

H. K. Rosen



# FLANGED & DISHED HEADS

**PRODUCTS and PRICES**

**PHOENIX STEEL CORPORATION**

**General Offices:  
CLAYMONT, DELAWARE**

**Product Office:  
CLAYMONT, DELAWARE**

H R ROSEN




# FLANGED & DISHED HEADS

**PRODUCTS and PRICES**

**PHOENIX STEEL CORPORATION**

General Offices:  
CLAYMONT, DELAWARE

Product Office:   
CLAYMONT, DELAWARE

# PHOENIX STEEL CORPORATION



## SALES OFFICES

BOSTON, MASS.  
(Braintree, Mass. 02184)  
174 Forbes Road  
Tel. 617 - 848-2910

CHARLOTTE, N. C. 28205  
P.O. Box 12645  
Tel. 704 - 536 - 3666

CHICAGO, ILL. 60646  
Edens East Office Center  
6200 North Hiawatha  
Tel. 312 - 736 - 4724

HOUSTON, TEX. 77055  
P.O. Box 55323  
Tel. 713 - 686 - 3741

LOS ANGELES, CALIF.  
(Long Beach, Calif. 90807)  
4134 Atlantic Avenue  
Tel. 213 - 426 - 9581

NEW YORK, N. Y.  
(Hackensack, N. J. 07601)  
354 State Street  
Tel. 201 - ~~HU8 - 8666~~  
212 - LA4 - 9633

PHILA. - BALTIMORE  
(Claymont, Del. 19703)  
4000 Phila. Pike  
Tel. 215 - LO3 - 7070  
301 - DR7 - 6100  
302 - 798 - 1411

PITTSBURGH, PENNA. 15220  
1910 Cochran Road  
Suite 350 Manor Oak Bldg.  
Tel. 412 - 531 - 8022, 23, 24

SALT LAKE CITY, UTAH 84110  
1604 South Second, West  
Tel. 801 - 466 - 1323

SEATTLE, WASH. 98199  
Magnolia Station  
P. O. Box 99273  
Tel. 206 - 283 - 6800

TULSA, OKLA. 74107  
4422 West 49th Street  
Tel. 918 - HI6 - 4411

*737-1416*  
*837-3095*  
*837-1416*

## SALES OFFICES CANADA RUSSELSTEEL LIMITED

420 Stinson Street  
Montreal 9, Quebec  
Tel. 514 - 747 - 9881

215 Bowes Road  
P.O. Box 186  
Downsview, Ontario  
Tel. 416 - 223 - 2220

1510 Clarence Avenue  
Winnipeg, Manitoba  
Tel. 204 - 474 - 2306



## GENERAL SALES OFFICES

CLAYMONT, DELAWARE 19703 • Telephone 302-798-1411



## PRODUCT SALES OFFICES

CLAYMONT, DELAWARE 19703 • Telephone 302-798-1411



## PLANTS

CLAYMONT, DELAWARE 19703 • PHOENIXVILLE, PENNSYLVANIA 19460



# INTRODUCTION...

THIS CATALOG IS PUBLISHED AS AN AID TO THE ENGINEERS, DESIGNERS AND OTHERS WHO DEAL WITH THE FABRICATION OF FIRED AND UNFIRED PRESSURE VESSELS AND TANKS OF VARIOUS DESIGNS.

IT CONTAINS COMPREHENSIVE INFORMATION ON PHOENIX:

- FLANGED AND DISHED HEADS
- FLUE HOLES
- MANHOLES
- HANDHOLES
- SADDLES AND FITTINGS

THERE IS ALSO INCLUDED A SECTION OF ENGINEERING DATA FOR CONVENIENT REFERENCE.

# INDEX

TOPIC	Page Number
<b>Introduction</b> . . . . .	1
<b>Index</b> . . . . .	2 and 3
<b>Facilities</b> . . . . .	4 to 8
<b>Flanged and Dished Heads</b> . . . . .	9 to 82
General Information on Heads . . . . .	10 to 15
Flanged Only Heads . . . . .	16 to 21
Standard Flanged and Dished Heads . . . . .	22 to 31
A.S.M.E. Code Flanged and Dished Heads . . . . .	32 to 43
Elliptical Dished Heads . . . . .	44 to 52
Flanged and Reverse Dished Heads . . . . .	53 to 55
Dished Only Heads . . . . .	56 to 61
Flared and Dished Heads . . . . .	62 to 65
Miscellaneous Head Photographs . . . . .	66
Flanged and Shallow Dished Heads . . . . .	67 to 69
Conical Heads . . . . .	70 to 73
Hemispherical Flanged Heads . . . . .	74 and 75
Special Heads . . . . .	76 and 77
Machining of Heads . . . . .	78 and 79
Welding of Heads . . . . .	80 and 81
Miscellaneous Head Photographs . . . . .	82
<b>Flue Holes, Manholes, Handholes, Saddles and Fittings</b> . . . . .	83 to 94
General Information . . . . .	84 and 85

T O P I C	Page Number
Types of Flued Heads . . . . .	86
List Price for Flue Holes . . . . .	87
Positioning of Manholes and Handholes . . . . .	88
List Price for Manholes and Handholes . . . . .	89
List Price for Reinforcing Bands . . . . .	89
Manhole and Handhole Fittings . . . . .	90
Storage Tank Manhole Frames and Covers . . . . .	91
Elliptical Manhole Rings . . . . .	91
Saddles . . . . .	92 and 93
<b>Engineering Data . . . . .</b>	<b>95 to 121</b>
Useful Information . . . . .	96 and 97
Working Pressure for Dished Heads . . . . .	98
Theoretical Weights of Steel Plates . . . . .	99
Sizes of Sheared and Gas Cut Steel Circles . . . . .	99
Approximate Volumes of Heads and Shells . . . . .	100
Circumferences and Areas of Circles . . . . .	101 to 108
<b>Circular Plates . . . . .</b>	<b>109 to 118</b>
Theoretical Weights of Circular Steel Plates . . . . .	110 to 114
Circle Pound Price Supplement . . . . .	115 to 118
Discounts and Extras . . . . .	119 to 122
Listing of Sales Offices . . . . .	Opposite Page One

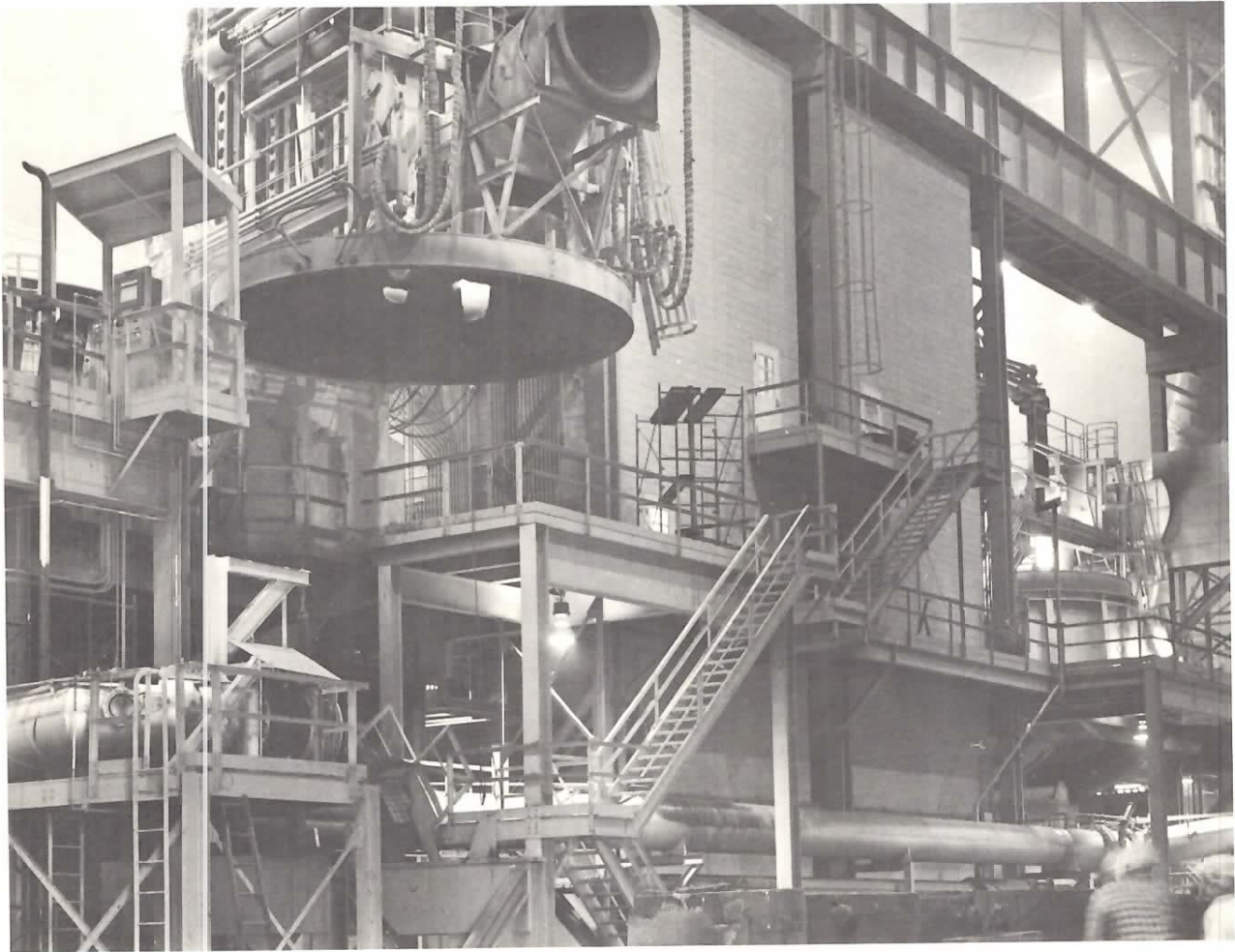
# Facilities and Capabilities

The Claymont, Delaware plant of Phoenix Steel has been one of the country's major producers of flanged and dished heads since 1921. Located on the Delaware River between Philadelphia, Pennsylvania and Wilmington, Delaware, it is favorably situated for shipment by rail, truck or water.

As a basic producer of steel and hot rolled plate, Phoenix controls quality from steelmaking to the finished head. A new melt shop and plate plant went into operation at Claymont in 1968. Steel is produced from two 150-ton electric arc furnaces, vacuum degassing as required and cast

through a continuous slab casting machine. The computer-controlled rolling complex comprised of a 2-high roughing mill operating in tandem with a 4-high 160-inch finishing mill guarantees the flat, scale-free surface finish so essential to quality head production.

Claymont produces a complete line of carbon, high-strength low-alloy, alloy, quenched and tempered, stainless and clad steels; — in fact, the most complete line from any one plate mill in the country. Clad steels include stainless-clad, nickel-clad, copper-clad, Monel\*-clad and Inconel\*-clad. All steels produced can be formed



Roof of one electric furnace (upper left) swings aside for charging scrap to start a new heat. White-hot electrodes of second electric furnace visible in right center during refining operation.

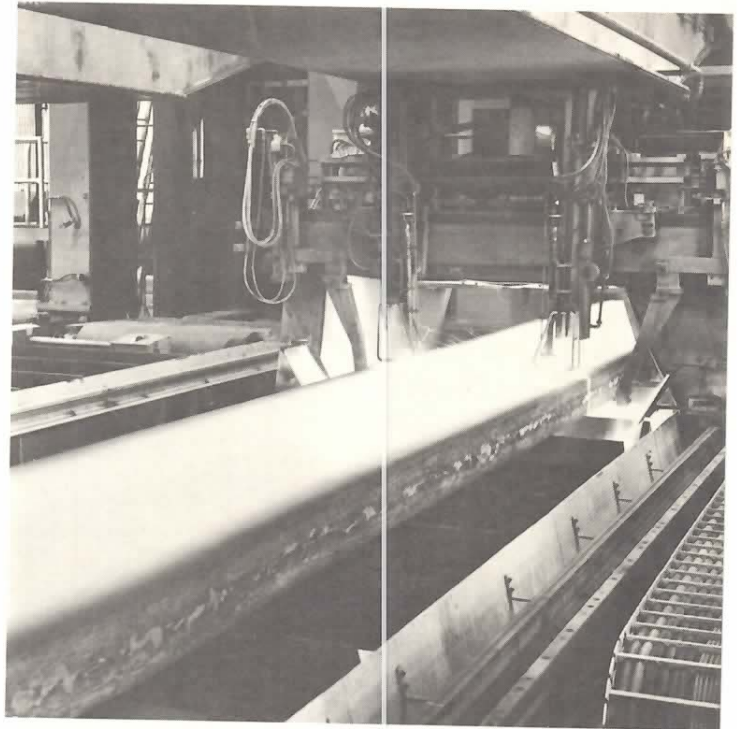
*\*Trade name of The International Nickel Co., Inc.*



Electric furnace tilts forward during pour of 150-ton heat.



Molten steel from furnace ladle is released into tundish then passes through snorkel tube in oscillating mold (lower center) of continuous casting machine.



Traveling torches cut cast into slab lengths as it slowly emerges from continuous casting machine.



# Facilities and Capabilities - Continued

into heads. The Flanging Department also forms copper, aluminum, nickel, and other materials.

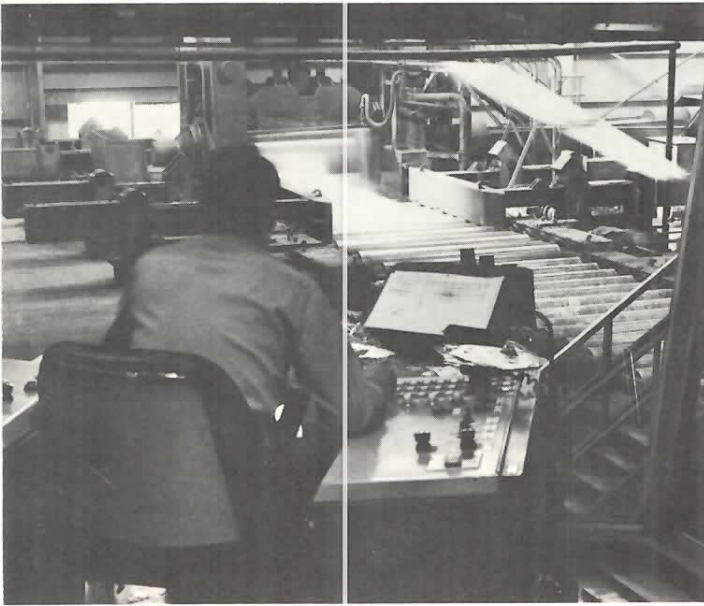
The plant is equipped to perform both spinning and pressing operations. Spun heads range in size from 9" to 19' O.D., in gages from 3/16"

to 6"; pressed heads range to 10' O.D., in gages from 3/16" to 2". Capability also includes pressing of flue holes, manholes etc.

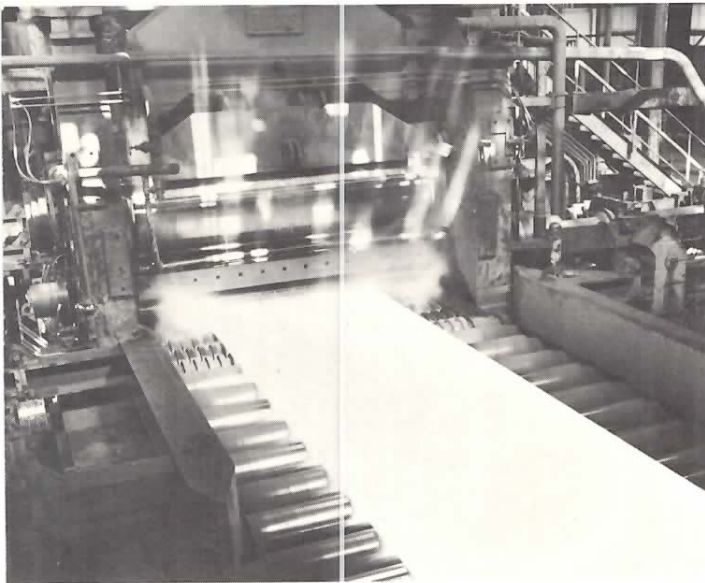
Phoenix produces all basic head types in the following size ranges:

Flanged only:	9" to 228" O.D.
Standard:	9" to 216" O.D.
ASME:	9" to 216" O.D.
Elliptical:	12" to 192" I.D.
Hemispherical:	24" to 96" I.D.

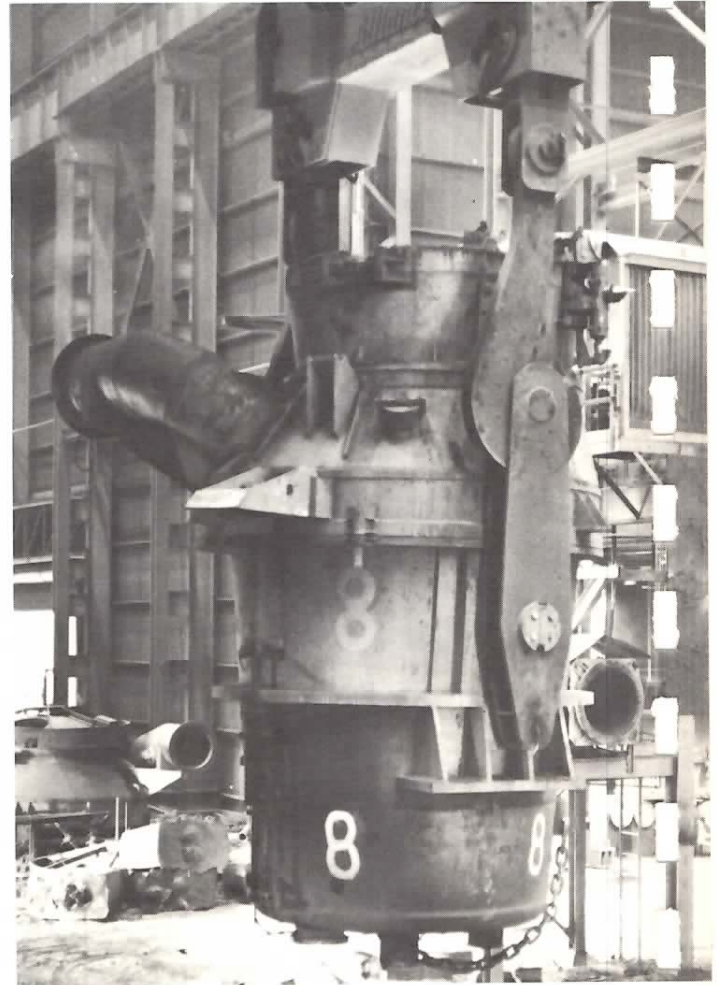
Heads requiring flat circles larger than produced by the 160-inch rolling mill are made by welding half circles. Welds can be 100 percent x-rayed and code certified as required. Heat



Two-high roughing and descaling mill (shown here) and 4-high finishing mill can be operated manually or by process control computer.



Powerful and fast 4-high 160-inch finishing mill produces a flat plate of excellent surface finish.



Degassed heat, with pony ladle and vacuum dome atop the ladle, starts 450 foot trip down melt shop aisle to continuous casting machine.

treating, flame trimming, machining, sand blasting, quenching, and pickling facilities are utilized as required.

For the convenience of customers needing quick delivery, Phoenix maintains extensive head inventories at Claymont, Delaware; Chicago, Illinois; Houston, Texas; and Tulsa, Oklahoma. Inventories are detailed in monthly stock lists which are available on request.

A head is only as good as the steel from which it is made and the skill with which it is formed. All-electric furnace steelmaking, a modern computer controlled rolling complex and diversified forming facilities, backed by nearly fifty years of head production experience, enables Phoenix to offer the best in quality. This is the head producing capability of Phoenix . . . the "we care more" steel company which offers price protection and does not compete with its customers in fabricating or warehousing.

We solicit your inquiries or requests for more information. Our sales offices are listed opposite page one.

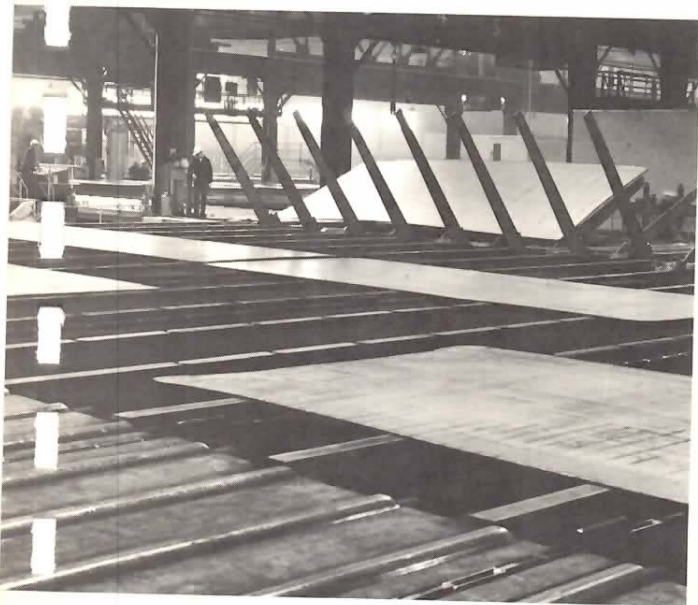


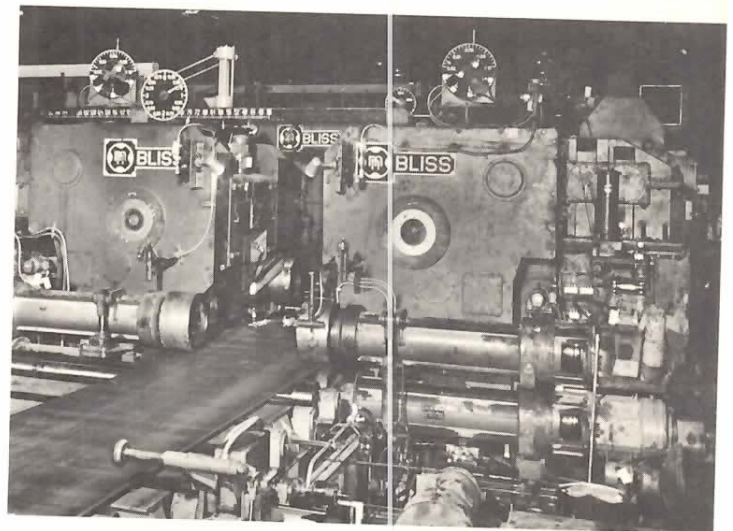
Plate turnover device makes possible inspection of both sides of plate to insure that quality standards are maintained.



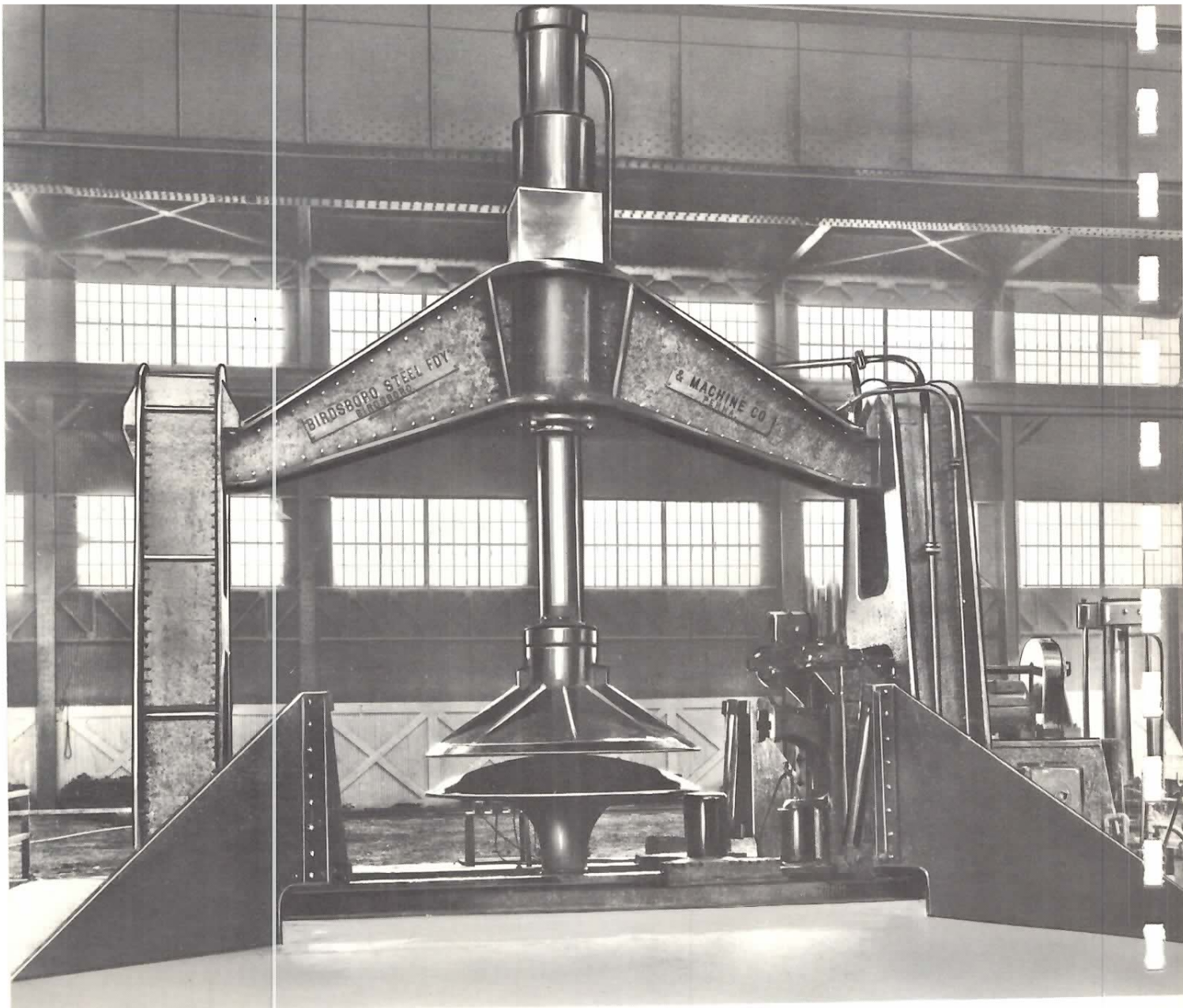
Three sizes of continuous cast slabs are produced - 6" x 60", 10" x 60" and 12" x 80", the world's largest when first cast in 1969.



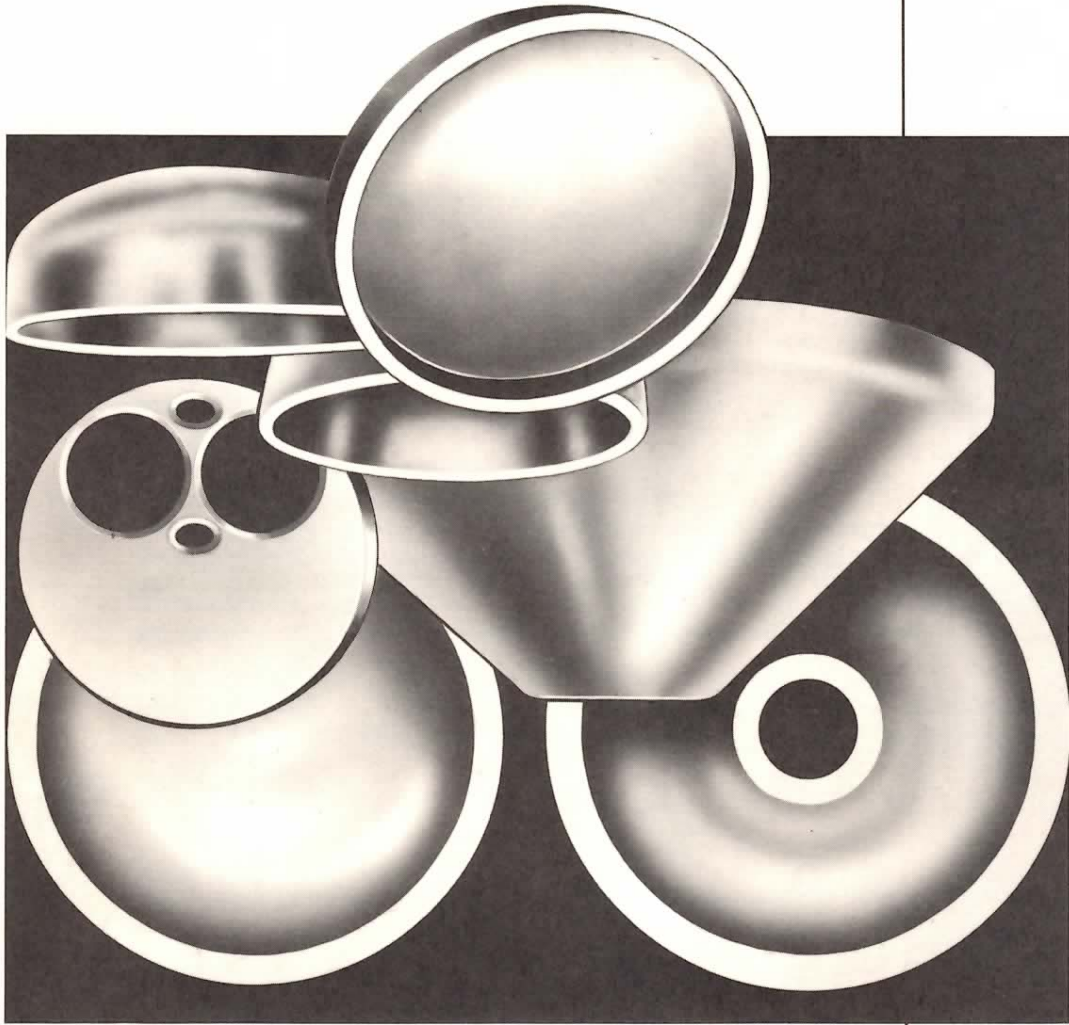
Scrap cars are unloaded into storage bins (center) or directly into charge buckets (right) in highly automated scrap aisle of electric furnace melt shop.



