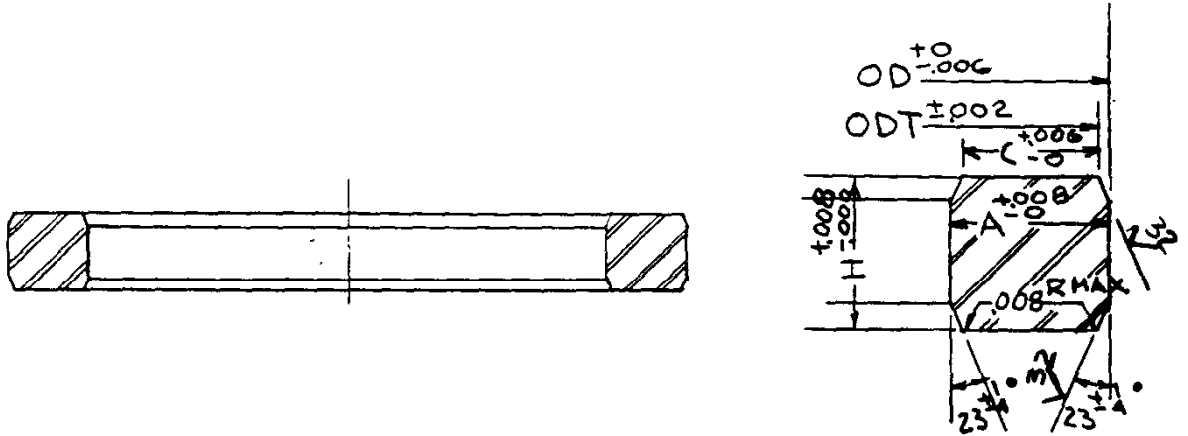
MARKING:

3. THE OUTER SURFACE OF EACH GASKET SHALL CARRY THE MANUFACTURER'S TRADEMARK, FLANGE BORE SIZE PREFIXED BY THE MONOGRAM* OR LETTERS AWHEM, AND FOLLOWED BY THE MATERIAL IDENTIFICATION. THE APPLICATION OF MARKING SHALL BE DONE SO AS NOT TO INJURE THE CONTACT FACES NOR TO HARMFULLY DISTORT THE GASKET.

*THE AUTHORITY TO USE THE OFFICIAL MONOGRAM CAN BE GRANTED ONLY BY THE ASSOCIATION OF WELLHEAD EQUIPMENT MANUFACTURERS.

APPENDIX A

GASKETS FOR 15000 PSI
MAXIMUM SERVICE PRESSURE RATING



SIZE BORE OF FLANGE	OUTSIDE DIA.	HEIGHT	WIDTH	FACE DIA.	FACE WIDTH
B	OD	H	A	ODT	C
1 ¹ / ₁₆	2.842	.366	.366	2.790	.314
1 ¹ / ₈	3.008	.379	.379	2.954	.325
2 ¹ / ₁₆	3.334	.403	.403	3.277	.346
2 ⁹ / ₁₆	3.974	.448	.448	3.910	.385
3 ¹ / ₁₆	4.600	.488	.488	4.531	.419
7 ¹ / ₁₆	9.367	.733	.733	9.263	.629

ALL FINISHES 120 RMS MAXIMUM EXCEPT AS NOTED.

APPENDIX "B"

AWHEM REPRESENTATIVES

ALCO PRODUCTS, INC. -----BEAUMONT, TEXAS
 CAMERON IRON WORKS, INC. -----HOUSTON, TEXAS
 GULF COAST MACHINE AND SUPPLY CO. -----BEAUMONT, TEXAS
 McEVoy COMPANY -----HOUSTON, TEXAS
 THE NATIONAL SUPPLY CO. -----HOUSTON, TEXAS
 RECTOR WELL EQUIPMENT Co., INC. -----FORT WORTH, TEXAS
 SHAFFER TOOL WORKS -----BREA, CALIFORNIA

ASSOCIATE MEMBERS

JOHNS-MANVILLE SALES CORPORATION ----- NEW YORK, N.Y.
 MISSION MANUFACTURING Co. ----- HOUSTON, TEXAS
 MURRAY RUBBER Co., INC. ----- HOUSTON, TEXAS
 ROCKWELL MANUFACTURING Co. ----- HOUSTON, TEXAS
 W-K-M DIVISION,
 ACF INDUSTRIES, INC. ----- MISSOURI CITY, TEXAS



Association of Well Head Equipment
 Manufacturers