Double side trimming shears simultaneously cut both sides of plate to the closest tolerance in the industry.



One of the three spinning machines in our Flanging Department. In this department Flanged and Dished Heads in various sizes and thicknesses are made.



# FLANGED AND DISHED HEADS



# GENERAL INFORMATION

## Heads

The information on the following pages is essential to the proper ordering of heads. We suggest that it be carefully followed.

### Prices

Forming charges are based on the rolled thickness.

List Prices shown cover forming only and do not include metal. (Saddles, manhole and handhole fittings excepted—these include metal.)

Intermediate diameters and gauges take list prices shown for next larger diameter and heavier gauge.

List Prices cover heads formed from carbon steels to standard specifications. See page 15 for alloy steels, copper, copper alloys, aluminum, nickel and clad materials.

Prices are subject to quantity differentials as shown in our latest list covering discounts and extras. Prices are subject to change without notice.

ASME type flanged and dished heads up to 144" OD inclusive with radius of dish less than 80% of OD or more than 12" under the OD (use greater radius of the two) take Elliptical list prices for forming.

When inside corner radius exceeds both 1/12th of the OD, and three times thickness, Elliptical list prices apply for forming.

### Tolerances

Prices apply on heads manufactured to standard shop practice and will be furnished to standard shop tolerances on all dimensions unless otherwise specified. Special tolerances or conditions of manufacture will be quoted on application.

All flanged or flanged & dished heads (dished only and flared & dished excluded) are spun to the outside diameter. When inside diameter is specified, heads are spun to the equivalent outside diameter arrived at by adding twice the metal thickness to inside diameter. In the case of minimum thickness heads, the total rolled thickness of the plate will be used in arriving at outside diameter unless otherwise instructed. If inside diameter must be maintained to close tolerance, machining is necessary at additional charges as shown on Page 79.

#### Diameter

##### *Dished Only and Flared & Dished*

Up to 48" O.D. inclusive . . . . .	plus 1/2" minus 0"
Over 48" O.D. to 96" O.D. inclusive . . . . .	plus 3/4" minus 0"
Over 96" O.D. . . . .	plus 1" minus 0"

See pages 64 and 65 for tolerances on I.D. of flared and dished heads.

##### *All Other Heads*

Out-of-round not to exceed 1% of the outside diameter. For tolerance closer than standard, the re-sizing charge will apply.

#### Outside Overall Height

*Shallow Flanged & Dished* . . . . . plus 1" minus 0"

##### *All Other Heads:*

Up to 48" O.D. inclusive . . . . .	plus 1/2" minus 0"
Over 48" O.D. to 96" O.D. inclusive . . . . .	plus 3/4" minus 0"
Over 96" O.D. . . . .	plus 1" minus 0"

The above tolerances can be cut in half by special gas trimming, but to do this a charge for gas trimming will be assessed. Closer tolerances can be obtained by machining at the published machining charges.

# GENERAL INFORMATION

## Outside Circumference

These tolerances do not apply to Dished Only or Flared & Dished heads. Unless otherwise specified, Dished Only heads will be furnished with the edge radial to the center line with allowance for machining or gas cutting.

Where circumference tolerances closer than standard are required, the re-sizing charge will be 40% of list price for a *Flanged Only* head (for all types of heads) of same outside diameter and thickness. Regular quantity differentials apply to re-sizing charge.

<u>O.D. of Head</u>	<u>Rolled Gauge</u>	<u>Std. Tolerance (Plus or Minus)</u>	<u>Re-Sized Tolerance (Plus or Minus)</u>
Up to 48" Incl.	Up to 1" Incl.	3/8"	1/8"
	Over 1" to 2 1/2" Incl.	3/8"	3/16"
	Over 2 1/2" to 4" Incl.	1/2"	*
Over 48" to 96" Incl.	Up to 1" Incl.	1/2"	1/8"
	Over 1" to 2 1/2" Incl.	1/2"	1/4"
	Over 2 1/2" to 4" Incl.	3/4"	*
	Over 4" to 6" Incl.	1"	*
Over 96" to 180" Incl.	Up to 1" Incl.	3/4"	3/16"
	Over 1" to 2 1/2" Incl.	3/4"	3/8"
	Over 2 1/2" to 4" Incl.	1"	*
	Over 4" to 6" Incl.	1 1/2"	*
Over 180"	Up to 1" Incl.	1"	1/4"
	Over 1" to 2 1/2" Incl.	1"	1/2"
	Over 2 1/2" to 3" Incl.	1 1/2"	*

\*The Re-Sized Tolerances shown for heads over 1" to 2 1/2" inclusive apply to heads over 2 1/2" thick by machining the outside diameter with a Style C taper on the O.D. If 4 to 1 taper is also required on the I.D., machining charge will then be Style D.

On heads 2 1/2" and under in gauge—if closer than standard tolerance is specified on circumference and out-of-roundness, re-sizing will be charged twice.

## Flatness—Flanged Only Heads

Standard flatness tolerance on the flat portion of a flanged only head is the same as ASTM standards (Part 4, A-6 or A-20, latest revision) flatness tolerances for plates of the same width and length as the flat portion of the head. If tolerances closer than standard are specified, extra charges for special flattening will be as follows:

Less than standard to and including 50% of standard . . . . .	25c per 100#
Less than 50% to and including 25% of standard . . . . .	50c per 100#
Less than 25% of standard . . . . .	75c per 100#

# GENERAL INFORMATION

## Sizes

Sizes listed herein do not indicate the limit of our capacities in either diameter or thickness. Prices on larger sizes will be quoted on application. Sizes requiring circles beyond limits of our mills can be furnished from two-piece welded circles. Our welders are experienced and qualified in accordance with ASME and other codes. We have complete facilities for this welding, including X-Ray and stress relieving. Refer to Page 80 for more complete information.

## Heads

## Thickness

A.S.M.E. Code specifies that thickness after forming shall be not less than that determined by appropriate Code formula.

Any heads ordered "A.S.M.E." will be considered as *minimum thickness* unless specified nominal or otherwise indicated as not minimum.

Formed heads of code dimensions are often used for non code purposes and it is requested that the thickness be clarified so most economical heads can be supplied.

Where minimum thickness after forming is required, the following extra thickness will be added:

Minimum Thickness	Extra Thickness To Be Added	
	All Types Except Hemispherical	Hemispherical Type
*Up to but not including 1"	* $\frac{1}{16}$ "	$\frac{3}{16}$ "
1" up to but not including 2"	$\frac{1}{8}$ "	$\frac{3}{8}$ "
2" up to but not including 3"	$\frac{1}{4}$ "	$\frac{5}{8}$ "
3" up to but not including 3 $\frac{3}{4}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
3 $\frac{3}{4}$ " up to but not including 4 $\frac{1}{4}$ "	$\frac{1}{2}$ "	1"
4 $\frac{1}{4}$ " and over	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "

Forming charges are based on the increased thickness.

Where heads are ordered "Nominal Thickness" they will be made from plate thickness specified as nominal regardless of type head or other specifications.

\*On all types of heads within our range of manufacture over 150" O.D. the extra thickness to maintain minimum gauge up to but not including 1" will be  $\frac{1}{8}$ ". For heavier gauges the extra thicknesses indicated above will be satisfactory for these extremely large heads.

**EXCEPTION:** For all types of heads in the large diameters where we show in the blue shaded area that prices will be quoted on application, the extra thickness to maintain minimum after forming will be at least  $\frac{3}{16}$ ".

## Dish Radii

Dish radii listed herein are considered standard. Variations from these are permissible for ASME Type heads at no additional charge, within the following restrictions:

1. Radius may be 80% of diameter, but in no case more than 12" less than head diameter (greater radius of the two applies). See page 10 under prices.
2. Dies for heads up to 30" are made in increments of 2"; over 30" to 132" inc. in 6" increments; over 132" available dies are 144", 168", 192", 240", and 285" Radius.

Radius must be nearest die size within these limits. Special radii will be quoted on application. For additional information on dish radii of dished only heads, see pages 58 through 61 inclusive.

## Straight Flange

List prices cover straight flanges shown herein as standard. Flanges exceeding standards shown will involve an extra of 5% for each additional  $\frac{1}{2}$ " or fraction thereof.

Straight flange should be kept to minimum requirements.

Heads ordered with flange toed in or toed out will be subject to an extra charge of 50% over list price, based on the greater diameter.

Flange thickness of spun heads will in most cases exceed ordered thickness due to thickening of metal at edge. (See Page 78 for machining details.)

## Heads

### Inside Knuckle Radius

**FLANGED ONLY HEADS:** When ordered STANDARD, heads will be furnished with an inside knuckle radius of twice metal thickness. When ordered ASME, inside knuckle radius will be furnished three times metal thickness. When ordered with knuckle radius greater than 3 times metal thickness, an extra charge of 5% for each additional 1/2" or fraction thereof will apply.

**FLANGED AND DISHED HEADS:** When ordered STANDARD, heads will be furnished with inside knuckle radius of 3 times metal thickness. When ordered ASME they will be furnished with inside knuckle radius of 3 times metal thickness or 6% of diameter, whichever is greater. When ordered with an inside knuckle greater than above, an extra charge of 5% for each additional 1/2" or fraction thereof will apply.

### Overall Depth

Both Straight Flange and Overall cannot be maintained. When both are specified, indicate the more important dimension. For heads of dimensions other than listed herein refer to formula shown on page 96 for figuring depth.

### Elliptical Heads

Elliptical heads are furnished in accordance with ASME code with a 2:1 Ratio. Unless otherwise specified, elliptical heads are trimmed after forming to overall height with allowance for customer's preparation of welding joints.

**While prices shown are for inside diameter, Elliptical heads are actually spun to equivalent outside diameter as explained under tolerances.**

### Flat Sizes

For estimating purposes only, flat sizes of heads are figured as follows:

Flat sizes shall be considered in increments of 1/2". When estimated flat size results in a fraction 1/4" or less, it is permissible to drop the fraction to avoid a higher width extra.

#### FLANGED ONLY:

When I.K.R. does not exceed  $3 \times T$   

$$\text{O.D.} + (2 \times \text{S.F.}) + (3 \times T)$$

When I.K.R. exceeds  $3 \times T$   

$$\text{O.D.} + (2 \times \text{S.F.}) + \text{I.K.R.}$$

#### FLANGED AND DISHED:

##### STANDARD TYPE

When I.K.R. does not exceed  $3 \times T$   

$$\text{O.D.} + \frac{\text{O.D.}}{24} + (2 \times \text{S.F.}) + (2 \times T)$$

When I.K.R. exceeds  $3 \times T$   

$$\text{O.D.} + \frac{\text{O.D.}}{24} + (2 \times \text{S.F.}) + (\frac{2}{3} \text{ I.K.R.})$$

##### A.S.M.E. TYPE

$$\text{O.D.} + \frac{\text{O.D.}}{24} + (2 \times \text{S.F.}) + (\frac{2}{3} \text{ I.K.R.})$$

#### DISHED ONLY:

$$\text{O.D.} + \frac{\text{O.D.}}{24} + 1''$$

#### FLANGED AND REVERSE DISHED:

When I.K.R. does not exceed  $3 \times T$   

$$\text{O.D.} + \frac{\text{O.D.}}{24} + (2 \times \text{S.F.}) + (2 \times T)$$

When I.K.R. exceeds  $3 \times T$   

$$\text{O.D.} + \frac{\text{O.D.}}{24} + (2 \times \text{S.F.}) + (\frac{2}{3} \text{ I.K.R.})$$

#### FLARED AND DISHED:

$$\text{O.D.} + \frac{\text{I.D.}}{24}$$

#### SHALLOW FLANGED AND DISHED:

	D.R. Up to 197" Incl.	D.R. Over 197"
I.K.R. Not Exceeding $3 \times T$	$\text{O.D.} + \frac{\text{O.D.}}{32} + (2 \times \text{S.F.}) + (2 \times T)$	$\text{O.D.} + \frac{\text{O.D.}}{48} + (2 \times \text{S.F.}) + (2 \times T)$
I.K.R. Exceeding $3 \times T$	$\text{O.D.} + \frac{\text{O.D.}}{32} + (2 \times \text{S.F.}) + (\frac{2}{3} \text{ I.K.R.})$	$\text{O.D.} + \frac{\text{O.D.}}{48} + (2 \times \text{S.F.}) + (\frac{2}{3} \text{ I.K.R.})$

- Note 1. On all types except Dishd only, add 1" to flat size if edge of flange is machined or gas trimmed.  
 2. On all types except Dishd only and Flared and Dishd if thickness is 1" or over add metal thickness to above flat sizes.



# GENERAL INFORMATION

## Flat Sizes, continued

## Heads

### ELLIPTICAL

Ascertain the I.D. of the head, and find corresponding perimeter. Add twice straight flange, and then add thickness of metal.

Minimum straight flange for estimating size of flat circle is 2" or actual rolled thickness (use greater of these two). For example:

108" I.D. x 1" thick x 2" SF

Perimeter ..... 133 1/4"  
 2 x SF ..... 4"  
 Thickness of metal ..... 1"

Flat Size ..... 138 1/4" Dia.

108" I.D. x 3" thick x 2" SF

Perimeter ..... 133 1/4"  
 2 x T ..... 6"  
 Thickness of metal ..... 3"

Flat Size ..... 142 1/4" Dia.

Flat sizes for estimating purposes to be considered in increments of 1/2".

I.D.	Perimeter	I.D.	Perimeter	I.D.	Perimeter	I.D.	Perimeter	I.D.	Perimeter
6"	9 3/4"	36"	43 1/2"	66"	80 3/4"	97"	119 1/2"	127"	156"
7"	10 1/4"	37"	44 5/8"	67"	82"	98"	120 3/4"	128"	157 1/4"
8"	10 3/4"	38"	45 3/4"	68"	83 1/4"	99"	122"	129"	158 1/2"
9"	11 7/8"	39"	47"	69"	84 1/2"	100"	123 1/4"	130"	159 3/4"
10"	13"	40"	48 1/4"	70"	85 3/4"	101"	124 1/2"	131"	161"
11"	14 3/8"	41"	49 1/2"	71"	87"	102"	125 3/4"	132"	162 1/4"
12"	15 5/8"	42"	50 3/4"	72"	88 1/4"	103"	127"	133"	163 1/2"
13"	16 3/4"	43"	52 1/8"	73"	89 1/2"	104"	128 1/4"	134"	164 3/4"
14"	17 7/8"	44"	53 1/2"	74"	90 3/4"	105"	129 1/2"	135"	166"
15"	19"	45"	54 5/8"	75"	92"	106"	130 3/4"	136"	167 1/4"
16"	20 1/8"	46"	55 3/4"	76"	93 1/4"	107"	132"	137"	168 1/2"
17"	21 1/4"	47"	57"	77"	94 1/2"	108"	133 1/4"	138"	169 3/4"
18"	22 3/8"	48"	58 1/4"	78"	95 3/4"	109"	134 1/2"	139"	171"
19"	23 1/2"	49"	59 1/2"	79"	97"	110"	135 3/4"	140"	172 1/4"
20"	24 5/8"	50"	60 3/4"	80"	98 1/4"	111"	137"	141"	173 1/2"
21"	25 3/4"	51"	62"	81"	99 1/2"	112"	138 1/4"	142"	174 3/4"
22"	26 7/8"	52"	63 1/4"	82"	100 3/4"	113"	139 1/2"	143"	176"
23"	27 15/16"	53"	64 1/2"	83"	102"	114"	140 3/4"	144"	177 1/4"
24"	29"	54"	65 3/4"	84"	103 1/4"	115"	141 3/4"	145"	178 1/2"
25"	30"	55"	67"	85"	104 1/2"	116"	142 3/4"	146"	179 3/4"
26"	31"	56"	68 1/4"	86"	105 3/4"	117"	143 7/8"	147"	181"
27"	32 1/8"	57"	69 1/2"	87"	107"	118"	145"	148"	182 1/4"
28"	33 1/4"	58"	70 3/4"	88"	108 1/4"	119"	146 1/8"	149"	183 1/2"
29"	34 1/2"	59"	72"	89"	109 1/2"	120"	147 1/4"	150"	184 3/4"
30"	35 3/4"	60"	73 1/4"	90"	110 3/4"	121"	148 1/2"	151"	186"
31"	37"	61"	74 1/2"	91"	112"	122"	149 3/4"	152"	187 1/4"
32"	38 1/4"	62"	75 3/4"	92"	113 1/4"	123"	151"	153"	188 1/2"
33"	39 1/2"	63"	77"	93"	114 1/2"	124"	152 1/4"	154"	189 3/4"
34"	40 3/4"	64"	78 1/4"	94"	115 3/4"	125"	153 1/2"	155"	191"
35"	42 1/8"	65"	79 1/2"	95"	117"	126"	154 3/4"	156"	192 1/4"
				96"	118 1/4"				

(Interpolate for intermediate diameters)

Above formula includes allowance for machining or burning edge of straight flange after forming.

### Hemispherical

Take one-half of the circumference of the mean diameter and add two times the straight flange if a straight flange is specified.

The mean diameter is the I.D. plus rolled gauge or O.D. minus rolled gauge. Circumferences are found on Pages 101 to 107 inclusive.

For example:

60" I.D. x 1" rolled gauge x 0" SF. Mean diameter (60" plus 1") equals 61".

Circumference of 61" circle equals 191.637".

One half of 191.637" equals 95.818" or 96" diameter for estimating purposes.

(Flat sizes for estimating purposes to be considered in increments of 1/2".)

## Machining

Heads can be furnished machined to customer's requirements. See page 79 covering list prices, styles of standard machining, and other details.

Where heads are to be machined either inside or outside diameter (not both), head thickness must exceed finished flange thickness by 1/16". If machined both inside and outside diameter, head thickness must exceed finished flange thickness by 1/8". This extra thickness is not in addition to extra added for minimum thickness. The greater of the two is to be used, not both.

# GENERAL INFORMATION

## Charges for Forming & Machining Alloy Steels as well as Metals not Manufactured by Phoenix

(Prices subject to regular quantity differentials shown on latest Discounts & Extras sheet)  
All inquiries for forming these metals should be referred to our General Sales Office

	Flanging & Dishing	Flue Holes Hand Holes Man Holes	Machining
ASTM A-202 . . . . .	List	List	List
ASTM A-204 . . . . .	List	List	List
ASTM A-302* . . . . .	List	List	List
PX 50, Cor-ten, Manten, Mayari-R, and ASTM A-441 . . . . .	List	List	List
MIL-S-871 Class I and Class II . . . . .	List	List	List
ASTM A-203* . . . . .	1½ x List	1½ x List	List
ASTM A-387* . . . . .	1½ x List	1½ x List	List
Nickel-5% or less . . . . .	1½ x List	1½ x List	List
AISI or SAE 4130 . . . . .	1½ x List	1½ x List	List
AISI or SAE 4140 . . . . .	1½ x List	1½ x List	List
MIL-S-18729B . . . . .	1½ x List	1½ x List	List
ASTM A-357 (Types #501 & #502) . . . . .	2 x List Plus annealing & sand blasting, no pickling	2 x List	List
Inconel, Solid Nickel, Monel, and Naval Brass . . . . .	2 x List	2 x List	2 x List
2% Chrome - ½% Moly . . . . .	2 x List	2 x List	2 x List
Ampco, Brass, Copper, Duronze, Everdur, Herculoy, Olympic Bronze . . . . .	Up to 48" O.D. Incl. 1½ x List over 48" O.D. 2 x List	1½ x List	List
Aluminum O or annealed condition . . . . .	1 to 49 Heads 2 x List 50 Hds. or more 1¼ x List	2 x List 1¼ x List	List List
Elliptical & Hemispherical types only in specification, with ten- sile strength exceeding 30,000 lbs. psi . . . . .	4 x List	4 x List	List
Cupro-Nickel (70% Cu. & 30% Ni.) . . . . . Super-Nickel (80% Ni. & 20% Ch.) . . . . .	4 x List	4 x List	2 x List
Nickel-8½% to 9% (ASTM A-353) Clad Steels Solid Stainless (300 & 400 Series) ASTM A-517 Grade A (PX-100 Plus) Other High-Strength Low-Alloys	Price on Application Price on Application Price on Application Price on Application Price on Application		

Forming Charges for metals other than shown above will be quoted on application

\* Two Piece Heads on Inquiry.

# Flanged Only Heads

117-1/4" O.D. flanged only heads, 1-1/8" gauge, 6-3/4" inside corner radius, 3-3/4" straight flange.



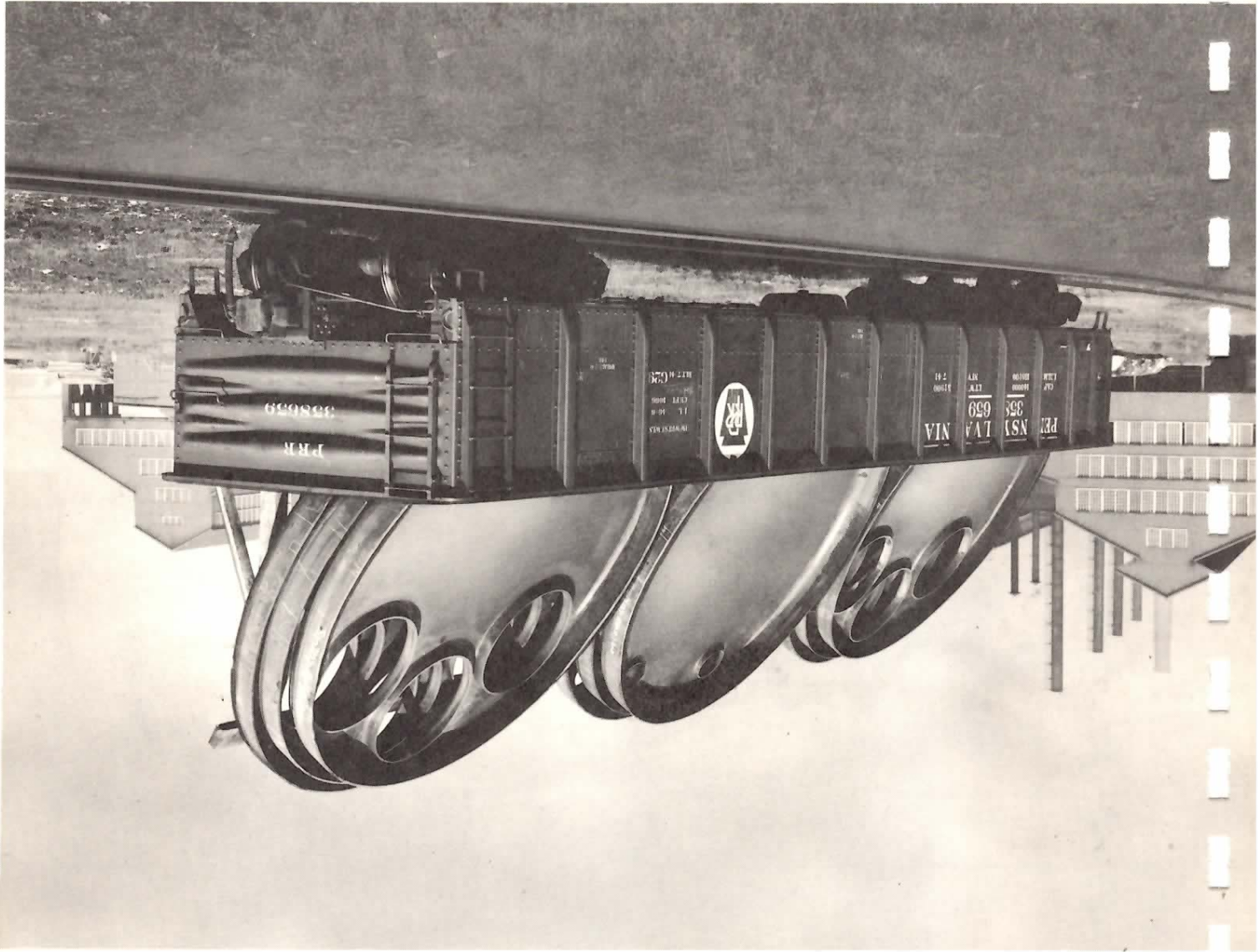
# FLANGED ONLY HEADS

Special Flanged Only Heads for Scotch Marine Boilers, 174 $\frac{3}{16}$ " outside diameter, made from two thickness circles, welded before flanging.

Front Heads have  $\frac{31}{32}$ " thick lower section with three 45" diameter flued holes. Upper section is  $\frac{1}{16}$ " thick. Heads have 3 $\frac{3}{32}$ " Outside Knuckle Radius and 8 $\frac{3}{32}$ " Straight Flange.

Rear Heads have  $\frac{29}{32}$ " thick lower section with two 12" x 16" manholes, and 1 $\frac{1}{8}$ " thick upper section with one 12" x 16" manhole. Heads have 4 $\frac{23}{32}$ " Outside Knuckle Radius and 8 $\frac{27}{32}$ " Straight Flange.

FLANGED  
ONLY

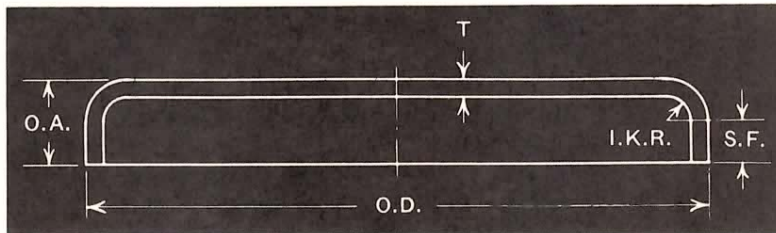


# FLANGED ONLY HEADS

Information required on orders and inquiries:

- Quantity.
  - Grade of steel.
  - O.D.—Outside diameter.
  - T—Thickness (specify min. or nom.)
  - IKR—Inside knuckle radius.
  - SF—Straight flange.
  - OA—Outside overall height.
- Cannot maintain both.  
Specify the more important dimension.

Machining or gas cutting, if required.  
Any other special work.



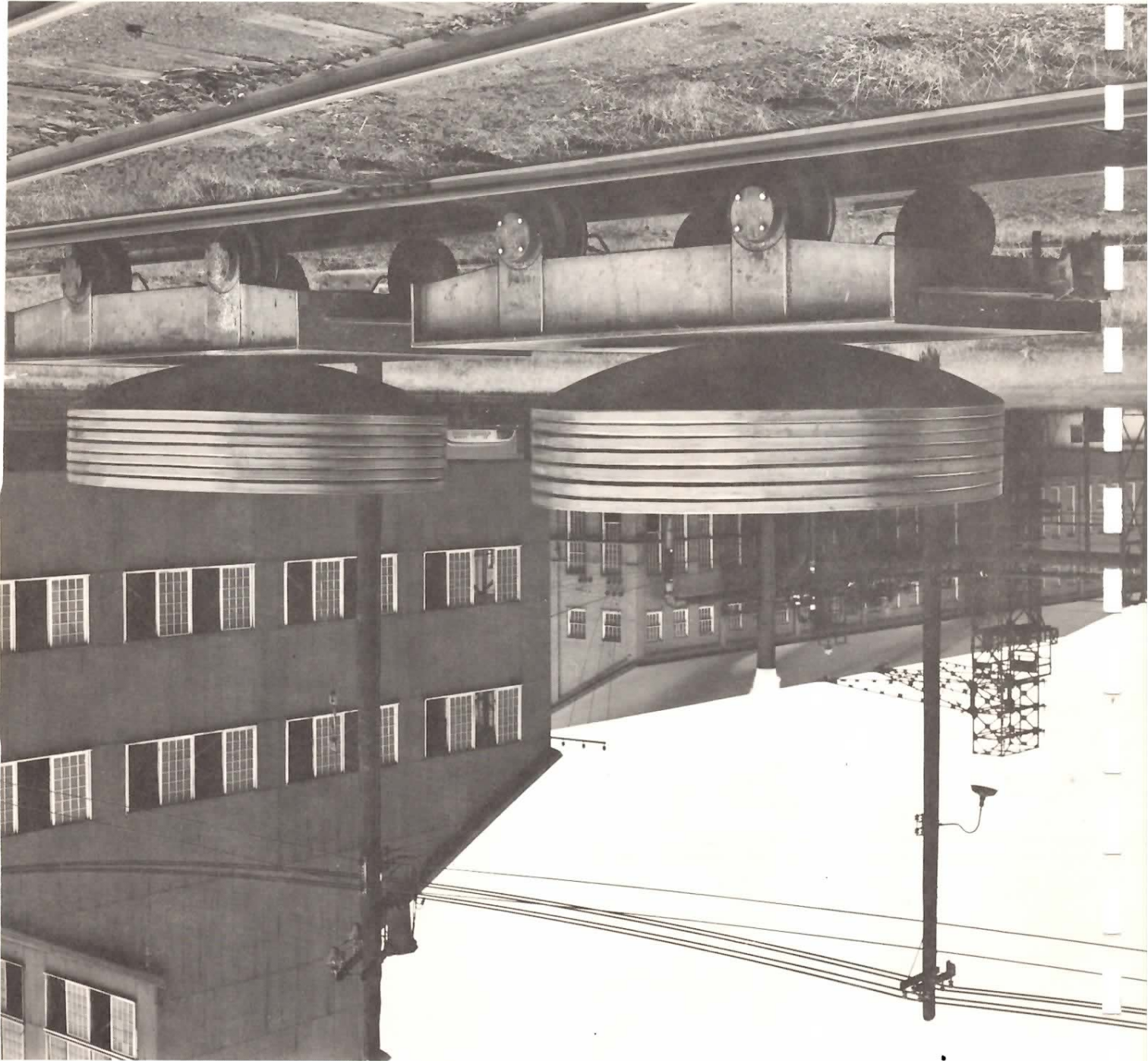
## List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	3/16 9/16 1 1/2-2 <sup>A</sup>	1/4 3/4 1 1/2-2 1/2 <sup>A</sup>	5/16 1 5/16 1 1/2-3	3/8 1 1/8 1 1/2-3	7/16 1 5/16 1 1/2-3 1/2	1/2 1 1/2 1 1/2-3 1/2	5/8 1 7/8 1 1/2-3 1/2	3/4 2 1/4 1 1/2-3 1/2
12	*Max. S.F. .... Flat Size ..... List Price .... \$	2 15 9/16 10.00	2 1/2 15 3/4 10.00	3 15 5/16 12.00	3 16 1/8 12.00	3 16 5/16 15.00	3 16 1/2 15.00	3 16 7/8 22.50	3 17 1/4 27.50
14	*Max. S.F. .... Flat Size ..... List Price .... \$	2 17 9/16 12.00	2 1/2 17 3/4 12.00	3 17 5/16 13.50	3 18 1/8 13.50	3 18 5/16 16.00	3 18 1/2 16.00	3 18 7/8 24.00	3 19 1/4 28.50
16	*Max. S.F. .... Flat Size ..... List Price .... \$	2 19 9/16 12.00	2 1/2 19 3/4 12.00	3 19 5/16 13.50	3 1/2 20 1/8 13.50	4 20 5/16 16.00	4 20 1/2 16.00	4 20 7/8 24.00	4 21 1/4 28.50
18	*Max. S.F. .... Flat Size ..... List Price .... \$	2 21 9/16 12.00	2 1/2 21 3/4 12.00	3 21 5/16 13.50	3 1/2 22 1/8 13.50	4 22 5/16 16.00	4 22 1/2 16.00	4 22 7/8 24.00	4 23 1/4 28.50
20	*Max. S.F. .... Flat Size ..... List Price .... \$	2 23 9/16 13.50	2 1/2 23 3/4 13.50	3 23 5/16 14.50	3 1/2 24 1/8 14.50	4 24 5/16 17.00	4 24 1/2 17.00	4 24 7/8 25.00	4 25 1/4 29.50
24	*Max. S.F. .... Flat Size ..... List Price .... \$	2 27 9/16 13.50	2 3/4 27 3/4 13.50	3 1/2 27 5/16 14.50	4 28 1/8 14.50	5 28 5/16 17.00	5 28 1/2 17.00	6 28 7/8 25.00	6 29 1/4 29.50
30	*Max. S.F. .... Flat Size ..... List Price .... \$	2 33 9/16 14.50	2 3/4 33 3/4 14.50	4 33 5/16 15.00	5 34 1/8 15.00	5 34 5/16 18.50	6 34 1/2 18.50	6 34 7/8 27.50	6 35 1/4 33.50
36	*Max. S.F. .... Flat Size ..... List Price .... \$	2 39 9/16 15.00	3 39 3/4 15.00	4 39 5/16 17.00	5 40 1/8 17.00	5 1/2 40 5/16 20.50	6 40 1/2 20.50	6 40 7/8 29.50	7 41 1/4 35.50
42	*Max. S.F. .... Flat Size ..... List Price .... \$	2 45 9/16 17.00	3 45 3/4 17.00	4 45 5/16 20.50	5 46 1/8 20.50	5 1/2 46 5/16 23.50	6 46 1/2 23.50	6 46 7/8 33.50	7 47 1/4 40.00
48	*Max. S.F. .... Flat Size ..... List Price .... \$	2 1/4 51 9/16 20.50	3 51 3/4 20.50	4 51 5/16 22.00	5 52 1/8 22.00	5 1/2 52 5/16 25.50	6 52 1/2 25.50	6 52 7/8 38.00	7 53 1/4 44.00
54	*Max. S.F. .... Flat Size ..... List Price .... \$	2 3/4 57 9/16 22.00	3 1/4 57 3/4 22.00	4 57 5/16 25.50	5 58 1/8 25.50	5 1/2 58 5/16 28.50	6 58 1/2 28.50	6 58 7/8 42.00	7 59 1/4 48.50
60	*Max. S.F. .... Flat Size ..... List Price .... \$	2 3/4 63 9/16 25.50	3 1/4 63 3/4 25.50	4 63 5/16 28.50	5 64 1/8 28.50	5 1/2 64 5/16 32.00	6 64 1/2 32.00	6 64 7/8 46.00	7 65 1/4 54.50
66	*Max. S.F. .... Flat Size ..... List Price .... \$	2 3/4 69 9/16 28.50	3 1/4 69 3/4 28.50	4 69 5/16 32.00	5 70 1/8 32.00	5 1/2 70 5/16 37.00	6 70 1/2 37.00	6 70 7/8 52.50	7 71 1/4 61.00
72	*Max. S.F. .... Flat Size ..... List Price .... \$	2 3/4 75 9/16 32.00	3 1/4 75 3/4 32.00	4 75 5/16 37.00	5 76 1/8 37.00	5 1/2 76 5/16 40.50	6 76 1/2 40.50	7 76 7/8 59.00	7 77 1/4 67.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

# FLANGED AND DISHED HEADS STANDARD



Standard Flanged and Dished Heads, 96" O.D. × 12 lbs. per sq. ft., 96" Dish Radius,  $\frac{1}{8}$ " I.K.R., 2" Straight Flange.

FLANGED AND  
DISHED (ST'D)

# STANDARD FLANGED AND DISHED HEADS

## STANDARD TYPE—NON CODE

Information required on orders and inquiries:  
 Quantity.  
 Grade of steel.  
 O.D.—Outside diameter.  
 T—Thickness (furnished nom. unless otherwise specified).  
 DR & IKR—If other than standard.  
 } SF—Straight flange.  
 } OA—Outside overall height.  
 Cannot maintain both. Specify the more important dimension.  
 Machining or gas cutting, if required.  
 Any other special work.

### List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	3/16 9/16 1 1/2-2*	1/4 3/4 1 1/2-2 1/2*	5/16 15/16 1 1/2-3	3/8 1 1/8 1 1/2-3	7/16 15/16 1 1/2-3 1/2	1/2 1 1/2 1 1/2-3 1/2	5/8 1 3/8 1 1/2-3 1/2	3/4 2 1/4 1 1/2-3 1/2	7/8 2 5/8 1 1/2-4	15/16 2 13/16 1 1/2-4	1 3 1 1/2-4	1 1/8 3 3/8 1 1/2-4 1/2
12	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	12 2 1 15/16 15 7/8 20.50	12 2 1/2 1 15/16 16 21.00	12 3 2 16 1/8 22.50	12 3 2 1/16 16 1/4 22.50	12 3 2 3/16 16 3/8 24.50	12 3 2 5/16 16 1/2 24.50	12 2 1/2 2 3/4 16 3/4 27.00	12 2 2 3/4 17 29.50	...	...	...	...
14	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	14 2 2 1/16 17 7/8 20.50	14 2 1/2 2 3/16 18 21.00	14 3 2 5/16 18 1/8 22.50	14 3 2 3/8 18 1/4 22.50	14 3 2 1/2 18 3/8 24.50	14 3 2 9/16 18 1/2 24.50	14 2 1/2 2 3/4 18 3/4 27.00	14 2 2 15/16 19 29.50	...	...	...	...
16	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	16 2 2 3/8 19 7/8 20.50	16 2 1/2 2 7/16 20 21.00	16 3 2 1/2 20 1/8 22.50	16 3 1/2 2 5/8 20 1/4 22.50	16 4 2 3/4 20 3/8 24.50	16 4 2 7/8 20 1/2 24.50	14 4 3 3/16 20 3/4 27.00	14 4 3 3/8 21 29.50	14 3 1/2 3 9/16 21 1/4 34.00	14 3 1/2 3 11/16 21 3/8 50.50	14 3 1/2 3 3/4 22 1/2 50.50	...
18	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	18 2 2 5/8 22 1/8 20.50	18 2 1/2 2 11/16 22 1/4 21.00	18 3 2 13/16 22 3/8 22.50	18 3 1/2 2 7/8 22 1/2 22.50	18 4 3 22 5/8 24.50	18 4 3 1/16 22 3/4 24.50	16 4 3 1/2 23 27.00	16 4 3 5/8 23 1/4 29.50	16 4 3 13/16 23 1/2 34.00	16 4 3 15/16 23 5/8 50.50	16 4 4 24 3/4 50.50	16 4 4 1/2 25 1/8 75.50
20	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	20 2 2 7/8 24 1/8 20.50	20 2 1/2 3 24 1/4 22.00	20 3 3 1/16 24 3/8 23.50	20 3 1/2 3 1/8 24 1/2 23.50	20 4 3 1/4 24 5/8 27.00	20 4 3 5/16 24 3/4 27.00	18 4 3 3/4 25 28.50	18 4 3 7/8 25 1/4 30.50	18 4 4 1/16 25 1/2 37.00	18 4 4 1/8 25 5/8 65.00	18 4 4 26 3/4 65.00	18 4 1/2 4 7/16 27 1/8 88.00
22	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	20 2 3 1/2 26 1/8 20.50	20 2 1/2 3 9/16 26 1/4 22.00	20 3 3 5/8 26 3/8 23.50	20 3 1/2 3 11/16 26 1/2 23.50	20 4 1/2 3 3/4 26 3/8 27.00	20 6 3 13/16 26 3/4 27.00	20 6 4 27 28.50	20 6 4 3/16 27 1/4 30.50	20 6 4 5/16 27 1/2 37.00	20 6 4 3/8 27 5/8 65.00	20 6 4 1/2 28 3/4 65.00	20 6 4 11/16 29 1/8 88.00
24	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	24 2 3 7/16 28 3/8 20.50	24 3 3 1/2 28 1/2 22.00	24 3 1/2 3 9/16 28 5/8 23.50	24 4 3 11/16 28 3/4 23.50	24 5 3 3/4 28 7/8 27.00	24 6 3 13/16 29 27.00	24 6 4 29 1/4 28.50	24 6 4 3/16 29 1/2 30.50	24 6 4 3/8 29 3/4 37.00	24 6 4 1/2 29 7/8 65.00	24 6 4 9/16 31 65.00	24 6 4 13/16 31 3/8 88.00
26	Dish Radius... *Max. S.F.... I.D.D.... Flat Size... List Price... \$	24 2 4 30 3/8 21.50	24 3 4 1/16 30 1/2 23.00	24 3 1/2 4 1/8 30 5/8 26.50	24 4 4 1/4 30 3/4 26.50	24 5 4 5/16 30 7/8 30.50	24 6 4 3/8 31 30.50	24 6 4 1/2 31 1/4 34.00	24 6 4 11/16 31 1/2 37.00	24 6 4 7/8 31 3/4 44.00	24 6 4 15/16 31 7/8 71.50	24 6 5 33 71.50	24 6 5 3/16 33 3/8 101.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

▲ Recommend maximum Straight Flange of 1 1/2" for 3/8" and 2 1/4" for 1/2" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Page 87-89 fluing manholes and flueholes.  
 Page 90 manhole and handhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# FLANGED ONLY HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	7/8 29/8 1 1/2-4	15/16 2 13/16 1 1/2-4	1 3 1 1/2-4	1 1/8 3 3/8 1 1/2-4 1/2	1 1/4 3 3/4 1 1/2-4 1/2	1 3/8 4 1/8 1 1/2-4 1/2	1 1/2 4 1/2 1 1/2-4 1/2	1 3/4 5 1/4 1 1/2-4 1/2	2 6 1 1/2-4 1/2
12	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	...
14	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	...
16	*Max. S.F. .... Flat Size ..... List Price .... \$	3 1/2 21 5/8 35.50	3 1/2 21 13/16 46.00	3 1/2 23 46.00	...	...	...	...	...	...
18	*Max. S.F. .... Flat Size ..... List Price .... \$	4 23 5/8 35.50	4 23 13/16 46.00	4 25 46.00	4 25 1/2 59.00	4 26 59.00	...	...	...	...
20	*Max. S.F. .... Flat Size ..... List Price .... \$	4 25 1/2 38.00	4 25 13/16 50.50	4 27 50.50	4 1/2 27 1/2 63.00	4 1/2 28 63.00	4 1/2 28 1/2 101.00	4 1/2 29 101.00	...	...
24	*Max. S.F. .... Flat Size ..... List Price .... \$	6 29 5/8 38.00	6 29 13/16 50.50	6 31 50.50	6 31 1/2 63.00	6 32 63.00	6 32 1/2 101.00	6 33 101.00	...	...
30	*Max. S.F. .... Flat Size ..... List Price .... \$	6 35 5/8 40.00	6 35 13/16 52.50	6 37 52.50	6 37 1/2 67.00	6 38 67.00	6 38 1/2 105.00	6 39 105.00	...	...
36	*Max. S.F. .... Flat Size ..... List Price .... \$	7 41 5/8 42.00	7 41 13/16 54.50	7 43 54.50	7 43 1/2 71.50	7 44 71.50	6 44 1/2 109.00	6 45 109.00	6 46 157.50	6 47 210.00
42	*Max. S.F. .... Flat Size ..... List Price .... \$	7 47 5/8 48.50	7 47 13/16 61.00	7 49 61.00	7 49 1/2 77.50	7 50 77.50	6 50 1/2 117.50	6 51 117.50	6 52 166.00	6 53 218.50
48	*Max. S.F. .... Flat Size ..... List Price .... \$	7 53 5/8 52.50	7 53 13/16 67.00	7 55 67.00	7 55 1/2 84.00	7 56 84.00	6 56 1/2 126.00	6 57 126.00	6 58 176.50	6 59 231.00
54	*Max. S.F. .... Flat Size ..... List Price .... \$	7 59 5/8 59.00	7 59 13/16 73.50	7 61 73.50	7 61 1/2 90.50	7 62 90.50	7 62 1/2 134.50	7 63 134.50	7 64 187.00	7 65 243.50
60	*Max. S.F. .... Flat Size ..... List Price .... \$	7 65 5/8 63.00	7 65 13/16 80.00	7 67 80.00	7 67 1/2 98.50	7 68 98.50	7 68 1/2 143.00	7 69 143.00	7 70 197.50	7 71 256.00
66	*Max. S.F. .... Flat Size ..... List Price .... \$	7 71 5/8 71.50	7 71 13/16 88.00	7 73 88.00	7 73 1/2 109.00	7 74 109.00	7 74 1/2 155.50	7 75 155.50	7 76 212.00	7 77 273.00
72	*Max. S.F. .... Flat Size ..... List Price .... \$	8 77 5/8 77.50	8 77 13/16 96.50	8 79 96.50	8 79 1/2 117.50	8 80 117.50	8 80 1/2 168.00	8 81 168.00	8 82 227.00	8 83 290.00

▲ Recommend maximum Straight Flange of 1 1/2" for 3/8" and 2 1/2" for 1/2" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases. Flanged Only Heads ordered "Standard" will be furnished with inside Knuckle Radius of 2xT and "ASME Type" 3xT unless otherwise specified.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes shown are based on 1 1/2" Straight Flange and 3xT Knuckle Radius. If dimensions not shown, see formula page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Page 87-89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.



# FLANGED ONLY HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	3/16 9/16 1 1/2-2 <sup>▲</sup>	1/4 3/4 1 1/2-2 1/2 <sup>▲</sup>	5/16 15/16 1 1/2-3	3/8 1 1/8 1 1/2-3	7/16 15/16 1 1/2-3 1/2	1/2 1 1/2 1 1/2-3 1/2	5/8 1 7/8 1 1/2-3 1/2	3/4 2 1/4 1 1/2-3 1/2
78	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 81 9/16 35.50	3 1/4 81 3/4 35.50	4 81 15/16 40.50	5 82 1/8 40.50	5 1/2 82 5/16 44.00	6 82 1/2 44.00	7 82 7/8 63.00	7 83 1/4 73.50
84	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 87 9/16 39.00	3 1/4 87 3/4 39.00	4 87 15/16 44.00	5 88 1/8 44.00	5 1/2 88 5/16 49.00	6 88 1/2 49.00	7 88 7/8 69.50	7 89 1/4 77.50
90	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 93 9/16 42.00	3 1/4 93 3/4 42.00	4 93 15/16 47.50	5 94 1/8 47.50	5 1/2 94 5/16 54.00	6 94 1/2 54.00	7 94 7/8 75.50	7 95 1/4 84.00
96	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 99 9/16 47.50	3 1/4 99 3/4 47.50	4 99 15/16 50.50	5 100 1/8 50.50	5 1/2 100 5/16 59.00	6 100 1/2 59.00	7 100 7/8 82.00	7 101 1/4 92.50
102	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 105 9/16 50.50	3 1/4 105 3/4 50.50	4 105 15/16 54.00	5 106 1/8 54.00	5 1/2 106 5/16 64.00	6 106 1/2 64.00	7 106 7/8 88.00	7 107 1/4 98.50
108	*Max. S.F. ... Flat Size ... List Price ... \$	23/4 111 9/16 54.00	3 1/4 111 3/4 54.00	4 111 15/16 57.50	5 112 1/8 57.50	5 1/2 112 5/16 69.00	6 112 1/2 69.00	7 112 7/8 96.50	7 113 1/4 107.00
114	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 117 3/4 61.00	4 117 15/16 61.00	5 118 1/8 61.00	5 1/2 118 5/16 74.50	6 118 1/2 74.50	7 118 7/8 105.00	7 119 1/4 115.50
120	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 123 3/4 64.00	4 123 15/16 64.00	5 124 1/8 64.00	5 1/2 124 5/16 79.50	6 124 1/2 79.50	7 124 7/8 113.50	7 125 1/4 126.00
126	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 129 3/4 71.00	4 129 15/16 71.00	5 130 1/8 71.00	5 1/2 130 5/16 86.00	6 130 1/2 86.00	7 130 7/8 122.00	7 131 1/4 134.50
132	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 135 3/4 81.00	4 135 15/16 81.00	5 136 1/8 81.00	5 1/2 136 5/16 96.00	6 136 1/2 96.00	7 136 7/8 132.50	7 137 1/4 143.00
138	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 141 3/4 91.00	4 141 15/16 91.00	5 142 1/8 91.00	5 1/2 142 5/16 104.50	6 142 1/2 104.50	7 142 7/8 143.00	7 143 1/4 153.50
144	*Max. S.F. ... Flat Size ... List Price ... \$	...	3 1/4 147 3/4 101.50	4 147 15/16 101.50	5 148 1/8 101.50	5 1/2 148 5/16 115.00	6 148 1/2 115.00	7 148 7/8 151.00	7 149 1/4 164.00
156	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	5 160 1/8 116.50	5 1/2 160 5/16 130.00	6 160 1/2 130.00	7 160 7/8 172.00	7 161 1/4 187.00
168	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	5 172 1/8 131.50	5 1/2 172 5/16 145.00	6 172 1/2 145.00	7 172 7/8 197.50	7 173 1/4 212.00
180	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	5 184 1/8 152.00	5 184 5/16 165.50	5 184 1/2 165.50	5 184 7/8 224.50	5 185 1/4 239.50
192	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	...	...	3 196 1/2 185.50	3 196 7/8 252.00	3 197 1/4 269.00
204	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	...	...	3	3	3
216	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	...	...	3	3	3
228	*Max. S.F. ... Flat Size ... List Price ... \$	...	...	...	...	...	3	3	3

▲ Recommend maximum Straight Flange of 1 1/2" for 3/16" and 2 1/2" for 1/4" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases. Flanged Only Heads ordered "Standard" will be furnished with inside Knuckle Radius of 2xT and "ASME Type" 3xT unless otherwise specified.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

20 Flat sizes shown are based on 1 1/2" Straight Flange and 3xT Knuckle

Radius. If dimensions not shown, see formula page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Page 87-89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 110 circle weights.

# FLANGED ONLY HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. .... Std. S.F. ....	7/8 25/8 1 1/2-4	1 5/16 2 13/16 1 1/2-4	1 3 1 1/2-4	1 1/8 3 3/8 1 1/2-4 1/2	1 1/4 3 3/4 1 1/2-4 1/2	1 3/8 4 1/8 1 1/2-4 1/2	1 1/2 4 1/2 1 1/2-4 1/2	1 3/4 5 1/4 1 1/2-4 1/2	2 6 1 1/2-4 1/2
78	*Max. S.F. .... Flat Size ..... List Price .... \$	8 83 5/8 84.00	8 83 13/16 103.00	8 85 103.00	8 85 1/2 128.00	8 86 128.00	8 86 1/2 178.50	8 87 178.50	8 88 239.50	8 89 304.50
84	*Max. S.F. .... Flat Size ..... List Price .... \$	8 89 5/8 92.50	8 89 13/16 111.50	8 91 111.50	8 91 1/2 138.50	8 92 138.50	8 92 1/2 191.00	8 93 191.00	8 94 254.00	8 95 321.50
90	*Max. S.F. .... Flat Size ..... List Price .... \$	8 95 5/8 98.50	8 95 13/16 119.50	8 97 119.50	8 97 1/2 149.00	8 98 149.00	8 98 1/2 206.00	8 99 206.00	8 100 271.00	8 101 340.00
96	*Max. S.F. .... Flat Size ..... List Price .... \$	8 101 5/8 107.00	8 101 13/16 130.00	8 103 130.00	8 103 1/2 161.50	8 104 161.50	8 104 1/2 218.50	8 105 218.50	8 106 287.50	8 107 357.00
102	*Max. S.F. .... Flat Size ..... List Price .... \$	8 107 5/8 115.50	8 107 13/16 138.50	8 109 138.50	8 109 1/2 174.50	8 110 174.50	8 110 1/2 235.00	8 111 235.00	8 112 306.50	8 113 378.00
108	*Max. S.F. .... Flat Size ..... List Price .... \$	8 113 5/8 126.00	8 113 13/16 151.00	8 115 151.00	8 115 1/2 189.00	8 116 189.00	8 116 1/2 252.00	8 117 252.00	8 118 325.50	8 119 399.00
114	*Max. S.F. .... Flat Size ..... List Price .... \$	8 119 5/8 134.50	8 119 13/16 161.50	8 121 161.50	8 121 1/2 201.50	8 122 201.50	8 122 1/2 269.00	8 123 269.00	8 124 346.50	8 125 422.00
120	*Max. S.F. .... Flat Size ..... List Price .... \$	8 125 5/8 147.00	8 125 13/16 172.00	8 127 172.00	8 127 1/2 218.50	8 128 218.50	8 128 1/2 290.00	8 129 290.00	8 130 369.50	8 131 447.50
126	*Max. S.F. .... Flat Size ..... List Price .... \$	8 131 5/8 155.50	8 131 13/16 187.00	8 133 187.00	8 133 1/2 233.00	8 134 233.00	8 134 1/2 306.50	8 135 306.50	8 136 390.50	8 137 472.50
132	*Max. S.F. .... Flat Size ..... List Price .... \$	8 137 5/8 168.00	8 137 13/16 199.50	8 139 199.50	8 139 1/2 248.00	8 140 248.00	8 140 1/2 327.50	8 141 327.50	8 142 416.00	8 143 497.50
138	*Max. S.F. .... Flat Size ..... List Price .... \$	8 143 5/8 180.50	8 143 13/16 214.00	8 145 214.00	8 145 1/2 266.50	8 146 266.50	8 146 1/2 348.50	8 147 348.50	8 148 441.00	8 149 525.00
144	*Max. S.F. .... Flat Size ..... List Price .... \$	8 149 5/8 193.00	8 149 13/16 229.00	8 151 229.00	8 151 1/2 285.50	8 152 285.50	8 152 1/2 374.00	8 153 374.00	8 154 466.00	8 155 554.50
156	*Max. S.F. .... Flat Size ..... List Price .... \$	8 161 5/8 218.50	8 161 13/16 260.50	8 163 260.50	8 163 1/2 325.50	8 164 325.50	8 164 1/2 420.00	8 165 420.00	8 166 521.00	8 167 617.50
168	*Max. S.F. .... Flat Size ..... List Price .... \$	8 173 5/8 248.00	8 173 13/16 294.00	8 175 294.00	8 175 1/2 367.50	8 176 367.50	8 176 1/2 472.50	8 177 472.50	8 178 575.50	8 179 680.50
180	*Max. S.F. .... Flat Size ..... List Price .... \$	5 185 5/8 279.50	5 185 13/16 329.50	5 187 329.50	5 187 1/2 411.50	5 188 411.50	5 188 1/2 529.00	5 189 529.00	5 190 638.50	5 191 735.00
192	*Max. S.F. .... Flat Size ..... List Price .... \$	3 197 5/8 311.00	3 197 13/16 369.50	3 199 369.50	3 199 1/2 462.00	3 200 462.00	3 ...	3 ...	3 ...	3 ...
204	*Max. S.F. .... Flat Size ..... List Price .... \$	3	3	3	3	3	3	3	3	3
216	*Max. S.F. .... Flat Size ..... List Price .... \$	3	3	3	3	3	3	3	3	3
228	*Max. S.F. .... Flat Size ..... List Price .... \$	3	3	3	...	...	...	...	...	...

\* Maximum Straight Flanges shown can be exceeded in most cases. Flanged Only Heads ordered "Standard" will be furnished with inside Knuckle Radius of 2xT and "ASME Type" 3xT unless otherwise specified.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes shown are based on 1 1/2" Straight Flange and 3xT Knuckle Radius. If dimensions not shown, see formula page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Page 87-89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.

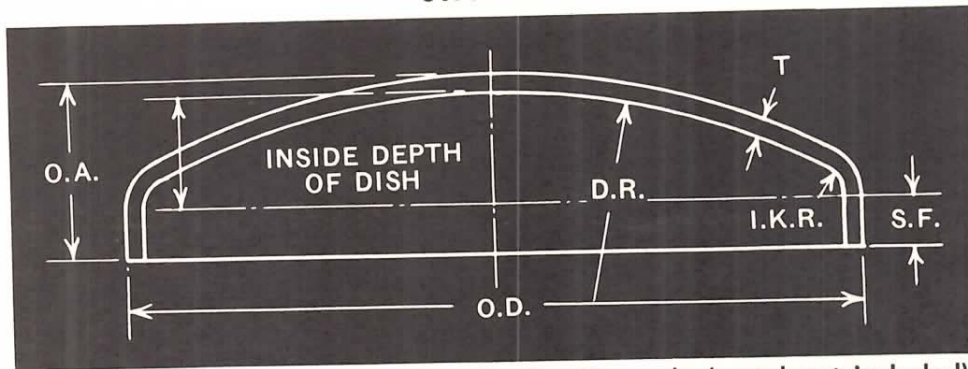
# *Flanged and Dished Heads*

**STANDARD -  
NON CODE**



# FLANGED AND DISHED HEADS STANDARD

## STANDARD TYPE—NON CODE



List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. .... Std. S.F. ....	1/4 3/4 1 1/2-4 1/2	3/8 4/8 1 1/2-4 1/2	1/2 4 1/2 1 1/2-4 1/2	5/8 4 7/8 1 1/2-4 1/2	3/4 5 1/4 1 1/2-4 1/2	7/8 5 5/8 1 1/2-4 1/2	2 6 1 1/2-4 1/2	2 1/4 6 3/4 1 1/2-4 1/2	2 1/2 7 1/2 1 1/2-4 1/2	2 3/4 8 1/4 1 1/2-4 1/2	3 9 1 1/2-4 1/2
12	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	...	...	...	...	...	...	...	...	...	...	...
14	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	...	...	...	...	...	...	...	...	...	...	...
16	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	...	...	...	...	...	...	...	...	...	...	...
18	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	16 4 1/2 4 7/16 25 1/2 75.50	...	...	...	...	...	...	...	...	...	...
20	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	18 4 1/2 4 11/16 27 1/2 88.00	18 4 1/2 4 7/8 27 7/8 130.00	18 4 1/2 5 1/8 28 1/4 130.00	...	...	...	...	...	...	...	...
22	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	20 6 4 7/8 29 1/2 88.00	20 6 5 1/8 29 7/8 130.00	20 6 5 7/16 30 1/4 130.00	20 6 5 5/8 30 3/8 189.00	...	...	...	...	...	...	...
24	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	24 6 5 31 3/4 88.00	24 6 5 1/4 32 1/8 130.00	20 6 5 3/8 32 1/2 130.00	20 6 5 1 5/16 32 7/8 189.00	20 6 6 1/8 33 1/4 189.00	...	...	...	...	...	...
26	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size List Price ... \$	24 6 5 3/8 33 3/4 101.00	24 6 5 5/8 34 1/8 143.00	24 6 5 1 3/16 34 1/2 143.00	24 6 6 34 7/8 199.50	24 6 6 1/4 35 1/4 199.50	24 6 6 1/2 35 5/8 252.00	...	...	...	...	...

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange. Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads. Page 78 machining information and list prices. Pages 87 - 89 fluing manholes and flueholes. Page 90 manhole and handhole fittings. Page 110 circle weights. Page 100 approximate volume of dish in gallons.

# STANDARD FLANGED AND DISHED HEADS

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	3/16 9/16 1 1/2-2 <sup>A</sup>	1/4 3/4 1 1/2-2 1/2 <sup>A</sup>	5/16 1 5/16 1 1/2-3	3/8 1 1/8 1 1/2-3	7/16 1 5/16 1 1/2-3 1/2	1/2 1 1/2 1 1/2-3 1/2	5/8 1 7/8 1 1/2-3 1/2	3/4 2 1/4 1 1/2-3 1/2	7/8 2 3/8 1 1/2-4	1 5/16 2 1 3/16 1 1/2-4	1 3 1 1/2-4	1 1/8 3 3/8 1 1/2-4 1/2
28	Dish Radius	26	26	26	26	26	26	26	26	24	24	24	24
	*Max. S.F.	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D.	4 5/16	4 3/8	4 7/16	4 1/2	4 9/16	4 5/8	4 3/4	4 1 5/16	5 3/8	4 1/2	5 9/16	5 1 1/16
	Flat Size	32 3/8	32 1/2	32 5/8	32 3/4	32 7/8	33	33 1/4	33 3/4	33 3/4	33 7/8	35	35 3/8
	List Price	\$ 21.50	23.00	26.50	26.50	30.50	30.50	34.00	37.00	44.00	71.50	71.50	101.00
30	Dish Radius	30	30	30	30	30	30	30	30	30	30	30	30
	*Max. S.F.	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D.	4 1/4	4 5/16	4 3/8	4 1/2	4 9/16	4 5/8	4 1 3/16	5	5 1/8	5 1/4	5 3/8	5 1/2
	Flat Size	34 5/8	34 3/4	34 7/8	35	35 1/8	35 1/4	35 1/2	35 3/4	36	36 1/8	37 1/4	37 5/8
	List Price	\$ 21.50	23.00	26.50	26.50	30.50	30.50	34.00	37.00	44.00	71.50	71.50	101.00
36	Dish Radius	36	36	36	36	36	36	36	36	36	36	36	36
	*Max. S.F.	2	3	3 1/2	4 1/2	5 1/2	6	6	6	6	6	6	6
	I.D.D.	5 1/16	5 1/8	5 3/16	5 1/4	5 3/8	5 7/16	5 5/8	5 3/4	5 5/8	6 1/16	6 1/8	6 5/16
	Flat Size	40 7/8	41	41 1/8	41 1/4	41 3/8	41 1/2	41 3/4	42	42 1/4	42 3/8	43 1/2	43 7/8
	List Price	\$ 25.50	27.00	28.50	28.50	32.00	32.00	37.00	40.50	49.00	80.00	80.00	113.50
42	Dish Radius	42	42	42	42	42	42	42	42	42	42	42	42
	*Max. S.F.	2	3	4	5	5 1/2	6	7	8	8	8	8	8
	I.D.D.	5 7/8	5 15/16	6	6 1/16	6 1/8	6 1/4	6 3/8	6 9/16	6 3/4	6 7/8	6 15/16	7 1/8
	Flat Size	47 1/8	47 1/4	47 3/8	47 1/2	47 5/8	47 3/4	48	48 1/4	48 1/2	48 5/8	49 3/4	50 1/8
	List Price	\$ 28.50	30.50	34.00	34.00	37.00	37.00	42.00	47.50	57.50	92.50	92.50	126.00
48	Dish Radius	48	48	48	48	48	48	48	48	48	48	48	48
	*Max. S.F.	2	3	4	5	5 1/2	6	7	8	8	8	8	8
	I.D.D.	6 5/8	6 1 1/16	6 1 3/16	6 7/8	6 1 5/16	7	7 3/16	7 3/8	7 1/2	7 5/8	8 1/2	8 5/8
	Flat Size	53 3/8	53 1/2	53 5/8	53 3/4	53 3/8	54	54 1/4	54 1/2	54 3/4	54 7/8	56	56 3/8
	List Price	\$ 30.50	34.00	37.00	37.00	42.00	42.00	47.50	54.00	64.00	105.00	105.00	138.50
54	Dish Radius	54	54	54	54	54	54	54	54	54	54	54	54
	*Max. S.F.	2	3	4	5	5 1/2	6	7	8	8	8	8	8
	I.D.D.	7 7/16	7 9/16	7 5/8	7 1 1/16	7 3/4	7 1 3/16	8	8 3/16	8 5/16	8 7/16	9 5/16	9 7/16
	Flat Size	59 5/8	59 3/4	59 7/8	60	60 1/8	60 1/4	60 1/2	60 3/4	61	61 1/8	62 1/4	62 5/8
	List Price	\$ 44.00	46.00	52.50	52.50	59.00	59.00	67.00	75.50	88.00	115.50	115.50	151.00
60	Dish Radius	60	60	60	60	60	60	60	60	60	60	60	60
	*Max. S.F.	2	3	4	5	5 1/2	6	7	8	8	8	8	8
	I.D.D.	8 1/4	8 3/8	8 7/16	8 1/2	8 9/16	8 5/8	8 1 3/16	8 1 5/16	9 1/8	9 3/16	10 1/8	10 1/4
	Flat Size	65 7/8	66	66 1/8	66 1/4	66 3/8	66 1/2	66 3/4	67	67 1/4	67 3/8	68 1/2	68 7/8
	List Price	\$ 52.50	54.50	61.00	61.00	67.00	67.00	75.50	84.00	101.00	126.00	126.00	168.00
66	Dish Radius	66	66	66	66	66	66	66	66	66	66	66	66
	*Max. S.F.	2	3	4	5	5 1/2	6	7	8	8	8	8	8
	I.D.D.	9 1/16	9 1/8	9 1/4	9 5/16	9 3/8	9 7/16	9 5/8	9 3/4	9 1 5/16	10	10 1/16	11 1/16
	Flat Size	72 1/8	72 1/4	72 3/8	72 1/2	72 5/8	72 3/4	73	73 1/4	73 1/2	73 3/8	74 3/4	75 1/8
	List Price	\$ 59.00	61.00	67.00	67.00	75.50	75.50	84.00	96.50	111.50	138.50	138.50	180.50
72	Dish Radius	72	72	72	72	72	72	72	72	72	72	72	72
	*Max. S.F.	3	4	5	5 1/2	6	7	8	8	8	8	8	8
	I.D.D.	10	10 1 5/16	10 1/8	10 3/16	10 1/4	10 3/8	10 7/16	10 9/16	10 1 1/16	10 1 3/16	10 7/8	11
	Flat Size	78 1/2	78 5/8	78 3/4	78 7/8	79	79 1/4	79 1/2	79 3/4	79 5/8	79 7/8	81	81 3/8
	List Price	\$ 69.50	75.50	75.50	84.00	84.00	94.50	107.00	126.00	153.50	153.50	193.00	
78	Dish Radius	78	78	78	78	78	78	78	78	78	78	78	78
	*Max. S.F.	3	4	5	5 1/2	6	7	8	8	8	8	8	8
	I.D.D.	10 3/4	10 1 3/16	10 7/8	10 5/8	11 1/16	11 1/8	11 3/16	11 3/8	11 1/2	11 5/8	11 1 1/16	11 1 3/16
	Flat Size	84 3/4	84 7/8	85	85 1/8	85 1/4	85 1/2	85 3/4	86	86 1/8	86 1/2	87 1/4	87 5/8
	List Price	\$ 75.50	86.00	86.00	94.50	94.50	105.00	119.50	138.50	168.00	168.00	206.00	

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

▲ Recommend maximum Straight Flange of 1 1/2" for 3/16" and 2 1/2" for 1/4" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases.

Dish radii other than shown can be furnished on practically all sizes.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Pages 87 - 89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS STANDARD

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	1 1/4 3 3/4 1 1/2-4 1/2	1 3/8 4 1/8 1 1/2-4 1/2	1 1/2 4 1/2 1 1/2-4 1/2	1 5/8 4 7/8 1 1/2-4 1/2	1 3/4 5 1/4 1 1/2-4 1/2	1 7/8 5 5/8 1 1/2-4 1/2	2 6 1 1/2-4 1/2	2 1/4 6 3/4 1 1/2-4 1/2	2 1/2 7 1/2 1 1/2-4 1/2	2 3/4 8 1/4 1 1/2-4 1/2	3 9 1 1/2-4 1/2
28	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	24 6 5 7/8 35 3/4 101.00	24 6 6 1/16 36 1/8 143.00	24 6 6 1/4 36 1/2 143.00	24 6 6 7/16 36 7/8 199.50	24 6 6 5/8 37 1/4 199.50	24 6 6 13/16 37 5/8 252.00	24 6 7 38 252.00	...	...	...	...
30	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	30 6 5 3/4 38 101.00	30 6 5 15/16 38 3/8 143.00	30 6 6 1/8 38 3/4 143.00	30 6 6 3/8 39 1/8 199.50	30 6 6 9/16 39 1/2 199.50	30 6 6 13/16 39 5/8 252.00	30 6 7 1/16 40 1/4 252.00	30 6 7 9/16 41 294.00	...	...	...
36	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	36 6 6 1/2 44 1/4 113.50	36 6 6 1 1/16 44 5/8 155.50	36 6 6 7/8 45 155.50	36 6 7 1/16 45 3/8 210.00	36 6 7 5/16 45 3/4 210.00	36 6 7 1/2 46 1/8 262.50	36 6 7 11/16 46 1/2 262.50	30 6 8 9/16 47 1/4 315.00	30 6 9 48 382.00	...	...
42	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	42 8 7 1/4 50 1/2 126.00	42 8 7 7/16 50 7/8 168.00	42 8 7 5/8 51 1/4 168.00	36 8 8 7/16 51 5/8 220.50	36 8 8 8/8 52 220.50	36 8 8 13/16 52 3/8 273.00	36 8 9 52 3/4 273.00	36 8 9 3/8 53 1/2 332.00	36 8 9 3/4 54 1/4 407.50	36 8 10 1/8 55 495.50	...
48	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	42 8 8 13/16 56 3/4 138.50	42 8 9 57 1/8 180.50	42 8 9 3/16 57 1/2 180.50	42 8 9 1/4 57 7/8 231.00	42 8 9 7/16 58 1/4 231.00	42 8 9 5/8 58 5/8 285.50	42 8 9 3/4 59 285.50	42 8 10 1/8 59 3/4 348.50	42 8 10 1/2 60 1/2 432.50	42 8 10 7/8 61 1/4 516.50	42 8 11 1/4 62 600.50
54	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	48 8 9 5/8 63 151.00	48 8 9 3/4 63 3/8 195.50	48 8 9 7/8 63 3/4 195.50	48 8 10 1/16 64 1/8 245.50	48 8 10 3/16 64 1/2 245.50	48 8 10 3/8 64 7/8 300.50	48 8 10 9/16 65 1/4 300.50	48 8 10 7/8 66 361.00	48 8 11 1/4 66 3/4 445.00	48 8 11 5/8 67 1/2 533.50	48 8 12 68 1/4 621.50
60	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	54 8 10 7/16 69 1/4 168.00	54 8 10 9/16 69 5/8 210.00	54 8 10 11/16 70 210.00	54 8 10 7/8 70 3/8 260.50	54 8 11 70 3/4 260.50	54 8 11 3/16 71 1/8 315.00	54 8 11 5/16 71 1/2 315.00	54 8 11 11/16 72 1/4 378.00	54 8 12 73 462.00	48 8 13 1/16 73 3/4 550.00	48 8 13 7/16 74 1/2 638.50
66	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	60 8 11 1/4 75 1/2 180.50	60 8 11 3/8 75 7/8 227.00	60 8 11 1/2 76 1/4 227.00	60 8 11 11/16 76 5/8 275.00	60 8 11 13/16 77 275.00	60 8 12 77 3/8 327.50	60 8 12 1/8 77 3/4 327.50	60 8 12 7/16 78 1/2 392.50	60 8 12 13/16 79 1/4 476.50	54 8 14 80 567.00	54 8 14 3/16 80 3/4 655.00
72	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	72 8 11 3/16 81 3/4 193.00	66 8 12 1/4 82 1/8 245.50	66 8 12 5/16 82 1/2 245.50	66 8 12 1/2 82 7/8 294.00	66 8 12 5/8 83 1/4 294.00	66 8 12 3/4 83 5/8 344.50	66 8 12 15/16 84 344.50	66 8 13 1/4 84 3/4 409.50	66 8 13 9/16 85 1/2 493.50	60 8 14 11/16 86 1/4 584.00	60 8 15 87 672.00
78	Dish Radius... *Max. S.F. ... I.D.D. .... Flat Size ... List Price ... \$	78 8 12 88 206.00	72 8 12 15/16 88 3/8 258.50	72 8 13 1/8 88 3/4 258.50	72 8 13 1/4 89 1/8 311.00	72 8 13 7/16 89 1/2 311.00	72 8 13 9/16 89 7/8 363.50	72 8 13 3/4 90 1/4 363.50	72 8 14 1/16 91 428.50	72 8 14 3/8 91 3/4 512.50	66 8 15 1/2 92 1/2 600.50	66 8 15 7/8 93 1/4 693.00

\* Maximum Straight Flanges shown can be exceeded in most cases.

Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# STANDARD FLANGED AND DISHED HEADS

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. .... Std. S.F. ....	3/16 9/16	1/4 3/4	5/16 15/16	3/8 11/8	7/16 15/16	1/2 11/2	5/8 17/8	3/4 21/4	7/8 25/8	15/16 213/16	1 3	11/8 33/8
		11/2-2	11/2-2 1/2 <sup>▲</sup>	11/2-3	11/2-3	11/2-3 1/2	11/2-3 1/2	11/2-3 1/2	11/2-3 1/2	11/2-4	11/2-4	11/2-4	11/2-4 1/2
84	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	84 3 119/16 91	84 4 115/8 91 1/8	84 5 111 1/16 91 1/4	84 5 1/2 113/4 91 3/8	84 6 117/8 91 1/2	84 7 121/8 91 3/4	84 8 125/8 92	84 8 129/8 92 1/4	84 8 133/8 92 1/2	84 8 137/8 92 3/8	84 8 141/8 92 5/8	84 8 145/8 93 1/8
		86.00	96.50	96.50	105.00	105.00	117.50	134.50	155.50	185.00	185.00	185.00	222.50
90	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	90 3 123/8 97 1/4	90 4 127/8 97 3/8	90 5 129/8 97 1/2	90 5 1/2 131/8 97 5/8	90 6 133/8 97 3/4	90 7 135/8 98	90 8 137/8 98 1/4	90 8 139/8 98 1/2	90 8 141/8 98 3/4	90 8 143/8 98 5/8	90 8 145/8 99 1/4	90 8 147/8 99 3/8
		96.50	105.00	105.00	117.50	117.50	130.00	149.00	172.00	201.50	201.50	201.50	239.50
96	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	96 3 133/16 103 1/2	96 4 135/16 103 3/8	96 5 137/16 103 3/4	96 5 1/2 139/16 103 7/8	96 6 141/16 104	96 7 143/16 104 1/4	96 8 145/16 104 1/2	96 8 147/16 104 3/4	96 8 149/16 104 5/8	96 8 151/16 104 7/8	96 8 153/16 105 1/8	96 8 155/16 105 3/8
		105.00	117.50	117.50	130.00	130.00	145.00	164.00	189.00	220.50	220.50	220.50	256.00
102	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	102 3 135 1/16 109 3/4	102 4 137 1/8 109 7/8	102 5 139 1/16 110	102 5 1/2 141 1/8 110 1/8	102 6 143 1/16 110 1/4	102 7 145 1/8 110 1/2	102 8 147 1/8 110 3/4	102 8 149 1/8 111	102 8 151 1/8 111 1/8	102 8 153 1/8 111 3/8	102 8 155 1/8 111 5/8	102 8 157 1/8 112 1/8
		117.50	130.00	130.00	143.00	143.00	159.50	180.50	208.00	239.50	239.50	239.50	277.00
108	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	108 3 1/2 141 3/16 116 1/8	108 4 143 1/8 116 1/4	108 5 145 1/8 116 1/2	108 5 1/2 147 1/8 116 3/4	108 6 149 1/8 117	108 7 151 1/8 117 1/4	108 8 153 1/8 117 1/2	108 8 155 1/8 117 3/4	108 8 157 1/8 117 5/8	108 8 159 1/8 118 1/8	108 8 161 1/8 118 1/4	108 8 163 1/8 118 3/8
		143.00	143.00	157.50	157.50	176.50	201.50	231.00	260.50	260.50	260.50	260.50	298.00
114	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	114 3 1/2 155 1/16 122 3/8	114 4 157 1/8 122 1/2	114 5 159 1/8 122 5/8	114 5 1/2 161 1/8 123 1/4	114 6 163 1/8 123 1/2	114 7 165 1/8 123 3/4	114 8 167 1/8 124 1/4	114 8 169 1/8 124 1/2	114 8 171 1/8 124 3/4	114 8 173 1/8 124 5/8	114 8 175 1/8 125 1/8	114 8 177 1/8 125 3/8
		157.50	157.50	172.00	172.00	193.00	220.50	252.00	283.50	283.50	283.50	319.00	
120	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	120 3 1/2 167 1/16 128 5/8	120 4 169 1/8 128 3/4	120 5 171 1/8 129 1/4	120 5 1/2 173 1/8 129 1/2	120 6 175 1/8 129 3/4	120 7 177 1/8 130 1/4	120 8 179 1/8 130 1/2	120 8 181 1/8 130 3/4	120 8 183 1/8 130 5/8	120 8 185 1/8 131 1/8	120 8 187 1/8 131 3/8	120 8 189 1/8 131 5/8
		172.00	172.00	189.00	189.00	210.00	239.50	273.00	306.50	306.50	306.50	340.00	
126	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	126 3 171 1/4 134 7/8	126 4 1/2 173 1/8 135	126 5 1/2 175 1/8 135 1/8	126 6 177 1/8 135 1/4	126 7 179 1/8 135 1/2	126 8 181 1/8 135 3/4	126 8 183 1/8 136	126 8 185 1/8 136 1/8	126 8 187 1/8 136 3/8	126 8 189 1/8 136 5/8	126 8 191 1/8 137 1/8	126 8 193 1/8 137 3/8
		187.00	187.00	206.00	206.00	231.00	260.50	296.00	329.50	329.50	329.50	363.50	
132	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	132 3 181 1/16 141 1/8	132 4 1/2 183 1/8 141 1/4	132 5 1/2 185 1/8 141 3/8	132 6 187 1/8 141 1/2	132 7 189 1/8 141 3/4	132 8 191 1/8 142	132 8 193 1/8 142 1/4	132 8 195 1/8 142 1/2	132 8 197 1/8 142 3/4	132 8 199 1/8 143 1/8	132 8 201 1/8 143 1/4	132 8 203 1/8 143 1/2
		201.50	201.50	222.50	222.50	248.00	277.00	315.00	346.50	346.50	346.50	382.00	
138	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	144 3 187 1/16 147 3/8	144 4 1/2 189 1/8 147 1/2	132 5 1/2 191 1/8 147 5/8	132 6 193 1/8 147 3/4	132 7 195 1/8 148	132 8 197 1/8 148 1/4	132 8 199 1/8 148 1/2	132 8 201 1/8 148 3/4	132 8 203 1/8 149 1/8	132 8 205 1/8 149 1/4	132 8 207 1/8 149 1/2	132 8 209 1/8 150 1/8
		210.00	210.00	231.00	231.00	256.00	290.00	325.50	357.00	357.00	357.00	390.50	

▲ Recommend maximum Straight Flange of 1 1/2" for 3/16" and 2 1/2" for 1/4" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases.

Dish radii other than shown can be furnished on practically all sizes.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS STANDARD

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. .... Std. S.F. ....	1¼ 3¾ 1½-4½	1⅜ 4⅞ 1½-4½	1½ 4½ 1½-4½	1⅝ 4⅞ 1½-4½	1¾ 5¼ 1½-4½	1⅞ 5⅝ 1½-4½	2 6 1½-4½	2¼ 6¾ 1½-4½	2½ 7½ 1½-4½	2¾ 8¼ 1½-4½	3 9 1½-4½
84	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	84 8 12 <sup>13</sup> / <sub>16</sub> 94¼ 222.50	78 8 13¾ 94⅝ 273.00	78 8 13 <sup>5</sup> / <sub>16</sub> 95 273.00	78 8 14 <sup>1</sup> / <sub>16</sub> 95⅜ 332.00	78 8 14¼ 95¾ 332.00	78 8 14⅜ 96⅞ 382.00	78 8 14½ 96½ 382.00	78 8 14⅞ 97¼ 449.50	78 8 15 <sup>3</sup> / <sub>16</sub> 98 533.50	72 8 16 <sup>5</sup> / <sub>16</sub> 98¾ 621.50	72 8 16 <sup>5</sup> / <sub>8</sub> 99½ 714.00
90	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	90 8 139 <sup>1</sup> / <sub>16</sub> 100½ 239.50	90 8 13¾ 100⅞ 287.50	90 8 13 <sup>5</sup> / <sub>16</sub> 101¼ 287.50	84 8 14⅞ 101⅝ 348.50	84 8 15 102 348.50	84 8 15 <sup>3</sup> / <sub>16</sub> 102⅜ 403.00	84 8 15 <sup>3</sup> / <sub>16</sub> 102¾ 403.00	84 8 15⅝ 103½ 470.50	84 8 16 104¼ 534.50	78 8 17⅞ 105 642.50	78 8 17 <sup>7</sup> / <sub>16</sub> 105¾ 735.00
96	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	96 8 14⅜ 106¾ 256.00	96 8 149 <sup>1</sup> / <sub>16</sub> 107⅞ 304.50	96 8 14¾ 107½ 304.50	90 8 15 <sup>11</sup> / <sub>16</sub> 107⅞ 365.50	90 8 15 <sup>13</sup> / <sub>16</sub> 108¼ 365.50	90 8 16 108⅝ 426.50	90 8 16⅞ 109 426.50	90 8 16 <sup>7</sup> / <sub>16</sub> 109¾ 491.50	90 8 16¾ 110½ 579.50	84 8 17⅞ 111¼ 668.00	84 8 18 <sup>3</sup> / <sub>16</sub> 112 760.00
102	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	102 8 15 <sup>3</sup> / <sub>16</sub> 113 277.00	102 8 15⅜ 113⅜ 321.50	102 8 15½ 113¾ 321.50	96 8 16½ 114⅞ 382.00	96 8 16⅝ 114½ 382.00	96 8 16 <sup>3</sup> / <sub>16</sub> 114⅞ 445.00	96 8 17 115¼ 445.00	96 8 17¼ 116 516.50	96 8 17 <sup>9</sup> / <sub>16</sub> 116¾ 605.00	90 8 18 <sup>1</sup> / <sub>16</sub> 117½ 693.00	90 8 19 118¼ 785.50
108	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	108 8 16 119¼ 298.00	108 8 16 <sup>3</sup> / <sub>16</sub> 119⅝ 340.00	108 8 16 <sup>5</sup> / <sub>16</sub> 120 340.00	102 8 17¼ 120⅜ 403.00	102 8 17 <sup>7</sup> / <sub>16</sub> 120¾ 403.00	102 8 17⅝ 121⅞ 466.00	102 8 17¾ 121½ 466.00	102 8 18 <sup>1</sup> / <sub>16</sub> 122¼ 542.00	102 8 18⅜ 123 630.00	96 8 19½ 123¾ 718.00	96 8 19 <sup>3</sup> / <sub>16</sub> 124½ 815.00
114	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	114 8 16 <sup>13</sup> / <sub>16</sub> 125½ 319.00	114 8 17 125⅞ 361.00	114 8 17 <sup>3</sup> / <sub>16</sub> 126¼ 361.00	108 8 18 <sup>1</sup> / <sub>16</sub> 126⅝ 424.00	108 8 18¼ 127 424.00	108 8 18⅜ 127⅞ 489.50	108 8 18 <sup>9</sup> / <sub>16</sub> 127¾ 489.50	108 8 18⅞ 128½ 563.00	108 8 19 <sup>3</sup> / <sub>16</sub> 129¼ 659.50	102 8 20 <sup>5</sup> / <sub>16</sub> 130 747.50	102 8 209 <sup>1</sup> / <sub>16</sub> 130¾ 844.00
120	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	120 8 179 <sup>1</sup> / <sub>16</sub> 131¾ 340.00	120 8 17¾ 132⅞ 382.00	114 8 18¾ 132½ 382.00	114 8 18 <sup>5</sup> / <sub>16</sub> 132⅞ 445.00	114 8 19 <sup>1</sup> / <sub>16</sub> 133¼ 445.00	114 8 19¼ 133⅞ 512.50	114 8 19⅜ 134 512.50	114 8 19 <sup>11</sup> / <sub>16</sub> 134¾ 588.00	114 8 19 <sup>5</sup> / <sub>16</sub> 135½ 689.00	108 8 21½ 136¼ 777.00	108 8 21 <sup>7</sup> / <sub>16</sub> 137 873.50
126	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	126 8 187 <sup>1</sup> / <sub>16</sub> 138 363.50	126 8 189 <sup>1</sup> / <sub>16</sub> 138⅜ 403.00	126 8 18 <sup>11</sup> / <sub>16</sub> 138¾ 403.00	126 8 18 <sup>13</sup> / <sub>16</sub> 139⅞ 466.00	120 8 19⅞ 139½ 466.00	120 8 20 139⅞ 535.50	114 8 21 <sup>1</sup> / <sub>16</sub> 140¼ 535.50	114 8 21 <sup>5</sup> / <sub>16</sub> 141 613.00	114 8 21⅝ 141¾ 718.00	114 8 21 <sup>5</sup> / <sub>16</sub> 142½ 808.50	114 8 22 <sup>3</sup> / <sub>16</sub> 143¼ 907.00
132	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	126 8 20 <sup>1</sup> / <sub>16</sub> 144¼ 382.00	126 8 20 <sup>3</sup> / <sub>16</sub> 144⅝ 420.00	126 8 20 <sup>5</sup> / <sub>16</sub> 145 420.00	126 8 20 <sup>7</sup> / <sub>16</sub> 145⅜ 483.00	126 8 20⅝ 145¾ 483.00	126 8 20¾ 146⅞ 558.50	126 8 20 <sup>15</sup> / <sub>16</sub> 146½ 558.50	126 8 21¼ 147¼ 638.50	126 8 21 <sup>9</sup> / <sub>16</sub> 148 743.50	126 8 21⅞ 148¾ 840.00	120 8 23 149½ 941.00
138	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	132 8 20 <sup>13</sup> / <sub>16</sub> 150½ 390.50	132 8 20 <sup>15</sup> / <sub>16</sub> 150⅞ 430.50	132 8 21⅞ 151¼ 430.50	132 8 21 <sup>5</sup> / <sub>16</sub> 151⅝ 495.50	132 8 21 <sup>7</sup> / <sub>16</sub> 152 495.50	132 8 21⅝ 152⅜ 579.50	132 8 21¾ 152¾ 579.50	126 6 22 <sup>15</sup> / <sub>16</sub> 153½ 663.50	126 6 23¼ 154¼ 768.50	126 6 23½ 155 861.00	126 6 23¾ 155¾ 974.50

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1½" to not exceeding standard shown. Add 5% to list price for each additional ½", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1½" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights  
Page 100 approximate volume of dish in gallons.



# STANDARD FLANGED AND DISHED HEADS

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

O.D.	Thickness... I. K. R. ... Std. S.F. ...	3/16 9/16 1 1/2-2	1/4 3/4 1 1/2-2 1/2	5/16 15/16 1 1/2-3	3/8 1 1/8 1 1/2-3	7/16 15/16 1 1/2-3 1/2	1/2 1 1/2 1 1/2-3 1/2	5/8 1 7/8 1 1/2-3 1/2	3/4 2 1/4 1 1/2-3 1/2	7/8 2 5/8 1 1/2-4	15/16 2 13/16 1 1/2-4	1 3 1 1/2-4	1 1/8 3 3/8 1 1/2-4 1/2
144	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	144 3 19 11/16 153 5/8	144 3 1/2 19 3/4 153 3/4	144 4 1/2 19 13/16 153 7/8	144 6 19 7/8 154	144 7 20 154 1/4	144 8 20 3/16 154 1/2	144 8 20 5/16 154 3/4	144 8 20 3/8 154 7/8	144 8 20 7/16 156	144 8 20 5/8 156 3/8
150	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	144 4 1/2 21 9/16 160 1/8	144 5 21 5/8 160 1/2	144 5 21 3/4 160 1/2	144 6 21 7/8 160 3/4	144 7 22 161	144 8 22 1/8 161 1/8	144 8 22 3/16 162 1/4	144 8 22 5/16 162 5/8
156	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	144 4 1/2 23 3/8 166 3/8	144 5 23 7/16 166 1/2	144 5 23 5/8 166 3/4	144 6 23 3/4 167	144 6 23 7/8 167 1/4	144 6 23 15/16 167 3/8	144 6 24 168 1/2	144 6 24 1/8 168 7/8
162	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	144 5 25 3/8 172 3/4	144 5 25 1/2 173	144 6 25 5/8 173 1/4	144 6 25 3/4 173 1/2	144 6 25 13/16 173 5/8	144 6 25 7/8 174 3/4	144 6 26 175 1/8
168	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	168 5 23 1/8 179	168 5 23 1/4 179 1/4	168 6 23 3/8 179 1/2	168 6 23 1/2 179 3/4	168 6 23 9/16 179 7/8	168 6 23 11/16 181	168 6 23 13/16 181 3/8
180	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	168 4 26 1 1/16 191 1/2	168 5 26 13/16 191 3/4	168 5 26 5/16 192	168 5 27 1/16 192 1/4	168 5 27 1/8 192 3/8	168 5 27 3/16 193 1/2	168 5 27 5/16 193 7/8
192	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	192 4 26 5/16	192 4 26 7/16	192 5 26 5/8	192 5 26 3/4	192 5 26 7/8	192 5 26 15/16	192 5 27 1/16
204	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	...	192 3 30	192 3 30 1/8	192 3 30 1/4	192 3 30 5/16	192 3 30 3/8	192 3 30 1/2
210	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	...	...	192 3 31 5/16	192 3 32 1/8	192 3 32 3/16	192 3 32 1/4	192 3 32 3/8
216	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	...	...	...	...	...	...	...	192 3 33 15/16	192 3 34 1/16	192 3 34 1/8	192 3 34 3/16	192 3 34 5/16

PRICES ON APPLICATION

† Sizes on this page require circles beyond the limits of our mills. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

\* Maximum Straight Flanges shown can be exceeded in most cases.

Dish radii other than shown can be furnished on practically all sizes.

Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Pages 87 - 89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS STANDARD

## STANDARD TYPE—NON CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES.

† O.D.	Thickness... I. K. R. ... Std. S.F. ...	1/4 3/4	1/8 4/8	1/2 4 1/2	5/8 4 7/8	1/4 5 1/4	17/8 5 5/8	2 6	2 1/4 6 3/4	2 1/2 7 1/2	2 3/4 8 1/4	3 9	
		1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	
144	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	144 8 20 13/16 156 3/4 399.00	144 8 21 157 1/8 441.00	144 8 21 1/8 157 1/2 441.00	132 8 23 1/16 157 7/8 504.00	132 8 23 3/16 158 1/4 504.00	132 8 23 5/16 158 5/8 588.00	132 8 23 7/16 159 588.00	132 6 23 3/4 159 3/4 676.00	132 6 24 1/16 160 1/2 731.00	126 6 25 5/16 161 1/4 886.00	126 6 25 9/16 162 1012.00	
150	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	144 8 22 1/2 163 420.00	144 8 22 5/8 163 3/8 462.00	144 8 22 3/4 163 3/4 462.00	144 8 22 7/8 164 1/8 525.00	144 8 23 164 1/2 525.00	144 8 23 3/16 164 7/8 609.00	144 8 23 5/16 165 1/4 609.00	144 6 23 5/8 166 697.00	144 6 23 15/16 166 3/4 798.00	132 6 26 1/16 167 1/2 903.00	...	...
156	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	144 8 24 1/4 169 1/4 420.00	144 8 24 3/8 169 5/8 462.00	144 8 24 1/2 170 462.00	144 8 24 5/8 170 3/8 525.00	144 8 24 13/16 170 3/4 525.00	144 8 24 15/16 171 1/8 609.00	144 8 25 1/16 171 1/2 609.00	144 6 25 3/8 172 1/4 697.00	144 6 25 5/8 173 798.00	...	...	...
162	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	144 8 26 175 1/2 441.00	144 8 26 1/8 175 5/8 487.00	144 8 26 5/16 176 1/4 487.00	144 8 26 7/16 176 5/8 546.00	144 8 26 5/8 177 546.00	144 8 26 3/4 177 3/8 630.00	144 8 26 7/8 177 3/4 630.00	144 6 27 3/16 178 1/2 718.00	...	...	...	...
168	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	168 6 24 181 3/4 441.00	168 6 24 1/8 182 1/8 487.00	168 6 24 5/16 182 1/2 487.00	168 6 24 7/16 182 7/8 546.00	168 6 24 5/8 183 1/4 546.00	168 6 24 7/8 183 5/8 630.00	168 6 25 184 630.00	168 6 25 1/4 184 3/4 718.00	...	...	...	...
180	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	168 5 27 7/16 194 1/4 466.00	168 5 27 9/16 194 5/8 512.50	168 5 27 11/16 195 512.50	168 5 27 7/8 195 3/8 571.00	168 5 28 195 3/4 571.00	168 5 28 1/8 196 1/8 672.00	168 5 28 5/16 196 1/2 672.00	...	...	...	...	...
192	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	192 5 27 3/16 ...	192 5 27 3/8 ...	192 5 27 1/2 ...	192 5 27 11/16 ...	192 5 27 13/16 ...	192 5 27 15/16 ...	192 5 28 1/8 ...	...	...	...	...	...
PRICES ON APPLICATION													
204	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	192 3 30 11/16 ...	192 3 30 13/16 ...	192 3 30 15/16 ...	...	...	...	...	...	...	...	...	...
210	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	192 3 32 1/2 ...	192 3 32 5/8 ...	192 3 32 3/4 ...	...	...	...	...	...	...	...	...	...
216	Dish Radius... *Max. S.F. .... I.D.D. .... Flat Size .... List Price .... \$	192 3 34 7/16 ...	192 3 34 9/16 ...	192 3 34 11/16 ...	...	...	...	...	...	...	...	...	...

† Sizes on this page require circles beyond the limits of our mills. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

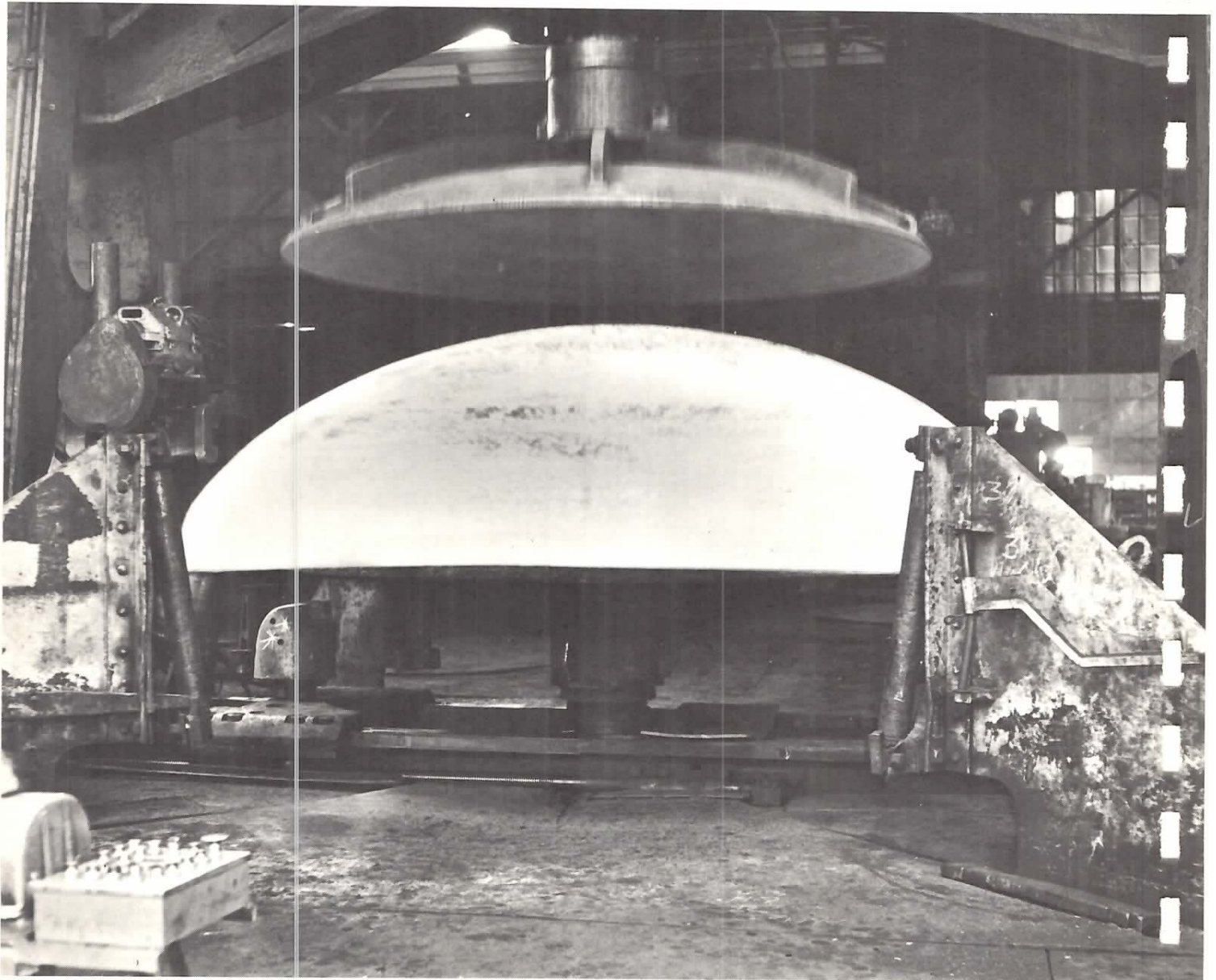
Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

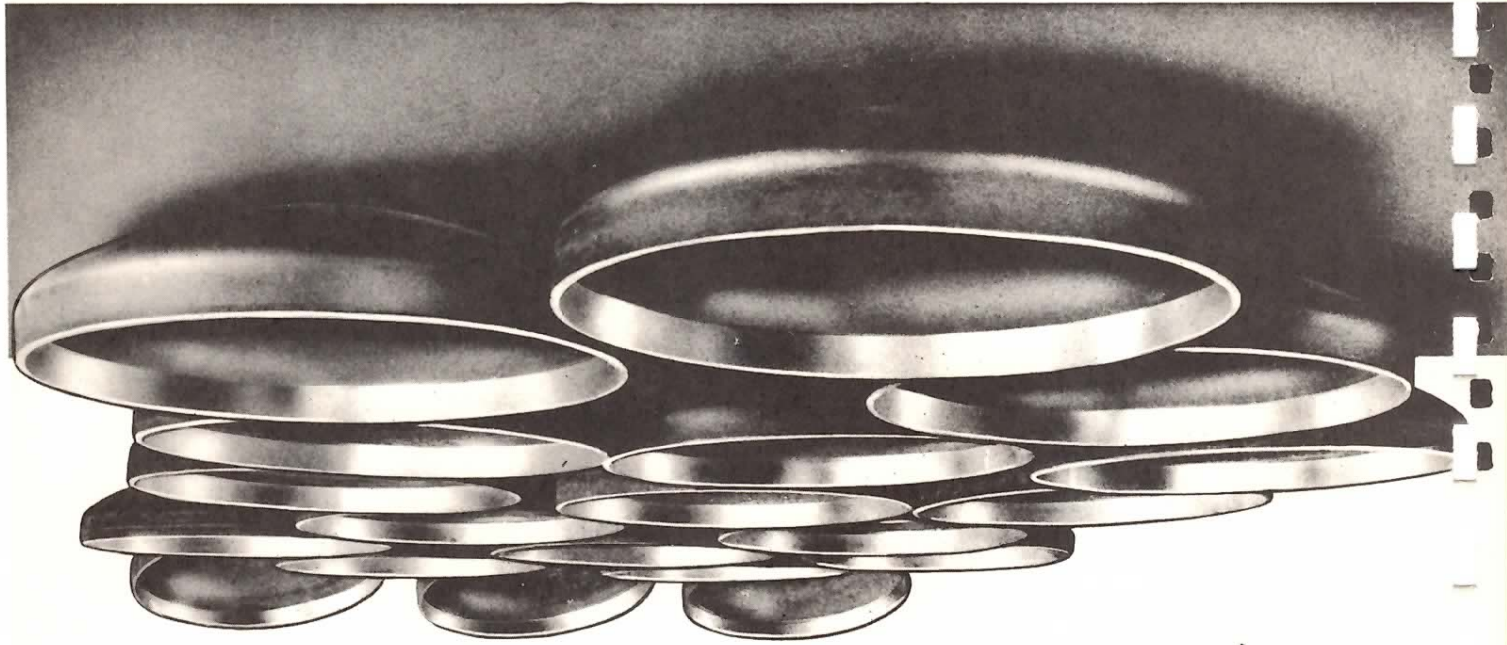
# *Flanged and Dished Heads*

**A. S. M. E. CODE**

A.S.M.E. Flanged and Dished Head, 197" O.D. and 1-1/8" thick, is positioned on spinning machine prior to final spinning operation. The head is made from a two-piece welded circle.

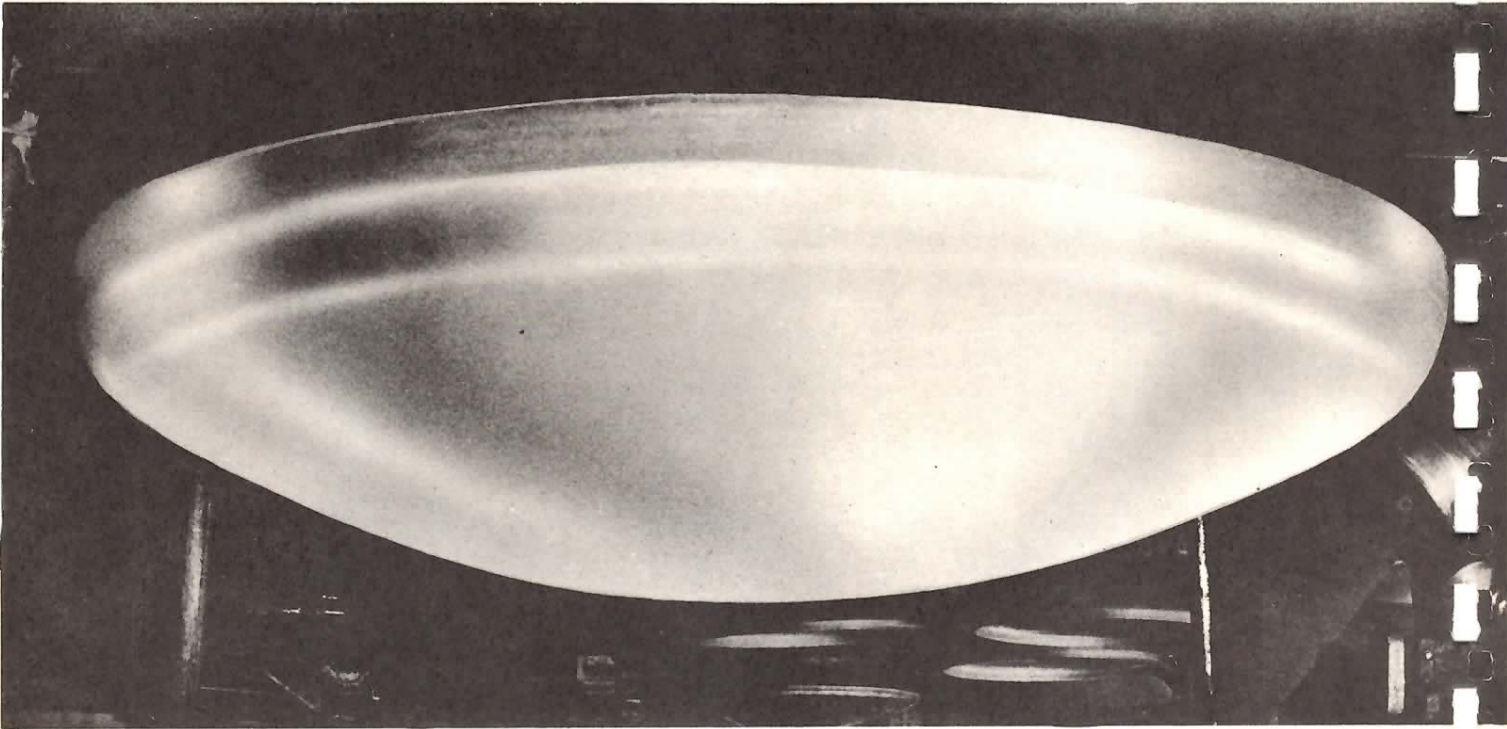


# FLANGED AND DISHED HEADS A.S.M.E. CODE



Upper: A.S.M.E. Flanged and Dishd Heads, 110 3/4" O.D., 1 1/2" Thick, 108" Dish Radius, 6 3/4" Knuckle Radius and 6" Straight Flange.

Lower: A.S.M.E. Flanged and Dishd Head, 192" O.D., 7/32" Thick, 192" Dish Radius, 11 1/2" Knuckle Radius, 3" Straight Flange, 35 1/2" Inside Depth, and made from two-piece welded circle.



FLANGED AND DISHED (ASME)

# A.S.M.E. CODE FLANGED AND DISHED HEADS

## A.S.M.E. CODE

Information required on orders and inquiries:

Quantity.

Grade of steel.

O.D.—Outside diameter.

T—Thickness (furnished min. unless otherwise specified).

DR & IKR—If other than A.S.M.E. standard shown.

} SF—Straight flange or

} OA—Outside overall height.

Cannot maintain both. Specify the more important dimension.

Machining or gas cutting, if required.

Any other special work.

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ....	3/16 <sup>▲</sup> 1 1/2-2 1/4	1/4 <sup>▲</sup> 1 1/2-2 1/4	5/16 1 1/2-3	3/8 1 1/2-3	7/16 1 1/2-3 1/2	1/2 1 1/2-3 1/2	5/8 1 1/2-3 1/2	3/4 1 1/2-4	7/8 1 1/2-4	15/16 1 1/2-4	1 1 1/2-4	1 1/8 1 1/2-4 1/2
12	Dish Radius....	12	12	12	12	12	12	12	12	...	...	...	...
	I. K. R. ....	3/4	3/4	15/16	1 1/8	15/16	1 1/2	17/8	2 1/4	...	...	...	...
	*Max. S.F. ....	2	2 1/2	3	3	3	3	2 1/2	2	...	...	...	...
	I.D.D. ....	115/16	115/16	2	2 1/16	23/16	25/16	2 1/2	23/4	...	...	...	...
	Flat Size ....	16	16	16 1/8	16 1/4	16 3/8	16 1/2	16 3/4	17	...	...	...	...
	List Price .... \$	21.00	21.00	22.50	22.50	24.50	24.50	27.00	29.50	...	...	...	...
14	Dish Radius....	14	14	14	14	14	14	14	14	...	...	...	...
	I. K. R. ....	7/8	7/8	15/16	1 1/8	15/16	1 1/2	17/8	2 1/4	...	...	...	...
	*Max. S.F. ....	2	2 1/2	3	3	3	3	2 1/2	2	...	...	...	...
	I.D.D. ....	25/16	25/16	25/16	23/8	2 1/2	29/16	23/4	215/16	...	...	...	...
	Flat Size ....	18 1/12	18 1/12	18 1/8	18 1/4	18 3/8	18 1/2	18 3/4	19	...	...	...	...
	List Price .... \$	21.00	21.00	22.50	22.50	24.50	24.50	27.00	29.50	...	...	...	...
16	Dish Radius....	16	16	16	16	16	16	14	14	14	14	14	...
	I. K. R. ....	1	1	1	1 1/8	15/16	1 1/2	17/8	2 1/4	2 5/8	2 13/16	3	...
	*Max. S.F. ....	2	2 1/2	3	3 1/2	4	4	4	4	3 1/2	3 1/2	3 1/2	...
	I.D.D. ....	29/8	29/8	29/16	29/8	23/4	27/8	33/16	33/8	39/16	31 1/16	33/4	...
	Flat Size ....	20 1/6	20 1/6	20 1/6	20 1/4	20 3/8	20 1/2	20 3/4	21	21 1/4	21 3/8	22 1/2	...
	List Price .... \$	21.00	21.00	22.50	22.50	24.50	24.50	27.00	29.50	34.00	50.50	50.50	...
18	Dish Radius....	18	18	18	18	18	18	16	16	16	16	16	16
	I. K. R. ....	1 1/8	1 1/8	1 1/8	1 1/8	15/16	1 1/2	17/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	2 1/2	3	3 1/2	4	4	4	4	4	4	4	4 1/2
	I.D.D. ....	3	2 15/16	27/8	27/8	3	3 1/16	3 1/2	3 5/8	3 13/16	3 15/16	4	4 3/16
	Flat Size ....	22 1/2	22 1/2	22 1/2	22 1/2	22 5/8	22 3/4	23	23 1/4	23 1/2	23 5/8	24 3/4	25 1/8
	List Price .... \$	21.00	21.00	22.50	22.50	24.50	24.50	27.00	29.50	34.00	50.50	50.50	75.50
20	Dish Radius....	20	20	20	20	20	20	18	18	18	18	18	18
	I. K. R. ....	1 1/4	1 1/4	1 1/4	1 1/4	15/16	1 1/2	17/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	2 1/2	3	3 1/2	4	4	4	4	4	4	4	4 1/2
	I.D.D. ....	37/16	35/16	3 1/4	3 1/4	3 1/4	3 1/4	3 5/16	3 3/4	3 7/8	4 1/16	4 1/8	4 1/4
	Flat Size ....	24 7/12	24 7/12	24 7/12	24 7/12	24 5/8	24 3/4	25	25 1/4	25 1/2	25 5/8	26 3/4	27 1/8
	List Price .... \$	23.00	23.00	23.50	23.50	27.00	27.00	28.50	30.50	37.00	65.00	65.00	88.00
22	Dish Radius....	20	20	20	20	20	20	20	20	20	20	20	20
	I. K. R. ....	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 1/2	17/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	2 1/2	3	3 1/2	4 1/2	6	6	6	6	6	6	6
	I.D.D. ....	3 15/16	3 15/16	3 7/8	3 13/16	3 13/16	3 13/16	4	4 3/16	4 5/16	4 3/8	4 1/2	4 11/16
	Flat Size ....	26 5/8	26 5/8	26 5/8	26 5/8	26 5/8	26 3/4	27	27 1/4	27 1/2	27 5/8	28 3/4	29 1/8
	List Price .... \$	23.00	23.00	23.50	23.50	27.00	27.00	28.50	30.50	37.00	65.00	65.00	88.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

▲ Recommend maximum Straight Flange of 1 1/2" for 3/16" and 2 1/2" for 1/4" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases.

Dish radii other than shown can be furnished on practically all sizes.

Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Pages 87 - 89 fluing manholes and flueholes.

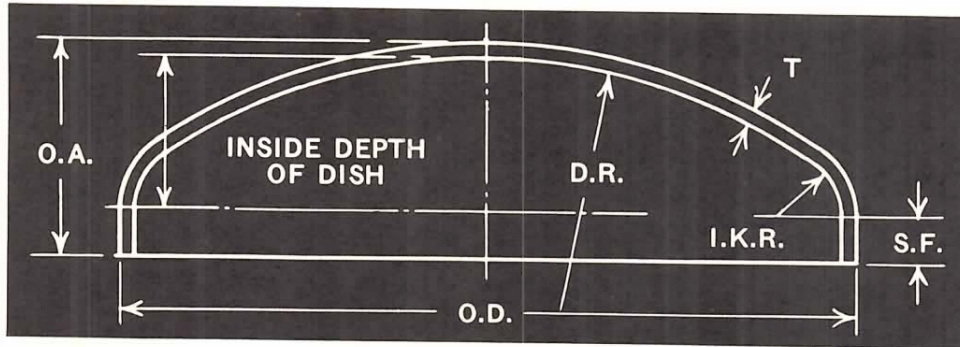
Page 90 manhole and handhole fittings.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS A.S.M.E. CODE

## A.S.M.E. CODE



ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ....	1 1/4 1 1/2-4 1/2	1 3/8 1 1/2-4 1/2	1 1/2 1 1/2-4 1/2	1 5/8 1 1/2-4 1/2	1 3/4 1 1/2-4 1/2	1 7/8 1 1/2-4 1/2	2 1 1/2-4 1/2	2 1/4 1 1/2-4 1/2	2 1/2 1 1/2-4 1/2	2 3/4 1 1/2-4 1/2	3 1 1/2-4 1/2
12	Dish Radius....	...	...	...	...	...	...	...	...	...	...	...
	I. K. R. ....	...	...	...	...	...	...	...	...	...	...	...
	*Max. S.F. ....	...	...	...	...	...	...	...	...	...	...	...
	I.D.D. ....	...	...	...	...	...	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
14	Dish Radius....	...	...	...	...	...	...	...	...	...	...	...
	I. K. R. ....	...	...	...	...	...	...	...	...	...	...	...
	*Max. S.F. ....	...	...	...	...	...	...	...	...	...	...	...
	I.D.D. ....	...	...	...	...	...	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
16	Dish Radius....	...	...	...	...	...	...	...	...	...	...	...
	I. K. R. ....	...	...	...	...	...	...	...	...	...	...	...
	*Max. S.F. ....	...	...	...	...	...	...	...	...	...	...	...
	I.D.D. ....	...	...	...	...	...	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
18	Dish Radius....	16	...	...	...	...	...	...	...	...	...	...
	I. K. R. ....	3 3/4	...	...	...	...	...	...	...	...	...	...
	*Max. S.F. ....	4 1/2	...	...	...	...	...	...	...	...	...	...
	I.D.D. ....	4 7/16	...	...	...	...	...	...	...	...	...	...
	Flat Size ....	25 1/2	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	75.50	...	...	...	...	...	...	...	...	...	...
20	Dish Radius....	18	18	18	...	...	...	...	...	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	...	...	...	...	...	...	...	...
	*Max. S.F. ....	4 1/2	4 1/2	4 1/2	...	...	...	...	...	...	...	...
	I.D.D. ....	4 11/16	4 7/8	5 1/8	...	...	...	...	...	...	...	...
	Flat Size ....	27 1/2	27 7/8	28 1/4	...	...	...	...	...	...	...	...
	List Price.... \$	88.00	130.00	130.00	...	...	...	...	...	...	...	...
22	Dish Radius....	20	20	20	20	...	...	...	...	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	...	...	...	...	...	...	...
	*Max. S.F. ....	6	6	6	6	...	...	...	...	...	...	...
	I.D.D. ....	4 7/8	5 1/8	5 7/16	5 5/8	...	...	...	...	...	...	...
	Flat Size ....	29 1/2	29 7/8	30 1/4	30 5/8	...	...	...	...	...	...	...
	List Price.... \$	88.00	130.00	130.00	189.00	...	...	...	...	...	...	...

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# A.S.M.E. CODE FLANGED AND DISHED HEADS

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ....	3/16 <sup>▲</sup> 1 1/2-2 1/4	1/4 <sup>▲</sup> 1 1/2-2 1/4	5/16 1 1/2-3	3/8 1 1/2-3	7/16 1 1/2-3 1/2	1/2 1 1/2-3 1/2	5/8 1 1/2-3 1/2	3/4 1 1/2-4	7/8 1 1/2-4	1 5/16 1 1/2-4	1 1 1/2-4	1 1/8 1 1/2-4 1/2
24	Dish Radius....	24	24	24	24	24	24	24	24	24	24	24	24
	I. K. R. ....	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 7/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D. ....	4	4	3 15/16	3 7/8	3 7/8	3 13/16	4	4 3/16	4 3/8	4 1/2	4 9/16	4 13/16
	Flat Size ....	29	29	29	29	29	29	29 1/4	29 1/2	29 3/4	29 7/8	31	31 3/8
	List Price .... \$	23.00	23.00	23.50	23.50	27.00	27.00	28.50	30.50	37.00	65.00	65.00	88.00
26	Dish Radius....	24	24	24	24	24	24	24	24	24	24	24	24
	I. K. R. ....	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 7/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D. ....	4 5/8	4 5/8	4 9/16	4 1/2	4 1/2	4 7/16	4 1/2	4 11/16	4 7/8	4 15/16	5	5 3/16
	Flat Size ....	31 1/16	31 1/16	31 1/16	31 1/16	31 1/16	31 1/16	31 1/4	31 1/2	31 3/4	31 7/8	33	33 3/8
	List Price .... \$	23.50	25.50	27.00	27.00	30.50	30.50	34.00	37.00	44.00	71.50	71.50	101.00
28	Dish Radius....	26	26	26	26	26	26	26	26	24	24	24	24
	I. K. R. ....	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 7/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D. ....	5	4 15/16	4 7/8	4 13/16	4 13/16	4 3/4	4 13/16	4 15/16	5 3/8	5 1/2	5 9/16	5 11/16
	Flat Size ....	33 3/8	33 1/8	33 3/8	33 3/8	33 3/8	33 3/8	33 3/4	33 1/2	33 3/4	33 7/8	35	35 3/8
	List Price .... \$	23.50	25.50	27.00	27.00	30.50	30.50	34.00	37.00	44.00	71.50	71.50	101.00
30	Dish Radius....	30	30	30	30	30	30	30	30	30	30	30	30
	I. K. R. ....	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	4	5	6	6	6	6	6	6	6
	I.D.D. ....	5	4 15/16	4 7/8	4 7/8	4 7/8	4 13/16	4 13/16	5	5 1/8	5 1/4	5 3/8	5 1/2
	Flat Size ....	35 1/2	35 1/2	35 1/2	35 1/2	35 1/2	35 1/2	35 1/2	35 3/4	36	36 1/8	37 1/4	37 3/8
	List Price .... \$	23.50	25.50	27.00	27.00	30.50	30.50	34.00	37.00	44.00	71.50	71.50	101.00
36	Dish Radius....	36	36	36	36	36	36	36	36	36	36	36	36
	I. K. R. ....	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	4 1/2	5 1/2	6	6	6	6	6	6	6
	I.D.D. ....	6	6	5 15/16	5 15/16	5 7/8	5 7/8	5 13/16	5 3/4	5 15/16	6	6 1/8	6 5/16
	Flat Size ....	42	42	42	42	42	42	42	42	42 1/4	42 3/8	43 1/2	43 7/8
	List Price .... \$	27.00	27.00	30.50	30.50	35.50	35.50	37.00	40.50	49.00	80.00	80.00	113.50
42	Dish Radius....	42	42	42	42	42	42	42	42	42	42	42	42
	I. K. R. ....	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 13/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	7 1/8	7 1/16	7	7	7	7	6 7/8	6 13/16	6 3/4	6 13/16	6 7/8	7 1/16
	Flat Size ....	48 1/2	48 1/2	48 1/2	48 1/2	48 1/2	48 1/2	48 1/2	48 1/2	48 1/2	48 5/8	49 3/4	50 1/8
	List Price .... \$	34.00	34.00	37.00	37.00	42.00	42.00	47.50	50.50	57.50	92.50	92.50	126.00
48	Dish Radius....	48	48	48	48	48	48	48	48	48	48	42	42
	I. K. R. ....	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	3	3 3/8
	*Max. S.F. ....	2	3	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	8 1/16	8 1/16	8	8	8	8	7 13/16	7 3/4	7 11/16	7 11/16	8 1/2	8 5/8
	Flat Size ....	55	55	55	55	55	55	55	55	55	55	56	56 3/8
	List Price .... \$	39.00	39.00	44.00	44.00	50.50	50.50	54.00	59.00	67.50	105.00	105.00	138.50
54	Dish Radius....	54	54	54	54	54	54	54	54	54	54	48	48
	I. K. R. ....	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 3/8
	*Max. S.F. ....	2	3	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	9 3/8	9	9	8 15/16	8 15/16	8 13/16	8 13/16	8 3/4	8 11/16	8 11/16	9 7/16	9 7/16
	Flat Size ....	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	61 5/12	62 5/12	62 5/8
	List Price .... \$	54.50	54.50	65.00	65.00	71.50	71.50	80.00	86.00	96.50	117.50	117.50	151.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

▲ Recommend maximum Straight Flange of 1 1/2" for 3/16" and 2 1/4" for 1/4" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS A.S.M.E. CODE

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ....	1/4	13/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4	3
		1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2
24	Dish Radius.....	24	24	20	20	20	...	...	...	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	...	...	...	...	...	...
	*Max. S.F. ....	6	6	6	6	6	...	...	...	...	...	...
	I.D.D. ....	5	5 1/4	5 3/8	5 15/16	6 1/8	...	...	...	...	...	...
	Flat Size .....	31 3/4	32 1/8	32 1/2	32 7/8	33 1/4	...	...	...	...	...	...
	List Price .....	\$ 88.00	130.00	130.00	189.00	189.00	...	...	...	...	...	...
26	Dish Radius.....	24	24	24	24	24	24	...	...	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	...	...	...	...	...
	*Max. S.F. ....	6	6	6	6	6	6	...	...	...	...	...
	I.D.D. ....	5 3/8	5 5/8	5 13/16	6	6 1/4	6 1/2	...	...	...	...	...
	Flat Size .....	33 3/4	34 1/8	34 1/2	34 7/8	35 1/4	35 5/8	...	...	...	...	...
	List Price .....	\$ 101.00	143.00	143.00	199.50	199.50	252.00	...	...	...	...	...
28	Dish Radius.....	24	24	24	24	24	24	24	...	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	...	...	...	...
	*Max. S.F. ....	6	6	6	6	6	6	6	...	...	...	...
	I.D.D. ....	5 7/8	6 1/16	6 1/4	6 7/16	6 3/8	6 13/16	7	...	...	...	...
	Flat Size .....	35 3/4	36 1/8	36 1/2	36 7/8	37 1/4	37 5/8	38	...	...	...	...
	List Price .....	\$ 101.00	143.00	143.00	199.50	199.50	252.00	252.00	...	...	...	...
30	Dish Radius.....	30	30	30	30	30	30	30	30	...	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	...	...	...
	*Max. S.F. ....	6	6	6	6	6	6	6	6	...	...	...
	I.D.D. ....	5 3/4	5 15/16	6 1/8	6 3/8	6 9/16	6 13/16	7 1/16	7 9/16	...	...	...
	Flat Size .....	38	38 3/8	38 3/4	39 1/8	39 1/2	39 7/8	40 1/4	41	...	...	...
	List Price .....	\$ 101.00	143.00	143.00	199.50	199.50	252.00	252.00	294.00	...	...	...
36	Dish Radius.....	36	36	36	36	36	36	36	30	30	...	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	...	...
	*Max. S.F. ....	6	6	6	6	6	6	6	6	6	...	...
	I.D.D. ....	6 1/2	6 11/16	6 7/8	7 1/16	7 5/16	7 1/2	7 11/16	8 9/16	9	...	...
	Flat Size .....	44 1/4	44 5/8	45	45 3/8	45 3/4	46 1/8	46 1/2	47 1/4	48	...	...
	List Price .....	\$ 113.50	155.50	155.50	210.00	210.00	262.50	262.50	315.00	382.00	...	...
42	Dish Radius.....	42	42	42	36	36	36	36	36	36	36	...
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	...
	*Max. S.F. ....	8	8	8	8	8	8	8	8	8	8	...
	I.D.D. ....	7 1/4	7 7/16	7 5/8	8 3/8	8 5/8	8 13/16	9	9 5/16	9 11/16	10 1/8	...
	Flat Size .....	50 1/2	50 7/8	51 1/4	51 5/8	52	52 3/8	52 3/4	53 1/2	54 1/4	55	...
	List Price .....	\$ 126.00	168.00	168.00	220.50	220.50	273.00	273.00	332.00	407.50	495.50	...
48	Dish Radius.....	42	42	42	42	42	42	42	42	42	42	42
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F. ....	8	8	8	8	8	8	8	8	8	8	8
	I.D.D. ....	8 13/16	9	9 3/16	9 1/4	9 7/16	9 5/8	9 3/4	10 1/8	10 1/2	10 7/8	11 1/4
	Flat Size .....	56 3/4	57 1/8	57 1/2	57 7/8	58 1/4	58 5/8	59	59 3/4	60 1/2	61 1/4	62
	List Price .....	\$ 138.50	180.50	180.50	231.00	231.00	285.50	285.50	348.50	432.50	516.50	600.50
54	Dish Radius.....	48	48	48	48	48	48	48	48	48	48	48
	I. K. R. ....	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F. ....	8	8	8	8	8	8	8	8	8	8	8
	I.D.D. ....	9 5/8	9 3/4	9 7/8	10 1/16	10 3/16	10 3/8	10 9/16	10 7/8	11 1/4	11 5/8	12
	Flat Size .....	63	63 3/8	63 3/4	64 1/8	64 1/2	64 7/8	65 1/4	66	66 3/4	67 1/2	68 1/4
	List Price .....	\$ 151.00	195.50	195.50	245.50	245.50	300.50	300.50	361.00	445.00	533.50	621.50

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and hardhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.



# A.S.M.E. CODE FLANGED AND DISHED HEADS

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ....	3/16 <sup>▲</sup> 1 1/2-2 1/4	1/4 <sup>▲</sup> 1 1/2-2 1/4	5/16 1 1/2-3	3/8 1 1/2-3	7/16 1 1/2-3 1/2	1/2 1 1/2-3 1/2	5/8 1 1/2-3 1/2	3/4 1 1/2-4	7/8 1 1/2-4	1 5/16 1 1/2-4	1 1 1/2-4	1 1/8 1 1/2-4 1/2
60	Dish Radius....	60	60	60	60	60	60	60	60	60	60	54	54
	I. K. R. ....	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8
	*Max. S.F. ....	1 1/2	3	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	10	10	10	10	9 15/16	9 7/8	9 7/8	9 13/16	9 3/4	9 11/16	10 1/2	10 7/16
	Flat Size ....	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	67 11/12	68 11/12	69 1/12
	List Price .... \$	63.00	63.00	75.50	75.50	84.00	84.00	92.50	101.00	113.50	134.50	134.50	168.00
66	Dish Radius....	...	66	66	66	66	66	66	60	60	60	60	60
	I. K. R. ....	...	4	4	4	4	4	4	4	4	4	4	4
	*Max. S.F. ....	...	3	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	11 1/16	11 1/16	11	10 15/16	10 15/16	10 7/8	11 5/8	11 9/16	11 9/16	11 1/2	11 7/16
	Flat Size ....	...	74 5/12	74 5/12	74 5/12	74 5/12	74 5/12	74 5/12	74 5/12	74 5/12	74 5/12	75 5/12	75 13/24
	List Price .... \$	...	75.50	88.00	88.00	96.50	96.50	105.00	115.50	130.00	151.00	151.00	185.00
72	Dish Radius....	...	72	72	72	72	72	66	66	66	66	66	66
	I. K. R. ....	...	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8	4 3/8
	*Max. S.F. ....	...	2 1/2	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	12 7/8	12 1/16	12	12	11 15/16	12 3/4	12 11/16	12 5/8	12 9/16	12 1/2	12 7/16
	Flat Size ....	...	80 11/12	80 11/12	80 11/12	80 11/12	80 11/12	80 11/12	80 11/12	80 11/12	80 11/12	81 11/12	82
	List Price .... \$	...	88.00	101.00	101.00	111.50	111.50	122.00	132.50	147.00	172.00	172.00	203.50
78	Dish Radius....	...	...	72	72	72	72	72	72	72	72	72	72
	I. K. R. ....	...	...	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4
	*Max. S.F. ....	...	...	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	...	13 15/16	13 15/16	13 7/8	13 3/8	13 3/4	13 11/16	13 9/16	13 9/16	13 1/2	13 7/16
	Flat Size ....	...	...	87 3/8	87 3/8	87 3/8	87 3/8	87 3/8	87 3/8	87 3/8	87 3/8	88 3/8	88 1/2
	List Price .... \$	...	...	115.50	115.50	128.00	128.00	138.50	151.00	168.00	193.00	193.00	224.50
84	Dish Radius....	...	...	78	78	78	78	78	78	78	78	78	78
	I. K. R. ....	...	...	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8
	*Max. S.F. ....	...	...	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	...	14 15/16	14 7/8	14 13/16	14 13/16	14 3/4	14 11/16	14 5/8	14 5/8	14 9/16	14 7/16
	Flat Size ....	...	...	93 7/8	93 7/8	93 7/8	93 7/8	93 7/8	93 7/8	93 7/8	93 7/8	94 7/8	95
	List Price .... \$	...	...	132.50	132.50	145.00	145.00	155.50	172.00	189.00	214.00	214.00	248.00
90	Dish Radius....	...	...	84	84	84	84	84	84	84	84	84	84
	I. K. R. ....	...	...	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2
	*Max. S.F. ....	...	...	3 1/2	5	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	...	16	15 15/16	15 7/8	15 13/16	15 3/4	15 11/16	15 5/8	15 5/8	15 9/16	15 1/2
	Flat Size ....	...	...	100 3/8	100 3/8	100 3/8	100 3/8	100 3/8	100 3/8	100 3/8	100 3/8	101 3/8	101 1/2
	List Price .... \$	...	...	149.00	149.00	164.00	164.00	176.50	193.00	214.00	239.50	239.50	273.00
96	Dish Radius....	...	...	90	90	90	90	90	90	90	90	90	90
	I. K. R. ....	...	...	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8
	*Max. S.F. ....	...	...	3	4 1/2	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	...	16 15/16	16 15/16	16 7/8	16 7/8	16 13/16	16 3/4	16 5/8	16 5/8	16 9/16	16 1/2
	Flat Size ....	...	...	106 7/8	106 7/8	106 7/8	106 7/8	106 7/8	106 7/8	106 7/8	106 7/8	107 7/8	108
	List Price .... \$	...	...	168.00	168.00	180.50	180.50	197.50	214.00	237.50	264.50	264.50	298.00
102	Dish Radius....	...	...	96	96	96	96	96	96	96	96	96	96
	I. K. R. ....	...	...	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8
	*Max. S.F. ....	...	...	3	4 1/2	5 1/2	6	7	8	8	8	8	8
	I.D.D. ....	...	...	17 15/16	17 15/16	17 7/8	17 7/8	17 3/4	17 11/16	17 5/8	17 5/8	17 9/16	17 7/16
	Flat Size ....	...	...	113 1/3	113 1/3	113 1/3	113 1/3	113 1/3	113 1/3	113 1/3	113 1/3	114 1/3	114 1/2
	List Price .... \$	...	...	189.00	189.00	201.50	201.50	220.50	239.50	264.50	290.00	290.00	323.50

▲ Recommend maximum Straight Flange of 1 1/2" for 3/4" and 2 1/2" for 1/2" thickness wherever possible.

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS A.S.M.E. CODE

## A.S.M.E. CODE

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

O.D.	Rolled Thickness... Std. S.F. ....	1 1/4 1 1/2-4 1/2	1 3/8 1 1/2-4 1/2	1 1/2 1 1/2-4 1/2	1 5/8 1 1/2-4 1/2	1 3/4 1 1/2-4 1/2	1 7/8 1 1/2-4 1/2	2 1 1/2-4 1/2	2 1/4 1 1/2-4 1/2	2 1/2 1 1/2-4 1/2	2 3/4 1 1/2-4 1/2	3 1 1/2-4 1/2
60	Dish Radius	54	54	54	54	54	54	54	54	54	48	48
	I. K. R.	3 3/4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	10 7/16	10 9/16	10 1 1/16	10 7/8	11	11 3/16	11 5/16	11 11/16	12	13 1/16	13 7/16
	Flat Size	69 1/4	69 5/8	70	70 3/8	70 3/4	71 1/8	71 1/2	72 1/4	73	73 3/4	74 1/2
	List Price	\$ 168.00	210.00	210.00	260.50	260.50	315.00	315.00	378.00	462.00	550.00	638.50
66	Dish Radius	60	60	60	60	60	60	60	60	60	54	54
	I. K. R.	4	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	11 3/8	11 3/8	11 1/2	11 1 1/16	11 1 3/16	12	12 1/8	12 7/16	12 1 3/16	14	14 3/16
	Flat Size	75 5/8	75 7/8	76 1/4	76 5/8	77	77 3/8	77 3/4	78 1/2	79 1/4	80	80 3/4
	List Price	\$ 185.00	227.00	227.00	275.00	275.00	327.50	327.50	392.50	476.50	567.00	655.00
72	Dish Radius	66	66	66	66	66	66	66	66	66	60	60
	I. K. R.	4 3/8	4 3/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	12 3/8	12 5/16	12 5/16	12 1/2	12 5/8	12 3/4	12 5/16	13 1/4	13 9/16	14 1 1/16	15
	Flat Size	82 1/8	82 1/4	82 1/2	82 7/8	83 1/4	83 3/8	84	84 3/4	85 1/2	86 1/4	87
	List Price	\$ 203.50	245.50	245.50	294.00	294.00	344.50	344.50	409.50	493.50	584.00	672.00
78	Dish Radius	72	72	72	72	72	72	72	72	72	66	66
	I. K. R.	4 3/4	4 3/4	4 3/4	4 7/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	13 3/8	13 5/16	13 1/4	13 1/4	13 7/16	13 9/16	13 3/4	14 1/16	14 3/8	15 1/2	15 7/8
	Flat Size	88 5/8	88 3/4	88 7/8	89 1/8	89 1/2	89 7/8	90 1/4	91	91 3/4	92 1/2	93 1/4
	List Price	\$ 224.50	264.50	264.50	311.00	311.00	363.50	363.50	428.50	512.50	600.50	693.00
84	Dish Radius	78	78	78	78	78	78	78	78	78	72	72
	I. K. R.	5 1/8	5 1/8	5 1/8	5 1/8	5 1/4	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	14 3/8	14 5/16	14 1/4	14 3/16	14 1/4	14 3/8	14 1/2	14 7/8	15 3/16	16 5/16	16 5/8
	Flat Size	95 5/8	95 1/4	95 5/8	95 1/2	95 3/4	96 1/8	96 1/2	97 1/4	98	98 3/4	99 1/2
	List Price	\$ 248.00	285.50	285.50	332.00	332.00	382.00	382.00	449.50	533.50	621.50	714.00
90	Dish Radius	84	84	84	84	84	84	84	84	84	78	78
	I. K. R.	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 5/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	15 7/16	15 5/16	15 1/4	15 3/16	15 1/8	15 3/16	15 5/16	15 5/8	16	17 1/8	17 7/16
	Flat Size	101 5/8	101 3/4	101 7/8	102	102 1/8	102 3/8	102 3/4	103 1/2	104 1/4	105	105 3/4
	List Price	\$ 273.00	311.00	311.00	355.00	355.00	403.00	403.00	470.50	554.50	642.50	735.00
96	Dish Radius	90	90	90	90	90	90	90	90	90	84	84
	I. K. R.	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	5 7/8	6	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	16 7/16	16 3/8	16 5/16	16 1/4	16 3/16	16 1/8	16 1/8	16 7/16	16 3/4	17 7/8	18 3/16
	Flat Size	108 1/8	108 1/4	108 3/8	108 1/2	108 5/8	108 3/4	109	109 3/4	110 1/2	111 1/4	112
	List Price	\$ 298.00	336.00	336.00	378.00	378.00	426.50	426.50	491.50	579.50	668.00	760.00
102	Dish Radius	96	96	96	96	96	96	96	96	96	90	90
	I. K. R.	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 1/8	6 3/4	7 1/2	8 1/4	9
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8
	I.D.D.	17 7/16	17 3/8	17 5/16	17 1/4	17 1/8	17 1/16	17	17 1/4	17 9/16	18 1 1/16	19
	Flat Size	114 5/8	114 3/4	114 7/8	115	115 1/8	115 1/4	115 1/3	116	116 3/4	117 1/2	118 1/4
	List Price	\$ 323.50	361.00	361.00	403.00	403.00	449.50	449.50	516.50	605.00	693.00	785.50

\* Maximum Straight Flanges shown can be exceeded in most cases.  
Dish radii other than shown can be furnished on practically all sizes.  
Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights  
Page 100 approximate volume of dish in gallons.

# A.S.M.E. CODE FLANGED AND DISHED HEADS

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness... Std. S.F. ...	$\frac{3}{16}$ 1 1/2-2 1/4	$\frac{1}{4}$ 1 1/2-2 1/4	$\frac{5}{16}$ 1 1/2-3	$\frac{3}{8}$ 1 1/2-3	$\frac{7}{16}$ 1 1/2-3 1/2	$\frac{1}{2}$ 1 1/2-3 1/2	$\frac{5}{8}$ 1 1/2-3 1/2	$\frac{3}{4}$ 1 1/2-4	$\frac{7}{8}$ 1 1/2-4	$\frac{15}{16}$ 1 1/2-4	1 1 1/2-4	$\frac{11}{8}$ 1 1/2-4 1/2
108	Dish Radius	...	...	...	102	102	102	102	102	102	102	102	102
	I. K. R.	...	...	...	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2
	*Max. S.F.	...	...	...	4 1/2	5 1/2	6	7	8	8	8	8	8
	I.D.D.	...	...	...	18 1 5/16	18 7/8	18 7/8	18 3/4	18 3/4	18 1 1/16	18 5/8	18 9/16	18 1/2
	Flat Size	...	...	...	119 5/8	119 5/8	119 5/8	119 5/8	119 5/8	119 5/8	119 5/8	120 5/8	121
	List Price	\$	...	...	210.00	222.50	222.50	243.50	264.50	290.00	319.00	319.00	353.00
114	Dish Radius	...	...	...	108	108	108	108	108	108	108	108	108
	I. K. R.	...	...	...	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8
	*Max. S.F.	...	...	...	4 1/2	5 1/2	6	7	8	8	8	8	8
	I.D.D.	...	...	...	19 1 5/16	19 1 5/16	19 7/8	19 1 3/16	19 3/4	19 1 1/16	19 5/8	19 5/8	19 9/16
	Flat Size	...	...	...	126 1/3	126 1/3	126 1/3	126 1/3	126 1/3	126 1/3	126 1/3	127 1/3	127 1/2
	List Price	\$	...	...	235.00	248.00	248.00	271.00	294.00	321.50	348.50	348.50	382.00
120	Dish Radius	...	...	...	114	114	114	114	114	114	114	114	114
	I. K. R.	...	...	...	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4
	*Max. S.F.	...	...	...	4 1/2	5 1/2	6	7	8	8	8	8	8
	I.D.D.	...	...	...	21	20 1 5/16	20 7/8	20 1 3/16	20 3/4	20 1 1/16	20 1 1/16	20 5/8	20 9/16
	Flat Size	...	...	...	132 1 3/16	132 1 3/16	132 1 3/16	132 1 3/16	132 1 3/16	132 1 3/16	132 1 3/16	133 1 3/16	133 1 5/16
	List Price	\$	...	...	260.50	273.00	273.00	298.00	323.50	353.00	382.00	382.00	416.00
126	Dish Radius	...	...	...	120	120	120	120	120	120	120	120	120
	I. K. R.	...	...	...	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8
	*Max. S.F.	...	...	...	3	4	6	7	8	8	8	8	8
	I.D.D.	...	...	...	22	21 5/16	21 7/8	21 1 3/16	21 3/4	21 1 1/16	21 1 1/16	21 5/8	21 9/16
	Flat Size	...	...	...	139 5/16	139 5/16	139 5/16	139 5/16	139 5/16	139 5/16	139 5/16	140 5/16	140 7/16
	List Price	\$	...	...	285.50	298.00	298.00	323.50	353.00	386.50	416.00	416.00	437.00
132	Dish Radius	...	...	...	126	126	126	126	126	126	126	126	126
	I. K. R.	...	...	...	8	8	8	8	8	8	8	8	8
	*Max. S.F.	...	...	...	4	6	7	8	8	8	8	8	8
	I.D.D.	...	...	...	23	22 1 5/16	22 7/8	22 1 3/16	22 3/4	22 3/4	22 3/4	22 1 1/16	22 5/8
	Flat Size	...	...	...	145 1 3/16	145 1 3/16	145 1 3/16	145 1 3/16	145 1 3/16	145 1 3/16	145 1 3/16	146 1 3/16	146 1 5/16
	List Price	\$	...	...	327.50	327.50	355.00	386.50	420.00	453.50	453.50	483.00	
138	Dish Radius	...	...	...	132	132	132	132	132	132	132	132	126
	I. K. R.	...	...	...	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8
	*Max. S.F.	...	...	...	4	6	7	8	8	8	8	8	8
	I.D.D.	...	...	...	24 1/8	24 1/16	23 1 5/16	23 7/8	23 1 3/16	23 3/4	23 1 1/16	23 5/8	23 5/8
	Flat Size	...	...	...	152 5/16	152 5/16	152 5/16	152 5/16	152 5/16	152 5/16	152 5/16	153 5/16	153 7/16
	List Price	\$	...	...	355.00	355.00	386.50	420.00	458.00	491.50	491.50	521.00	
144	Dish Radius	...	...	...	144	144	144	144	144	144	144	144	132
	I. K. R.	...	...	...	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4
	*Max. S.F.	...	...	...	4	6	7	8	8	8	8	8	8
	I.D.D.	...	...	...	24 1/4	24 3/16	24 1/8	24 1/16	24	24	23 1 5/16	25 9/16	25 9/16
	Flat Size	...	...	...	158 1 3/16	158 1 3/16	158 1 3/16	158 1 3/16	158 1 3/16	158 1 3/16	158 1 3/16	159 1 3/16	159 1 5/16
	List Price	\$	...	...	386.50	386.50	420.00	458.00	495.50	529.00	529.00	558.50	
150	Dish Radius	...	...	...	144	144	144	144	144	144	144	144	144
	I. K. R.	...	...	...	9	9	9	9	9	9	9	9	9
	*Max. S.F.	...	...	...	3 1/2	5	5	6	7	8	8	8	8
	I.D.D.	...	...	...	26	25 1 5/16	25 7/8	25 1 3/16	25 3/4	25 3/4	25 1 1/16	25 5/8	25 5/8
	Flat Size	...	...	...	165 1/4	165 1/4	165 1/4	165 1/4	165 1/4	165 1/4	166 1/4	166 3/8	166 3/8
	List Price	\$	...	...	420.00	420.00	462.00	533.50	575.50	609.00	609.00	642.50	

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and handhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS A.S.M.E. CODE

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D.	Rolled Thickness Std. S.F.	1/4 1 1/2-4 1/2	3/8 1 1/2-4 1/2	1/2 1 1/2-4 1/2	5/8 1 1/2-4 1/2	3/4 1 1/2-4 1/2	7/8 1 1/2-4 1/2	2 1 1/2-4 1/2	2 1/4 1 1/2-4 1/2	2 1/2 1 1/2-4 1/2	2 3/4 1 1/2-4 1/2	3 1 1/2-4 1/2	
108	Dish Radius	102	102	102	102	102	102	102	102	102	96	96	
	I. K. R.	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 3/4	7 1/2	8 1/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8	
	I.D.D.	18 7/16	18 3/8	18 5/16	18 1/4	18 3/16	18 1/8	18 1/16	18 1/16	18 1/16	18 3/8	19 1/2	19 13/16
	Flat Size	121 1/12	121 1/4	121 1/3	121 1/2	121 5/8	121 3/4	121 5/8	122 1/4	123	123 3/4	124 1/2	124 1/2
	List Price	\$ 353.00	386.50	386.50	428.50	428.50	474.50	474.50	542.00	530.00	718.00	815.00	815.00
114	Dish Radius	108	108	108	108	108	108	108	108	108	102	102	
	I. K. R.	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	7 1/2	8 1/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8	
	I.D.D.	19 1/2	19 7/16	19 5/16	19 1/4	19 3/16	19 1/8	19 1/16	19 1/16	18 5/16	19 3/16	20 5/16	20 9/16
	Flat Size	127 5/8	127 3/4	127 13/16	127 5/8	128 1/16	128 3/16	128 5/16	128 9/16	129 1/4	130	130 3/4	130 3/4
	List Price	\$ 382.00	420.00	420.00	458.00	458.00	504.00	504.00	571.00	659.50	747.50	844.00	844.00
120	Dish Radius	114	114	114	114	114	114	114	114	114	108	108	
	I. K. R.	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/2	8 1/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8	
	I.D.D.	20 7/16	20 7/16	20 3/8	20 5/16	20 1/4	20 3/16	20 1/16	19 15/16	20	21 1/8	21 7/16	21 7/16
	Flat Size	134 1/16	134 3/16	134 5/16	134 7/16	134 9/16	134 11/16	134 13/16	135 1/16	135 1/2	136 1/4	137	137
	List Price	\$ 416.00	449.50	449.50	487.00	487.00	533.50	533.50	600.50	689.00	777.00	873.50	873.50
126	Dish Radius	120	120	120	120	114	114	114	114	114	114	114	
	I. K. R.	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	8 1/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8	
	I.D.D.	21 1/2	21 7/16	21 3/8	21 5/16	22 1/8	22 1/16	21 5/16	21 13/16	21 5/8	21 5/16	22 3/16	22 3/16
	Flat Size	140 9/16	140 11/16	140 13/16	140 15/16	141 1/16	141 3/16	141 5/16	141 9/16	141 13/16	142 1/2	143 1/4	143 1/4
	List Price	\$ 437.00	483.00	483.00	527.00	527.00	563.00	563.00	630.00	722.50	808.50	907.00	907.00
132	Dish Radius	126	126	126	126	126	126	126	126	126	126	120	
	I. K. R.	8	8	8	8	8	8	8	8	8	8 1/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	8	8	8	
	I.D.D.	22 9/16	22 1/2	22 7/16	22 3/8	22 1/4	22 3/16	22 1/8	22	21 7/8	21 7/8	23	23
	Flat Size	147 1/16	147 3/16	147 5/16	147 7/16	147 9/16	147 11/16	147 13/16	148 1/16	148 5/16	148 3/4	149 1/2	149 1/2
	List Price	\$ 483.00	516.50	516.50	550.00	550.00	596.50	596.50	663.50	754.00	840.00	941.00	941.00
138	Dish Radius	126	126	126	126	126	126	126	126	126	126	126	
	I. K. R.	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	8 3/8	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	6	6	6	
	I.D.D.	24 7/16	24 3/8	24 5/16	24 1/4	24 3/16	24 1/8	24	23 7/8	23 3/4	23 5/8	23 13/16	23 13/16
	Flat Size	153 9/16	153 11/16	153 13/16	153 15/16	154 1/16	154 3/16	154 5/16	154 9/16	154 13/16	155 1/16	155 3/4	155 3/4
	List Price	\$ 521.00	554.50	554.50	584.00	584.00	628.00	628.00	697.00	789.50	878.00	974.50	974.50
144	Dish Radius	132	132	132	132	132	132	132	132	126	126	126	
	I. K. R.	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	9	
	*Max. S.F.	8	8	8	8	8	8	8	8	6	6	6	
	I.D.D.	25 1/2	25 7/16	25 5/16	25 1/4	25 3/16	25 1/8	25 1/16	24 5/16	25 3/4	25 9/16	25 9/16	25 9/16
	Flat Size	160 1/16	160 3/16	160 5/16	160 7/16	160 9/16	160 11/16	160 13/16	161 1/16	161 5/16	161 9/16	162	162
	List Price	\$ 558.50	592.00	592.00	621.50	621.50	663.50	663.50	731.00	823.00	911.50	1012.00	1012.00
150	Dish Radius	144	144	144	144	144	144	144	144	132	132	...	
	I. K. R.	9	9	9	9	9	9	9	9	9	9	...	
	*Max. S.F.	8	8	8	8	8	8	8	8	6	6	...	
	I.D.D.	25 9/16	25 1/2	25 7/16	25 3/8	25 1/4	25 3/16	25 1/8	25	24 7/8	24 3/4	...	
	Flat Size	166 1/2	166 5/8	166 3/4	166 7/8	167	167 1/8	167 1/4	167 1/2	167 3/4	168	...	
	List Price	\$ 642.50	668.00	668.00	697.00	697.00	739.00	739.00	806.50	903.00	991.00	...	

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and handhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# A.S.M.E. CODE FLANGED AND DISHED HEADS

## A.S.M.E. CODE

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

O.D. †	Rolled Thickness... Std. S.F. ....	3/16 1 1/2-2 1/4	1/4 1 1/2-2 1/4	5/16 1 1/2-3	3/8 1 1/2-3	7/16 1 1/2-3 1/2	1/2 1 1/2-3 1/2	5/8 1 1/2-3 1/2	3/4 1 1/2-4	7/8 1 1/2-4	1 5/16 1 1/2-4	1 1 1/2-4	1 1/8 1 1/2-4 1/2
156	Dish Radius	...	...	...	...	144	144	144	144	144	144	144	144
	I. K. R.	...	...	...	...	9 3/8	9 3/8	9 3/8	9 3/8	9 3/8	9 3/8	9 3/8	9 3/8
	*Max. S.F.	...	...	...	...	3 1/2	5	5	6	6	6	6	6
	I.D.D.	...	...	...	...	27 1 5/16	27 7/8	27 1 3/16	27 3/4	27 1 1/16	27 5/8	27 3/8	27 1/2
	Flat Size	...	...	...	...	171 3/4	171 3/4	171 3/4	171 3/4	171 3/4	171 3/4	172 3/4	172 7/8
	List Price	...	...	...	...	420.00	420.00	462.00	533.50	575.50	609.00	609.00	642.50
162	Dish Radius	...	...	...	...	144	144	144	144	144	144	144	144
	I. K. R.	...	...	...	...	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4
	*Max. S.F.	...	...	...	...	5	5	6	6	6	6	6	6
	I.D.D.	...	...	...	...	29 1 5/16	29 7/8	29 3/4	29 1 1/16	29 1 1/16	29 5/8	29 1/2	29 1/2
	Flat Size	...	...	...	...	178 1/4	178 1/4	178 1/4	178 1/4	178 1/4	178 1/4	179 1/4	179 3/8
	List Price	...	...	...	...	504.00	546.00	613.00	663.50	701.50	701.50	701.50	731.00
168	Dish Radius	...	...	...	...	168	168	168	168	144	144	144	144
	I. K. R.	...	...	...	...	10 1/8	10 1/8	10 1/8	10 1/8	10 1/8	10 1/8	10 1/8	10 1/8
	*Max. S.F.	...	...	...	...	5	5	6	6	6	6	6	6
	I.D.D.	...	...	...	...	28 3/16	28 1/8	28 1/16	28	31 3/4	31 1 1/16	31 5/8	31 5/8
	Flat Size	...	...	...	...	184 3/4	184 3/4	184 3/4	184 3/4	184 3/4	185 3/4	185 3/4	185 7/8
	List Price	...	...	...	...	504.00	546.00	613.00	663.50	701.50	701.50	701.50	731.00
180	Dish Radius	...	...	...	...	168	168	168	168	168	168	168	168
	I. K. R.	...	...	...	...	11	11	11	11	11	11	11	11
	*Max. S.F.	...	...	...	...	5	5	5	5	5	5	5	5
	I.D.D.	...	...	...	...	31 1 5/16	31 7/8	31 1 3/16	31 1 3/16	31 1 3/16	31 3/4	31 1 1/16	31 1 1/16
	Flat Size	...	...	...	...	197 3/4	197 3/4	197 3/4	197 3/4	197 3/4	197 3/4	197 3/4	197 3/4
	List Price	...	...	...	...	819.00	882.00	819.00	882.00	819.00	882.00	819.00	882.00
192	Dish Radius	...	...	...	...	192	192	192	192	192	192	192	192
	I. K. R.	...	...	...	...	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8
	*Max. S.F.	...	...	...	...	4	5	5	5	5	5	5	5
	I.D.D.	...	...	...	...	32 1/4	32 3/16	32 1/8	32 1/8	32 1/16	32 1/16	32 1/16	32
	Flat Size	...	...	...	...	...	...	...	...	...	...	...	...
	List Price	...	...	...	...	...	...	...	...	...	...	...	...
204	Dish Radius	...	...	...	...	192	192	192	192	192	192	192	192
	I. K. R.	...	...	...	...	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4
	*Max. S.F.	...	...	...	...	4	4	4	4	4	4	4	4
	I.D.D.	...	...	...	...	35 3/4	35 3/4	35 3/4	35 3/4	35 3/4	35 1 1/16	35 5/8	35 5/8
	Flat Size	...	...	...	...	...	...	...	...	...	...	...	...
	List Price	...	...	...	...	...	...	...	...	...	...	...	...
210	Dish Radius	...	...	...	...	192	192	192	192	192	192	192	192
	I. K. R.	...	...	...	...	12 5/8	12 5/8	12 5/8	12 5/8	12 5/8	12 5/8	12 5/8	12 5/8
	*Max. S.F.	...	...	...	...	4	4	4	4	4	4	4	4
	I.D.D.	...	...	...	...	37 3/4	37 1 1/16	37 3/8	37 1 1/16	37 3/8	37 3/8	37 3/8	37 3/8
	Flat Size	...	...	...	...	...	...	...	...	...	...	...	...
	List Price	...	...	...	...	...	...	...	...	...	...	...	...
216	Dish Radius	...	...	...	...	192	192	192	192	192	192	192	192
	I. K. R.	...	...	...	...	13	13	13	13	13	13	13	13
	*Max. S.F.	...	...	...	...	3	3	3	3	3	3	3	3
	I.D.D.	...	...	...	...	39 3/4	39 1 1/16	39 5/8	39 1 1/16	39 5/8	39 5/8	39 5/8	39 5/8
	Flat Size	...	...	...	...	...	...	...	...	...	...	...	...
	List Price	...	...	...	...	...	...	...	...	...	...	...	...

† Sizes on this page require circles beyond the limits of our mills. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

\* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Knuckle and/or Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and handhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# FLANGED AND DISHED HEADS A.S.M.E. CODE

## A.S.M.E. CODE

List prices for forming only (metal not included).

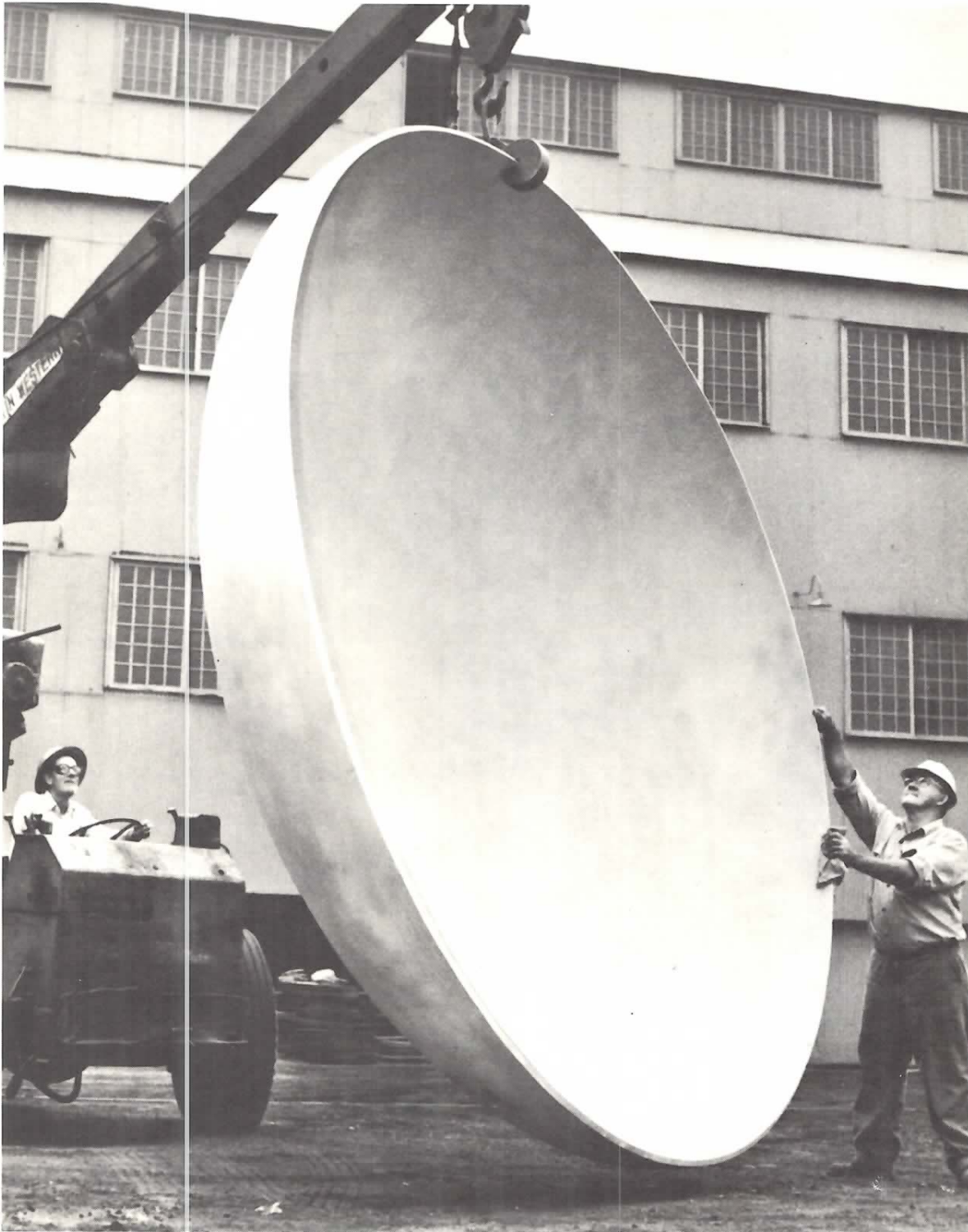
ALL DIMENSIONS IN INCHES.

† O.D.	Rolled Thickness... Std. S.F. ...	1¼	1¾	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3
		1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½	1½-4½
156	Dish Radius....	144	144	144	144	144	144	144	144	144	...	...
	I. K. R. ....	9¾	9¾	9¾	9¾	9¾	9¾	9¾	9¾	9¾	...	...
	*Max. S.F. ....	8	8	8	8	8	8	8	8	8	...	...
	I.D.D. ....	27⅞	27⅞	27⅞	27¼	27⅞	27⅞	27⅞	27	26⅞	26¾	...
	Flat Size ....	173	173⅞	173¼	173⅞	173½	173⅞	173¾	173¾	174	174¼	...
	List Price.... \$	642.50	668.00	668.00	697.00	697.00	739.00	739.00	806.50	903.00	...	...
162	Dish Radius....	144	144	144	144	144	144	144	144	...	...	...
	I. K. R. ....	9¾	9¾	9¾	9¾	9¾	9¾	9¾	9¾	...	...	...
	*Max. S.F. ....	8	8	8	8	8	8	8	8	...	...	...
	I.D.D. ....	29⅞	29⅞	29⅞	29¼	29⅞	29⅞	29	29	28⅞	...	...
	Flat Size ....	179½	179⅞	179¾	179⅞	180	180⅞	180¼	180¼	180½	...	...
	List Price.... \$	731.00	756.00	756.00	840.00	840.00	924.00	924.00	1008.00	...	...	...
168	Dish Radius....	144	144	144	144	144	144	144	144	...	...	...
	I. K. R. ....	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	...	...	...
	*Max. S.F. ....	6	6	6	6	6	6	6	6	...	...	...
	I.D.D. ....	31⅞	31⅞	31⅞	31⅞	31⅞	31⅞	31⅞	31⅞	30⅞	...	...
	Flat Size ....	186	186⅞	186¼	186⅞	186½	186⅞	186¾	187	...	...	...
	List Price.... \$	731.00	756.00	756.00	840.00	840.00	924.00	924.00	1008.00	...	...	...
180	Dish Radius....	168	168	168	168	168	168	168	...	...	...	...
	I. K. R. ....	11	11	11	11	11	11	11	...	...	...	...
	*Max. S.F. ....	5	5	5	5	5	5	5	...	...	...	...
	I.D.D. ....	31⅞	31⅞	31½	31⅞	31⅞	31¼	31⅞	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
192	Dish Radius....	192	192	192	192	192	192	192	...	...	...	...
	I. K. R. ....	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	...	...	...	...
	*Max. S.F. ....	5	5	5	5	5	5	5	...	...	...	...
	I.D.D. ....	31⅞	31⅞	31⅞	31¾	31⅞	31⅞	31⅞	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
204	Dish Radius....	192	192	192	192	192	...	...	...	...	...	...
	I. K. R. ....	12¼	12¼	12¼	12¼	12¼	...	...	...	...	...	...
	*Max. S.F. ....	4	4	4	4	4	...	...	...	...	...	...
	I.D.D. ....	35⅞	35½	35⅞	35⅞	35¼	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
210	Dish Radius....	192	192	192	192	...	...	...	...	...	...	...
	I. K. R. ....	12⅞	12⅞	12⅞	12⅞	...	...	...	...	...	...	...
	*Max. S.F. ....	4	4	4	4	...	...	...	...	...	...	...
	I.D.D. ....	37⅞	37⅞	37⅞	37¼	...	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...
216	Dish Radius....	192	192	192	...	...	...	...	...	...	...	...
	I. K. R. ....	13	13	13	...	...	...	...	...	...	...	...
	*Max. S.F. ....	3	3	3	...	...	...	...	...	...	...	...
	I.D.D. ....	39½	39⅞	39⅞	...	...	...	...	...	...	...	...
	Flat Size ....	...	...	...	...	...	...	...	...	...	...	...
	List Price.... \$	...	...	...	...	...	...	...	...	...	...	...

† Sizes on this page require circles beyond the limits of our mills. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.  
 \* Maximum Straight Flanges shown can be exceeded in most cases. Dish radii other than shown can be furnished on practically all sizes. Prices are based on inside Knuckle Radius shown and Straight Flange 1½" to not exceeding standard shown. Add 5% to list price for each additional ½", or fraction thereof, for excess Knuckle and/or Straight Flange.

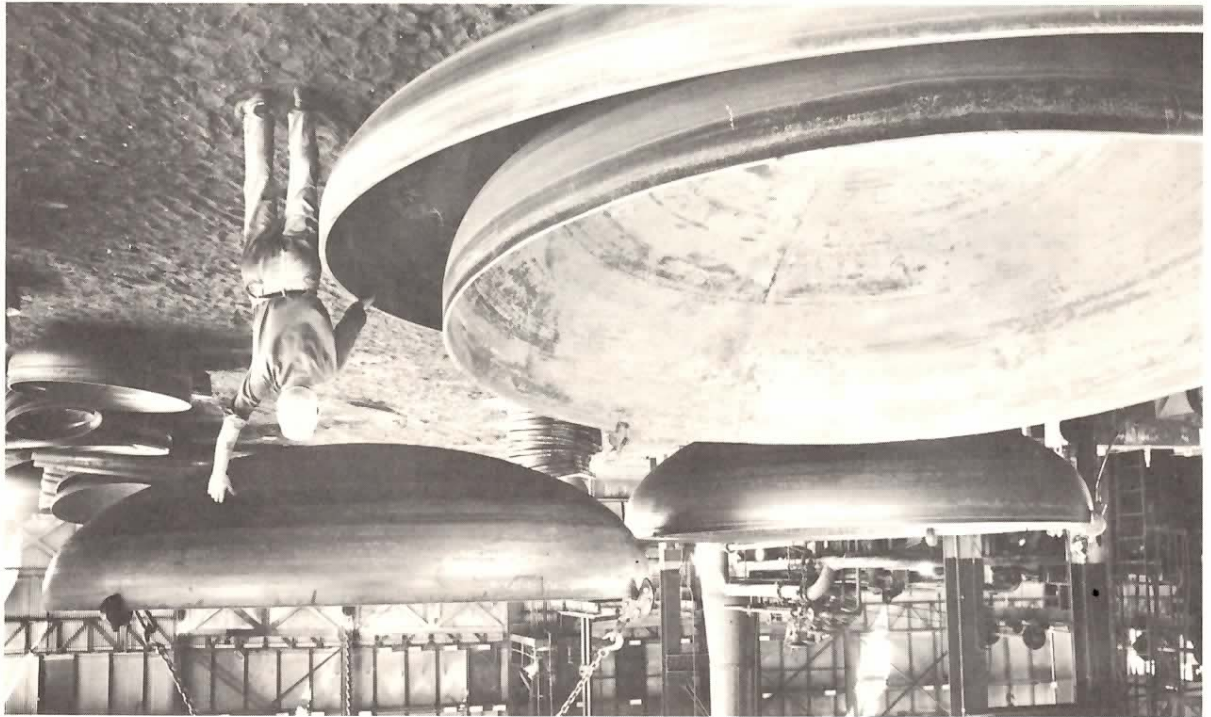
Flat sizes are based on 1½" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.  
 References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and handhole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# Elliptical Dished Heads



Elliptical Stainless Head, 147" I.D., 3/4" minimum gauge, 2" straight flange. Made from two-piece welded circle.

# ELLIPTICAL DISHED HEADS



Elliptical dished heads on shop floor. Foreground bottom—211-1/2" I.D.; foreground top and background center—174" I.D.; background right—192" I.D.



These two heavy elliptical heads, 90" I.D.—with 5-3/8" gauge. Each weigh over 9 tons.

ELLIPTICAL  
DISHED



# ELLIPTICAL DISHED HEADS

Information required on orders and inquiries:

Quantity.

Grade of steel.

†I.D.—Nominal inside diameter.

T—Minimum thickness.

} SF—Straight flange.

} OA—Outside overall height.

Cannot maintain both. Will furnish to O.A. unless otherwise instructed.

Machining, if required.

Any other special work.

## List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

†NOM I.D.	I.D.D.	Rolled Thickness... Std. S.F. ...	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	15/16	1	1 1/8
			2-2 1/4	2-3	2-3	2-3 1/2	2-3 1/2	2-3 1/2	2-4	2-4	2-4	2-4	2-4
12	3	*Max. S.F. ....	3	3	3	3	3	2 1/2	2 1/2	2 1/2	2	2	...
		Flat Size .....	19 7/8	19 15/16	20	20 1/16	20 1/8	20 1/4	20 3/8	20 1/2	20 9/16	20 5/8	...
		List Price .... \$	27.00	30.50	30.50	30.50	30.50	34.00	37.00	44.00	65.00	65.00	...
14	3 1/2	*Max. S.F. ....	3	3	3	3	3	2 1/2	2 1/2	2 1/2	2	2	2
		Flat Size .....	22 1/8	22 3/16	22 1/4	22 5/16	22 3/8	22 1/2	22 5/8	22 3/4	22 13/16	22 7/8	23
		List Price .... \$	27.00	30.50	30.50	30.50	30.50	34.00	37.00	44.00	65.00	65.00	80.00
16	4	*Max. S.F. ....	3	3	3	3 1/2	3 1/2	3 1/2	3	3	3	3	3
		Flat Size .....	24 3/8	24 7/16	24 1/2	24 9/16	24 5/8	24 3/4	24 7/8	25	25 1/16	25 1/8	25 1/4
		List Price .... \$	27.00	30.50	30.50	30.50	30.50	34.00	37.00	44.00	65.00	65.00	80.00
18	4 1/2	*Max. S.F. ....	3	3	3	4	4	4	4	4	4	4	4 1/2
		Flat Size .....	26 5/8	26 1 1/16	26 3/4	26 13/16	26 7/8	27	27 1/8	27 1/4	27 5/16	27 3/8	27 1/2
		List Price .... \$	27.00	30.50	30.50	30.50	30.50	34.00	37.00	44.00	65.00	65.00	80.00
20	5	*Max. S.F. ....	3	3	3	4	4	4	4	4	4	4	4 1/2
		Flat Size .....	28 7/8	28 15/16	29	29 1/16	29 1/8	29 1/4	29 3/8	29 1/2	29 9/16	29 5/8	29 3/4
		List Price .... \$	30.50	32.00	32.00	37.00	37.00	42.00	47.50	54.00	75.50	75.50	101.00
22	5 1/2	*Max. S.F. ....	3	3	3 1/2	4 1/2	5	5	5	5	5	5	5
		Flat Size .....	31 1/8	31 3/16	31 1/4	31 5/16	31 3/8	31 1/2	31 5/8	31 3/4	31 13/16	31 7/8	32
		List Price .... \$	30.50	32.00	32.00	37.00	37.00	42.00	47.50	54.00	75.50	75.50	101.00
24	6	*Max. S.F. ....	3	3	3 1/2	4 1/2	5	5	5	6	6	6	6
		Flat Size .....	33 1/4	33 5/16	33 3/8	33 7/16	33 1/2	33 5/8	33 3/4	33 7/8	33 15/16	34	34 1/8
		List Price .... \$	30.50	32.00	32.00	37.00	37.00	42.00	47.50	54.00	75.50	75.50	101.00
27	6 3/4	*Max. S.F. ....	3	3	3 1/2	4 1/2	5	5	5	6	6	6	6
		Flat Size .....	36 3/8	36 7/16	36 1/2	36 9/16	36 5/8	36 3/4	36 7/8	37	37 1/16	37 1/8	37 1/4
		List Price .... \$	39.00	40.50	40.50	45.50	45.50	50.50	57.50	67.50	96.50	96.50	113.50
30	7 1/2	*Max. S.F. ....	3	3	3 1/2	4 1/2	5	5	6	6	6 1/2	6 1/2	7
		Flat Size .....	40	40 1/16	40 1/8	40 3/16	40 1/4	40 3/8	40 1/2	40 5/8	40 1 1/16	40 3/4	40 7/8
		List Price .... \$	39.00	40.50	40.50	45.50	45.50	50.50	57.50	67.50	96.50	96.50	113.50
33	8 1/4	*Max. S.F. ....	3	3	3 1/2	4 1/2	5	5	6	6	6 1/2	6 1/2	7
		Flat Size .....	43 3/4	43 13/16	43 3/8	43 15/16	44	44 1/8	44 1/4	44 3/8	44 7/16	44 1/2	44 5/8
		List Price .... \$	44.00	49.00	49.00	54.00	54.00	61.00	67.50	77.50	109.00	109.00	126.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases. Recommend Straight Flange be kept to minimum, especially on lighter gauges.

Prices are based on Straight Flange not exceeding standard shown.

Add 5% to list price for each additional 1/2", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness, whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

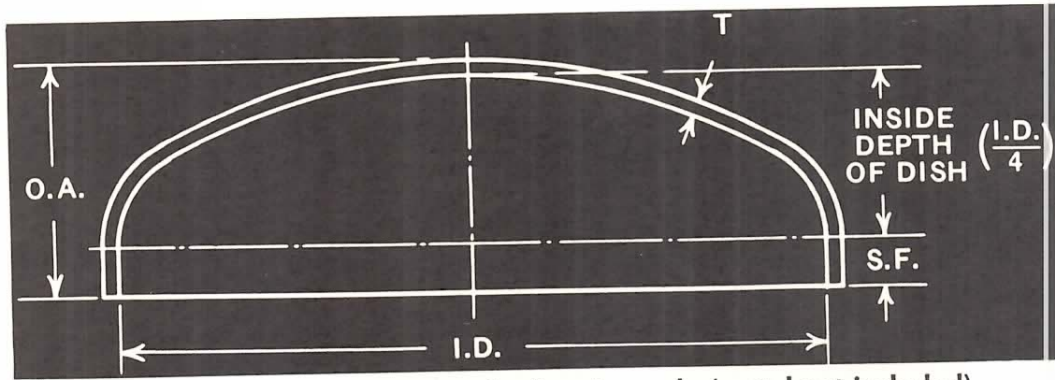
Pages 87-89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 100 circle weights.

Page 113 approximate volume of dish in gallons.

# ELLIPTICAL DISHED HEADS



List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

NOM. I.D.	I.D.D.	Rolled Thickness... Std. S.F...	1 1/4 2-4 1/2	1 3/8 2-4 1/2	1 1/2 2-4 1/2	1 5/8 2-4 1/2	1 3/4 2-4 1/2	1 7/8 2-4 1/2	2 2-4 1/2	2 1/4 2 1/4-4 1/2	2 1/2 2 1/2-4 1/2	2 3/4 2 3/4-4 1/2	3 3-4 1/2	3 1/4 3 1/4-5
12	3	*Max. S.F... Flat Size... List Price...\$	...	...	...	...	...	...	...	...	...	...	...	...
14	3 1/2	*Max. S.F... Flat Size... List Price...\$	...	...	...	...	...	...	...	...	...	...	...	...
16	4	*Max. S.F... Flat Size... List Price...\$	3 25 3/8 80.00	...	...	...	...	...	...	...	...	...	...	...
18	4 1/2	*Max. S.F... Flat Size... List Price...\$	4 1/2 27 3/8 80.00	4 1/2 27 3/4 101.00	4 1/2 27 7/8 101.00	...	...	...	...	...	...	...	...	...
20	5	*Max. S.F... Flat Size... List Price...\$	4 1/2 29 7/8 101.00	4 1/2 30 109.00	4 1/2 30 1/8 109.00	4 1/2 30 1/4 151.00	...	...	...	...	...	...	...	...
22	5 1/2	*Max. S.F... Flat Size... List Price...\$	5 32 1/8 101.00	5 32 1/4 109.00	5 32 3/8 109.00	5 32 1/2 151.00	5 32 5/8 151.00	5 32 3/4 197.50	...	...	...	...	...	...
24	6	*Max. S.F... Flat Size... List Price...\$	6 34 1/4 101.00	6 34 3/8 109.00	6 34 1/2 109.00	6 34 5/8 151.00	6 34 3/4 151.00	6 34 7/8 197.50	6 35 197.50	...	...	...	...	...
27	6 3/4	*Max. S.F... Flat Size... List Price...\$	6 37 3/8 113.50	6 37 1/2 130.00	6 37 5/8 130.00	6 37 3/4 172.00	6 37 7/8 172.00	6 38 218.50	6 38 1/8 218.50	6 38 7/8 269.00	...	...	...	...
30	7 1/2	*Max. S.F... Flat Size... List Price...\$	7 41 113.50	7 41 1/8 130.00	7 41 1/4 130.00	7 41 1/2 172.00	7 41 3/4 172.00	7 41 5/8 218.50	7 41 3/4 218.50	7 42 1/2 269.00	7 43 1/4 323.50	...	...	...
33	8 1/4	*Max. S.F... Flat Size... List Price...\$	7 44 3/4 126.00	7 44 7/8 151.00	7 45 151.00	7 45 1/8 197.50	7 45 1/4 197.50	7 45 3/8 239.50	7 45 1/2 239.50	7 46 1/4 298.00	7 47 374.00	7 47 3/4 458.00	...	...

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases.  
Recommend Straight Flange be kept to minimum.

Prices are based on Straight Flange not exceeding standard shown.  
Add 5% to list price for each additional 1/8", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness, whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# ELLIPTICAL DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

NOM. I.D.	I.D.D.	Rolled Thickness... Std. S.F. ....	1/4 2-2 1/4	5/16 2-3	3/8 2-3	7/16 2-3 1/2	1/2 2-3 1/2	5/8 2-3 1/2	3/4 2-4	7/8 2-4	1 5/16 2-4	1 2-4	1 1/8 2-4 1/2
36	9	*Max. S.F. .... Flat Size ..... List Price.....\$	3 47 3/4 44.00	3 47 13/16 49.00	4 47 7/8 49.00	5 47 15/16 54.00	5 48 54.00	5 48 1/8 61.00	6 48 1/4 67.50	6 48 3/8 77.50	6 1/2 48 7/16 109.00	6 1/2 48 1/2 109.00	7 48 5/8 126.00
39	9 3/4	*Max. S.F. .... Flat Size ..... List Price.....\$	...	3 51 5/16 57.50	4 51 3/8 57.50	5 51 7/16 64.00	5 51 1/2 64.00	6 51 5/8 72.50	6 51 3/4 81.00	8 51 7/8 91.00	8 51 15/16 126.00	8 52 126.00	8 52 1/8 143.00
42	10 1/2	*Max. S.F. .... Flat Size ..... List Price.....\$	...	3 55 1/16 57.50	4 55 1/8 57.50	5 55 3/16 64.00	5 55 1/4 64.00	6 55 3/8 72.50	6 55 1/2 81.00	8 55 5/8 91.00	8 55 11/16 126.00	8 55 3/4 126.00	8 55 7/8 143.00
45	11 1/4	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	3 1/2 59 67.50	4 1/2 59 1/16 74.50	5 59 1/8 74.50	6 59 1/4 84.50	6 59 3/8 93.00	8 59 1/2 104.50	8 59 9/16 143.00	8 59 5/8 143.00	8 59 3/4 161.50
48	12	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	4 62 3/8 67.50	5 62 11/16 74.50	5 62 3/4 74.50	6 62 7/8 84.50	6 63 93.00	8 63 1/8 104.50	8 63 3/16 143.00	8 63 1/4 143.00	8 63 3/8 161.50
54	13 1/2	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	4 70 1/8 101.00	5 70 3/16 109.00	5 70 1/4 109.00	6 70 3/8 119.50	6 70 1/2 132.50	8 70 5/8 147.00	8 70 11/16 164.00	8 70 3/4 164.00	8 70 7/8 185.00
60	15	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	4 77 5/8 117.50	5 77 11/16 126.00	5 77 3/4 126.00	6 77 7/8 138.50	6 78 151.00	8 78 1/8 166.00	8 78 3/16 185.00	8 78 1/4 185.00	8 78 3/8 208.00
66	16 1/2	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	4 85 1/8 134.50	5 85 3/16 145.00	5 85 1/4 145.00	6 85 3/8 159.50	6 85 1/2 172.00	8 85 5/8 191.00	8 85 11/16 210.00	8 85 3/4 210.00	8 85 7/8 235.00
72	18	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	...	4 92 11/16 168.00	5 92 3/4 168.00	6 92 7/8 182.50	6 93 195.50	8 93 1/8 214.00	8 93 3/16 235.00	8 93 1/4 235.00	8 93 3/8 264.50
78	19 1/2	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	...	4 100 3/16 189.00	5 100 1/4 189.00	7 100 3/8 206.00	7 100 1/2 220.50	8 100 5/8 239.50	8 100 11/16 264.50	8 100 3/4 264.50	8 100 7/8 296.00
84	21	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	...	4 107 11/16 216.50	6 107 3/4 216.50	7 107 7/8 233.00	7 108 250.00	8 108 1/8 271.00	8 108 3/16 298.00	8 108 1/4 298.00	8 108 3/8 332.00
90	22 1/2	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	...	4 115 3/16 243.50	6 115 1/4 243.50	7 115 3/8 260.50	7 115 1/2 279.50	8 115 5/8 302.50	8 115 11/16 332.00	8 115 3/4 332.00	8 115 7/8 369.50
96	24	*Max. S.F. .... Flat Size ..... List Price.....\$	...	...	...	4 122 11/16 275.00	6 122 3/4 275.00	7 122 7/8 292.00	7 123 311.00	8 123 1/8 336.00	8 123 3/16 369.50	8 123 1/4 369.50	8 123 3/8 407.50

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases.

Recommend Straight Flange be kept to minimum, especially on lighter gauges.

Prices are based on Straight Flange not exceeding standard shown.

Add 5% to list price for each additional 1/2", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness,

whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Pages 87 - 89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# ELLIPTICAL DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

†NOM. I.D.	I.D.D.	Rolled Thickness... Std. S.F. ...	1¼	1⅝	1½	1⅞	1¾	1⅞	2	2¼	2½	2¾	3	3¼
			2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2¼-4½	2½-4½	2¾-4½
36	9	*Max. S.F... Flat Size ... List Price...\$	7 48¾ 126.00	7 48⅞ 151.00	7 49 151.00	7 49⅞ 197.50	7 49¼ 197.50	7 49⅝ 239.50	7 49½ 239.50	7 50¼ 298.00	7 51 374.00	7 51¾ 458.00	7 52½ 533.50	...
39	9¾	*Max. S.F... Flat Size ... List Price...\$	8 52¼ 143.00	8 52⅝ 172.00	8 52½ 172.00	8 52⅞ 218.50	8 52¾ 218.50	8 52⅞ 260.50	8 53 260.50	7 53¾ 319.00	7 54¼ 395.00	7 55¼ 483.00	7 56 558.50	6 56¾ 634.00
42	10½	*Max. S.F... Flat Size ... List Price...\$	8 56 143.00	8 56⅞ 172.00	8 56¼ 172.00	8 56⅞ 218.50	8 56½ 218.50	8 56⅝ 260.50	8 56¾ 260.50	8 57½ 319.00	8 58¼ 395.00	8 59 483.00	8 59¾ 558.50	7 60½ 634.00
45	11¼	*Max. S.F... Flat Size ... List Price...\$	8 59⅞ 161.50	8 60 191.00	8 60⅞ 191.00	8 60¼ 235.00	8 60⅝ 235.00	8 60½ 285.50	8 60⅞ 285.50	8 61⅞ 344.50	8 62¼ 420.00	8 62⅞ 508.00	8 63⅞ 584.00	7 64⅞ 663.50
48	12	*Max. S.F... Flat Size ... List Price...\$	8 63½ 161.50	10 63⅞ 191.00	10 63¼ 191.00	10 63⅞ 235.00	10 64 235.00	10 64⅞ 285.50	10 64¼ 285.50	10 65 344.50	10 65¼ 420.00	10 66½ 508.00	10 67¼ 584.00	8 68 663.50
54	13½	*Max. S.F... Flat Size ... List Price...\$	8 71 185.00	10 71⅞ 214.00	10 71¼ 214.00	10 71⅞ 264.50	10 71½ 264.50	10 71⅞ 311.00	10 71¾ 311.00	10 72½ 365.50	10 73¼ 449.50	10 74 537.50	10 74¼ 617.50	8 75½ 697.00
60	15	*Max. S.F... Flat Size ... List Price...\$	8 78½ 208.00	10 78⅞ 239.50	10 78¼ 239.50	10 78⅞ 290.00	10 79 290.00	10 79¼ 340.00	10 79¼ 340.00	10 80 399.00	10 80¼ 479.00	10 81½ 567.00	10 82¼ 647.00	8 83 731.00
66	16½	*Max. S.F... Flat Size ... List Price...\$	8 86 235.00	10 86⅞ 269.00	10 86¼ 269.00	10 86⅞ 319.00	10 86½ 319.00	10 86⅞ 369.50	10 86¾ 369.50	10 87½ 432.50	10 88¼ 512.50	10 89 605.00	10 89¼ 686.50	8 90½ 773.00
72	18	*Max. S.F... Flat Size ... List Price...\$	8 93½ 264.50	10 93⅞ 302.50	10 93¼ 302.50	10 93⅞ 353.00	10 94 353.00	10 94⅞ 403.00	10 94¼ 403.00	10 95 468.50	10 95¼ 550.00	10 96½ 642.50	10 97¼ 726.50	8 98 819.00
78	19½	*Max. S.F... Flat Size ... List Price...\$	8 101 296.00	10 101⅞ 336.00	10 101¼ 336.00	10 101⅞ 386.50	10 101½ 386.50	10 101⅞ 441.00	10 101¾ 441.00	10 102½ 508.00	10 103¼ 592.00	10 104 684.50	10 104¼ 773.00	8 105½ 869.50
84	21	*Max. S.F... Flat Size ... List Price...\$	8 108½ 332.00	10 108⅞ 374.00	10 108¼ 374.00	10 108⅞ 428.50	10 109 428.50	10 109⅞ 483.00	10 109¼ 483.00	10 110 550.00	10 110¼ 636.50	10 111½ 731.00	10 112¼ 819.00	8 113 920.00
90	22½	*Max. S.F... Flat Size ... List Price...\$	8 116 369.50	10 116⅞ 416.00	10 116¼ 416.00	10 116⅞ 468.50	10 116½ 468.50	10 116⅞ 525.00	10 116¾ 525.00	10 117½ 596.50	10 118¼ 684.50	10 119 781.00	10 119¾ 873.50	8 120½ 978.50
96	24	*Max. S.F... Flat Size ... List Price...\$	8 123½ 407.50	10 123⅞ 458.00	10 123¼ 458.00	10 123⅞ 512.50	10 124 512.50	10 124⅞ 571.00	10 124¼ 571.00	10 125 647.00	10 125¼ 735.00	10 126½ 831.50	10 127¼ 928.00	8 128 1041.50

† NOM.— Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases. Recommend Straight Flange be kept to minimum.

whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

Prices are based on Straight Flange not exceeding standard shown. Add 5% to list price for each additional ½", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness,

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

**FOR HEAVIER GAUGES, SEE PAGE 52**

# ELLIPTICAL DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

NOM. I.D.	I.D.D.	Roller Thickness... Std. S.F. ...	5/16 2-3	3/8 2-3	7/16 2-3 1/2	1/2 2-3 1/2	9/16 2-3 1/2	5/8 2-3 1/2	3/4 2-4	7/8 2-4	15/16 2-4	1 2-4	1 1/8 2-4 1/2
102	25 1/2	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	4 130 3/16 306.50	6 130 1/4 306.50	6 1/2 130 5/16 323.50	7 130 3/8 323.50	7 130 1/2 344.50	8 130 5/8 369.50	8 130 11/16 409.50	8 130 3/4 409.50	8 130 7/8 449.50
108	27	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	3 137 1 1/16 348.50	6 137 3/4 348.50	6 1/2 137 13/16 361.00	7 137 7/8 361.00	7 138 382.00	8 138 1/8 409.50	8 138 3/16 451.50	8 138 1/4 451.50	8 138 3/8 497.50
114	28 1/2	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	6 145 1/4 374.00	6 1/2 145 5/16 395.00	7 145 3/8 395.00	7 145 1/2 420.00	8 145 5/8 449.50	8 145 11/16 495.50	8 145 3/4 495.50	8 145 7/8 544.00
120	30	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	2 151 3/4 416.00	6 151 13/16 434.50	7 151 7/8 434.50	8 152 462.00	8 152 1/8 491.50	8 152 3/16 542.00	8 152 1/4 542.00	8 152 3/8 596.50
126	31 1/2	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	7 159 3/8 474.50	8 159 1/2 504.00	8 159 5/8 537.50	8 159 11/16 592.00	8 159 3/4 592.00	8 159 7/8 647.00
132	33	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	7 1/2 167 550.00	8 167 1/8 584.00	8 167 3/16 642.50	8 167 1/4 642.50	8 167 3/8 705.50
138	34 1/2	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	7 1/2 174 1/2 596.50	8 174 5/8 630.00	8 174 11/16 693.00	8 174 3/4 693.00	8 174 7/8 764.50
144	36	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	4 182 680.50	8 182 1/8 680.50	8 182 3/16 752.00	8 182 1/4 752.00	8 182 3/8 827.50
156	39	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	4 197 966.00	6 197 1/8 966.00	6 197 3/16 1029.00	6 197 1/4 1029.00	8 197 3/8 1134.00
168	42	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	6	6	6
174	43 1/2	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	...	5	6
180	45	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	...	5	5
192	48	*Max. S.F. .... Flat Size ..... List Price .... \$	...	...	...	...	...	...	...	...	...	...	5

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases.

Recommend Straight Flange to be kept to minimum, especially on lighter gauges.

Prices are based on Straight Flange not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness, whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Page 87-89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# ELLIPTICAL DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

†NOM. I.D.	I.D.D.	Rolled Thickness... Std. S.F. . .	1¼	1½	1½	1¾	1¾	2	2¼	2½	2¾	3	3¼	
			2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2-4½	2¼-4½	2½-4½	2¾-4½	3-4½	3¼-5
102	25½	*Max.S.F. . . Flat Size . . . List Price . . \$	8 131 449.50	10 131½ 504.00	10 131¼ 504.00	10 131¾ 563.00	10 131½ 563.00	10 131¾ 623.50	10 131¼ 623.50	10 133¼ 789.50	10 134 890.50	10 134¾ 991.00	8 135½ 1104.50	
108	27	*Max.S.F. . . Flat Size . . . List Price . . \$	8 138½ 497.50	10 138¾ 554.50	10 138¼ 554.50	10 138¾ 613.00	10 139 613.00	10 139¾ 676.00	10 139¼ 676.00	10 140 756.00	10 140¾ 848.50	10 141½ 951.50	8 142¾ 1054.00	8 143 1176.00
114	28½	*Max.S.F. . . Flat Size . . . List Price . . \$	8 146 544.00	10 146¾ 605.00	10 146¼ 605.00	10 146¾ 663.50	10 146½ 663.50	10 146¾ 731.00	10 146¼ 731.00	10 147½ 815.00	10 148¾ 911.50	10 149 1016.50	8 149¾ 1121.50	8 150½ 1251.50
120	30	*Max.S.F. . . Flat Size . . . List Price . . \$	8 152½ 596.50	10 152¾ 659.50	10 152¼ 659.50	10 152¾ 722.50	10 153 722.50	10 153¾ 791.50	10 153¼ 791.50	10 154 875.50	10 154¾ 974.50	10 155½ 1083.50	8 156¼ 1193.00	8 157 1331.50
126	31½	*Max.S.F. . . Flat Size . . . List Price . . \$	8 160 647.00	10 160¾ 716.00	10 160¼ 716.00	10 160¾ 781.00	10 160½ 781.00	10 160¾ 854.50	10 160¼ 854.50	10 161½ 941.00	10 162¼ 1041.50	10 163 1151.00	8 163¾ 1268.50	8 164½ 1411.00
132	33	*Max.S.F. . . Flat Size . . . List Price . . \$	8 167½ 705.50	10 167¾ 777.00	10 167¼ 777.00	10 167¾ 844.00	10 168 844.00	10 168¾ 920.00	10 168¼ 920.00	10 169 1008.00	10 169¾ 1113.00	10 170½ 1226.50	8 171¼ 1348.00	8 172 1495.00
138	34½	*Max.S.F. . . Flat Size . . . List Price . . \$	8 175 764.50	8 175¾ 840.00	8 175¼ 840.00	8 175¾ 907.00	8 175½ 907.00	8 175¾ 991.00	8 175¼ 991.00	8 176½ 1079.50	8 177¼ 1188.50	6 178 1306.00	6 178¾ 1428.00	...
144	36	*Max.S.F. . . Flat Size . . . List Price . . \$	8 182½ 827.50	8 182¾ 903.00	8 182¼ 903.00	8 182¾ 974.50	8 183 974.50	8 183¾ 1058.50	8 183¼ 1058.50	8 184 1155.00	6 184¾ 1264.00	6 185½ 1386.00	6 186¼ 1516.00	...
156	39	*Max.S.F. . . Flat Size . . . List Price . . \$	8 197½ 1134.00	8 197¾ 1239.00	8 197¼ 1239.00	8 197¾ 1323.00	8 198 1323.00	8 198¾ 1407.00	8 198¼ 1407.00	6 199 1617.00	6 199¾ 1827.00	...	...	...
168	42	*Max.S.F. . . Flat Size . . . List Price . . \$	6	6	6	6	6	6	6	6	6	...	...	...
174	43½	*Max.S.F. . . Flat Size . . . List Price . . \$	6	6	6	6	6	6	6	...	...	...	...	...
180	45	*Max.S.F. . . Flat Size . . . List Price . . \$	5	5	5	5	5	5	5	...	...	...	...	...
192	48	*Max.S.F. . . Flat Size . . . List Price . . \$	5	5	5	5	5	5	5	...	...	...	...	...

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to no. nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases.  
Recommend Straight Flange be kept to minimum.

Prices are based on Straight Flange not exceeding standard shown.  
Add 5% to list price for each additional ½", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness, whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

Sizes below heavy line require circles beyond limits of our mills. The two sizes immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# ELLIPTICAL DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

†NOM. I.D.	I.D.D.	Rolled Thickness... Std. S.F. ....	3½	3¾	4	4¼	4½	4¾	5	5¼	5½
			3½-5½	3¾-6	4-6	4¼-6½	4½-7	4¾-7½	5-7½	5¼-8	5½-8½
42	10½	*Max. S.F.... Flat Size .... List Price ...\$	6 61¼ 693.00	...	...	...	...	...	...	...	...
45	11¼	*Max. S.F.... Flat Size .... List Price ...\$	6 65⅞ 722.50	...	...	...	...	...	...	...	...
48	12	*Max. S.F.... Flat Size .... List Price ...\$	6 68¾ 722.50	6 69½ 781.00	6 70¼ 840.00	...	...	...	...	...	...
54	13½	*Max. S.F.... Flat Size .... List Price ...\$	6 76¼ 756.00	6 77 815.00	6 77¾ 869.50	6 78½ 932.50	6 79¼ 1025.00	...	...	...	...
60	15	*Max. S.F.... Flat Size .... List Price ...\$	6 83¾ 798.00	6 84½ 861.00	6 85¼ 924.00	6 86 987.00	6 86¾ 1058.50	6 87½ 1121.50	6 88¼ 1184.50	...	...
66	16½	*Max. S.F.... Flat Size .... List Price ...\$	6 91¼ 844.00	6 92 920.00	6 92¾ 995.50	6 93½ 1071.00	6 94¼ 1155.00	6 95 1226.50	6 95¾ 1298.00	...	...
72	18	*Max. S.F.... Flat Size .... List Price ...\$	6 98¾ 899.00	6 99½ 978.50	6 100¼ 1067.00	6 101 1151.00	6 101¾ 1247.50	6 102½ 1331.50	6 103¼ 1415.50	6 104 1503.50	6 104¾ 1587.50
78	19½	*Max. S.F.... Flat Size .... List Price ...\$	6 106¼ 953.50	6 107 1046.00	6 107¾ 1146.50	6 108½ 1247.50	6 109¼ 1356.50	6 110 1449.00	6 110¾ 1545.50	6 111½ 1646.50	6 112¼ 1747.00
84	21	*Max. S.F.... Flat Size .... List Price ...\$	6 113¾ 1016.50	6 114½ 1117.00	6 115¼ 1230.50	6 116 1344.00	6 116¾ 1470.00	6 117½ 1575.00	6 118¼ 1684.00	6 119 1797.50	6 119¾ 1911.00
90	22½	*Max. S.F.... Flat Size .... List Price ...\$	6 121¼ 1083.50	6 122 1197.00	6 122¾ 1327.00	6 123½ 1453.00	6 124¼ 1600.00	6 125 1709.50	6 125¾ 1835.50	6 126½ 1965.50	6 127¼ 2100.00
96	24	*Max. S.F.... Flat Size .... List Price ...\$	6 128¾ 1155.00	6 129½ 1281.00	6 130¼ 1424.00	6 131 1566.50	6 131¾ 1730.50	6 132½ 1852.00	6 133¼ 1999.00	6 134 2142.00	6 134¾ 2289.00
102	25½	*Max. S.F.... Flat Size .... List Price ...\$	6 136¼ 1230.50	6 137 1369.00	6 137¾ 1533.00	6 138½ 1692.50	6 139¼ 1873.00	6 140 2007.50	6 140¾ 2171.50	...	...
108	27	*Max. S.F.... Flat Size .... List Price ...\$	6 143¾ 1310.50	6 144½ 1466.00	6 145¼ 1646.50	6 146 1823.00	6 146¾ 2024.50	...	...	...	...
114	28½	*Max. S.F.... Flat Size .... List Price ...\$	6 151¼ 1398.50	6 152 1571.00	6 152¾ 1764.00	...	...	...	...	...	...
120	30	*Max. S.F.... Flat Size .... List Price ...\$	6 157¾ 1487.00	6 158½ 1671.50	...	...	...	...	...	...	...
126	31½	*Max. S.F.... Flat Size .... List Price ...\$	6 165¼ 1583.50	...	...	...	...	...	...	...	...

† NOM.—Refer to page 10 (tolerances) and page 13 (elliptical heads) for more complete information relative to nominal I.D.

\* Maximum Straight Flange can be exceeded in most cases.

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

Prices are based on Straight Flange not exceeding standard shown. Add 5% to list price for each additional ½", or fraction thereof, for excess Straight Flange.

Flat sizes are based on Straight Flange of 2" or 1 x thickness, whichever is greater. Heads of dimensions other than shown, refer to flat size formula, page 13.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

Pages 87 - 89 fluing manholes and flueholes.

Page 90 manhole and handhole fittings.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

TYRES

Flanged and Reverse Dished  
Head, 83 1/2" O.D., 7/8" Thick.



*Flanged and Reverse Dished  
Heads*



# FLANGED AND REVERSE DISHED HEADS

Information required on orders and inquiries:

Quantity.

Grade of steel.

O.D.—Outside diameter.

T—Thickness (furnished nom. unless otherwise specified).

D.R.—Dish radius.

I.K.R.—Inside knuckle radius.

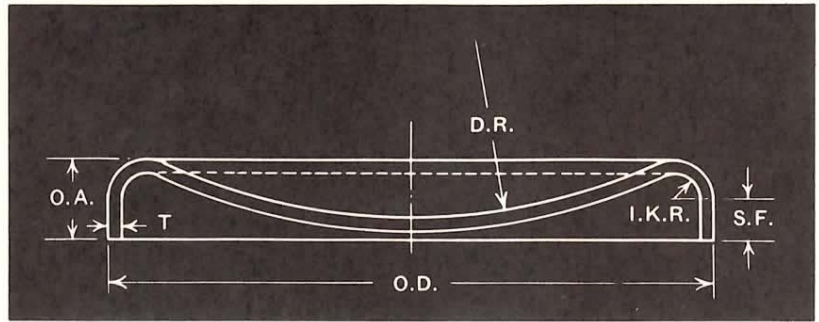
SF—Straight flange.

OA—Outside overall height.

Cannot maintain both. Specify the more important dimension.

Machining or gas cutting, if required.

Any other special work.



## List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

O.D.	Thickness..	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	15/16	1	1 1/8	1 1/4	1 3/8	1 1/2
	I. K. R. . .	9/16	3/4	15/16	1 1/8	15/16	1 1/2	1 7/8	2 1/4	2 5/8	2 13/16	3	3 3/8	3 3/4	4 1/8	4 1/2
	Std. S.F. . .	1 1/2-2	1 1/2-2 1/2	1 1/2-3	1 1/2-3	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-4	1 1/2-4	1 1/2-4	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2
12	Dish Radius.	12	12	12	12	12	12	12	12	...	...	...	...	...	...	...
	*Max. S.F. . .	2	2 1/2	3	3	3	3	3	3	...	...	...	...	...	...	...
	Flat Size . . .	15 7/8	16	16 1/8	16 1/4	16 3/8	16 1/2	16 3/4	17	...	...	...	...	...	...	...
	List Price . . \$	30.50	31.50	33.50	33.50	36.50	36.50	40.50	44.50	...	...	...	...	...	...	...
18	Dish Radius.	18	18	18	18	18	18	18	18	18	18	18	...	...	...	...
	*Max. S.F. . .	2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2	4	4	4	...	...	...	...
	Flat Size . . .	22 1/8	22 1/4	22 3/8	22 1/2	22 5/8	22 3/4	23	23 1/4	23 1/2	23 5/8	24 3/4	...	...	...	...
	List Price . . \$	30.50	31.50	33.50	33.50	36.50	36.50	40.50	44.50	50.50	75.50	75.50	...	...	...	...
24	Dish Radius.	24	24	24	24	24	24	24	24	24	24	24	...	...	...	...
	*Max. S.F. . .	2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2	4	4	4	...	...	...	...
	Flat Size . . .	28 3/8	28 1/2	28 5/8	28 3/4	28 7/8	29	29 1/4	29 1/2	29 3/4	29 7/8	31	...	...	...	...
	List Price . . \$	30.50	33.00	35.50	35.50	40.50	40.50	43.00	45.50	55.50	97.50	97.50	...	...	...	...
30	Dish Radius.	...	30	30	30	30	30	30	30	30	30	30	...	...	...	...
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	4	4	4	4	4	4	...	...	...	...
	Flat Size . . .	...	34 3/4	34 7/8	35	35 1/8	35 1/4	35 1/2	35 3/4	36	36 1/8	37 1/4	...	...	...	...
	List Price . . \$	...	34.50	39.50	39.50	45.50	45.50	50.50	55.50	66.00	107.00	107.00	...	...	...	...
36	Dish Radius.	...	36	36	36	36	36	36	36	36	36	36	36	36	36	...
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	4	4	4	4	4	4	4	4	4	...
	Flat Size . . .	...	41	41 1/8	41 1/4	41 3/8	41 1/2	41 3/4	42	42 1/4	42 3/8	43 1/2	43 7/8	44 1/4	...	...
	List Price . . \$	...	40.50	43.00	43.00	48.00	48.00	55.50	61.00	73.50	119.50	119.50	170.00	170.00	...	...
42	Dish Radius.	...	42	42	42	42	42	42	42	42	42	42	42	42	42	42
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	4	4	4	4	4	4	4	4	4	4
	Flat Size . . .	...	47 1/4	47 3/8	47 1/2	47 5/8	47 3/4	48	48 1/4	48 1/2	48 5/8	49 3/4	50 1/8	50 1/2	50 7/8	51 1/4
	List Price . . \$	...	45.50	50.50	50.50	55.50	55.50	63.50	71.00	86.00	138.50	138.50	189.00	189.00	252.00	252.00
48	Dish Radius.	...	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	4	4	4	4	4	4	4	4	4	4
	Flat Size . . .	...	53 1/2	53 5/8	53 3/4	53 7/8	54	54 1/4	54 1/2	54 3/4	54 7/8	56	56 3/8	56 3/4	57 1/8	57 1/2
	List Price . . \$	...	50.50	55.50	55.50	63.50	63.50	71.00	81.00	96.00	157.50	157.50	208.00	208.00	271.00	271.00
54	Dish Radius.	...	54	54	54	54	54	54	54	54	54	54	54	54	54	54
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	5	5	5	5	5	5	5	5	5	5
	Flat Size . . .	...	59 3/4	59 7/8	60	60 1/8	60 1/4	60 1/2	60 3/4	61	61 1/8	62 1/4	62 3/8	63	63 3/8	63 3/4
	List Price . . \$	...	69.50	79.00	79.00	88.00	88.00	101.00	113.50	132.50	173.50	173.50	227.00	227.00	293.00	293.00
60	Dish Radius.	...	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	5	5	5	5	5	5	5	5	5	5
	Flat Size . . .	...	66	66 1/8	66 1/4	66 3/8	66 1/2	66 3/4	67	67 1/4	67 3/8	68 1/2	68 7/8	69 1/4	69 5/8	70
	List Price . . \$	...	82.00	91.50	91.50	101.00	101.00	113.50	126.00	151.00	189.00	189.00	252.00	252.00	315.00	315.00
66	Dish Radius.	...	66	66	66	66	66	66	66	66	66	66	66	66	66	66
	*Max. S.F. . .	...	2 1/2	3	3 1/2	4	5	5	5	5	5	5	5	5	5	5
	Flat Size . . .	...	72 1/4	72 3/8	72 1/2	72 5/8	72 3/4	73	73 1/4	73 1/2	73 5/8	74 3/4	75 1/8	75 1/2	75 7/8	76 1/4
	List Price . . \$	...	91.50	101.00	101.00	113.50	113.50	126.00	145.00	167.00	208.00	208.00	271.00	271.00	340.00	340.00

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

\* Maximum Straight Flanges can be exceeded in most cases. For Knuckle Radius greater than shown, refer for quotation. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Straight Flange.

Flat sizes are based on 1 1/2" Straight Flange. Heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads. Page 78 machining information and list prices. Pages 87 - 89 fluing manholes and flueholes. Page 90 manhole and handhole fittings. Page 110 circle weights.

OTHER TYPES

# FLANGED AND REVERSE DISHED HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

O.D.	Thickness . . . . .	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	15/16	1	1 1/8	1 1/4	1 3/8	1 1/2
	I. K. R. . . . .	3/4	15/16	1 1/8	15/16	1 1/2	1 7/8	2 1/4	2 5/8	2 3/4	3	3 3/8	3 3/4	4 1/8	4 1/2
	Std. S.F. . . . .	1 1/2-2 1/2	1 1/2-3	1 1/2-3	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-3 1/2	1 1/2-4	1 1/2-4	1 1/2-4	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2	1 1/2-4 1/2
72	Dish Radius . . . . .	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	*Maximum S.F. . . . .	2 1/2	3	3 1/2	4	5	5	5	5	5	5	5	5	5	5
	Flat Size . . . . .	78 1/2	78 5/8	78 3/4	78 7/8	79	79 1/4	79 1/2	79 3/4	79 7/8	81	81 3/8	81 3/4	82 1/8	82 1/2
	List Price . . . . . \$	104.00	113.50	113.50	126.00	126.00	142.00	160.50	189.00	230.00	230.00	291.00	290.00	368.50	368.50
78	Dish Radius . . . . .	78	78	78	78	78	78	78	78	78	78	78	78	78	78
	*Maximum S.F. . . . .	3	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	84 7/8	85	85 1/8	85 1/4	85 1/2	85 3/4	86	86 1/8	87 1/4	87 5/8	88	88 3/8	88 3/4	
	List Price . . . . . \$	129.00	129.00	142.00	142.00	157.50	179.50	208.00	252.00	252.00	303.50	308.50	387.50	387.50	
84	Dish Radius . . . . .	84	84	84	84	84	84	84	84	84	84	84	84	84	84
	*Maximum S.F. . . . .	3	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	91 1/8	91 1/4	91 3/8	91 1/2	91 3/4	92	92 1/4	92 3/8	92 3/4	93 1/2	93 7/8	94 1/4	94 5/8	95
	List Price . . . . . \$	145.00	145.00	157.50	157.50	176.50	201.50	233.00	277.00	277.00	334.00	334.00	409.50	409.50	
90	Dish Radius . . . . .	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	*Maximum S.F. . . . .	3	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	97 3/8	97 1/2	97 5/8	97 3/4	98	98 1/4	98 1/2	98 5/8	99 3/4	100 1/8	100 1/2	100 7/8	101 1/4	
	List Price . . . . . \$	157.50	157.50	176.50	176.50	195.50	223.50	258.50	302.50	302.50	351.00	359.00	431.50	431.50	
96	Dish Radius . . . . .	96	96	96	96	96	96	96	96	96	96	96	96	96	96
	*Maximum S.F. . . . .	3	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	103 5/8	103 3/4	103 7/8	104	104 1/4	104 1/2	104 3/4	104 7/8	106	106 3/8	106 3/4	107 1/8	107 1/2	
	List Price . . . . . \$	176.50	176.50	195.50	195.50	217.50	245.50	283.50	331.00	331.00	384.50	384.50	457.00	457.00	
102	Dish Radius . . . . .	102	102	102	102	102	102	102	102	102	102	102	102	102	102
	*Maximum S.F. . . . .	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	110	110 1/8	110 1/4	110 1/2	110 3/4	111	111 1/8	112 1/4	112 5/8	113	113 3/8	113 3/4		
	List Price . . . . . \$	195.50	214.00	214.00	239.50	271.00	312.00	359.00	359.00	418.00	416.00	482.00	482.00		
108	Dish Radius . . . . .	108	108	108	108	108	108	108	108	108	108	108	108	108	108
	*Maximum S.F. . . . .	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	116 1/4	116 3/8	116 1/2	116 3/4	117	117 1/4	117 3/8	118 1/2	118 7/8	119 1/4	119 5/8	120		
	List Price . . . . . \$	214.00	236.50	236.50	264.50	302.50	346.50	390.50	390.50	447.50	447.50	510.50	510.50		
114	Dish Radius . . . . .	114	114	114	114	114	114	114	114	114	114	114	114	114	114
	*Maximum S.F. . . . .	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	122 1/2	122 5/8	122 3/4	123	123 1/4	123 1/2	123 5/8	124 3/4	125 1/8	125 1/2	125 7/8	126 1/4		
	List Price . . . . . \$	236.50	258.50	258.50	290.00	331.00	378.00	425.50	425.50	479.00	479.00	542.00	542.00		
120	Dish Radius . . . . .	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	*Maximum S.F. . . . .	3 1/2	4	5	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	128 3/4	128 7/8	129	129 1/4	129 1/2	129 3/4	129 7/8	131	131 3/8	131 3/4	132 1/8	132 1/2		
	List Price . . . . . \$	258.50	283.50	283.50	315.00	359.00	409.50	460.00	460.00	510.50	510.50	573.50	573.50		
126	Dish Radius . . . . .	126	126	126	126	126	126	126	126	126	126	126	126	126	126
	*Maximum S.F. . . . .	4	5	6	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	135 1/8	135 1/4	135 1/2	135 3/4	136	136 1/8	137 1/4	137 5/8	138	138 3/8	138 3/4			
	List Price . . . . . \$	308.50	308.50	346.50	390.50	444.00	494.50	494.50	545.00	545.00	605.00	605.00			
132	Dish Radius . . . . .	132	132	132	132	132	132	132	132	132	132	132	132	132	132
	*Maximum S.F. . . . .	4	5	6	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	141 3/8	141 1/2	141 3/4	142	142 1/4	142 3/8	143 1/2	143 7/8	144 1/4	144 5/8	145			
	List Price . . . . . \$	334.00	334.00	371.50	416.00	472.50	520.00	520.00	573.50	573.50	630.00	630.00			
138	Dish Radius . . . . .	144	144	144	144	144	144	144	144	144	144	144	144	144	144
	*Maximum S.F. . . . .	4	5	6	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	147 5/8	147 3/4	148	148 1/4	148 1/2	148 5/8	149 3/4	150 1/8	150 1/2	150 7/8	151 1/4			
	List Price . . . . . \$	346.50	346.50	384.50	434.50	488.50	535.50	535.50	586.00	586.00	646.00	646.00			
144	Dish Radius . . . . .	144	144	144	144	144	144	144	144	144	144	144	144	144	144
	*Maximum S.F. . . . .	5	6	6	6	6	6	6	6	6	6	6	6	6	6
	Flat Size . . . . .	154	154 1/4	154 1/2	154 3/4	154 7/8	156	156 3/8	156 3/4	157 1/8	157 1/2				
	List Price . . . . . \$	365.50	403.00	447.50	501.00	548.00	548.00	593.50	598.50	661.50	661.50				

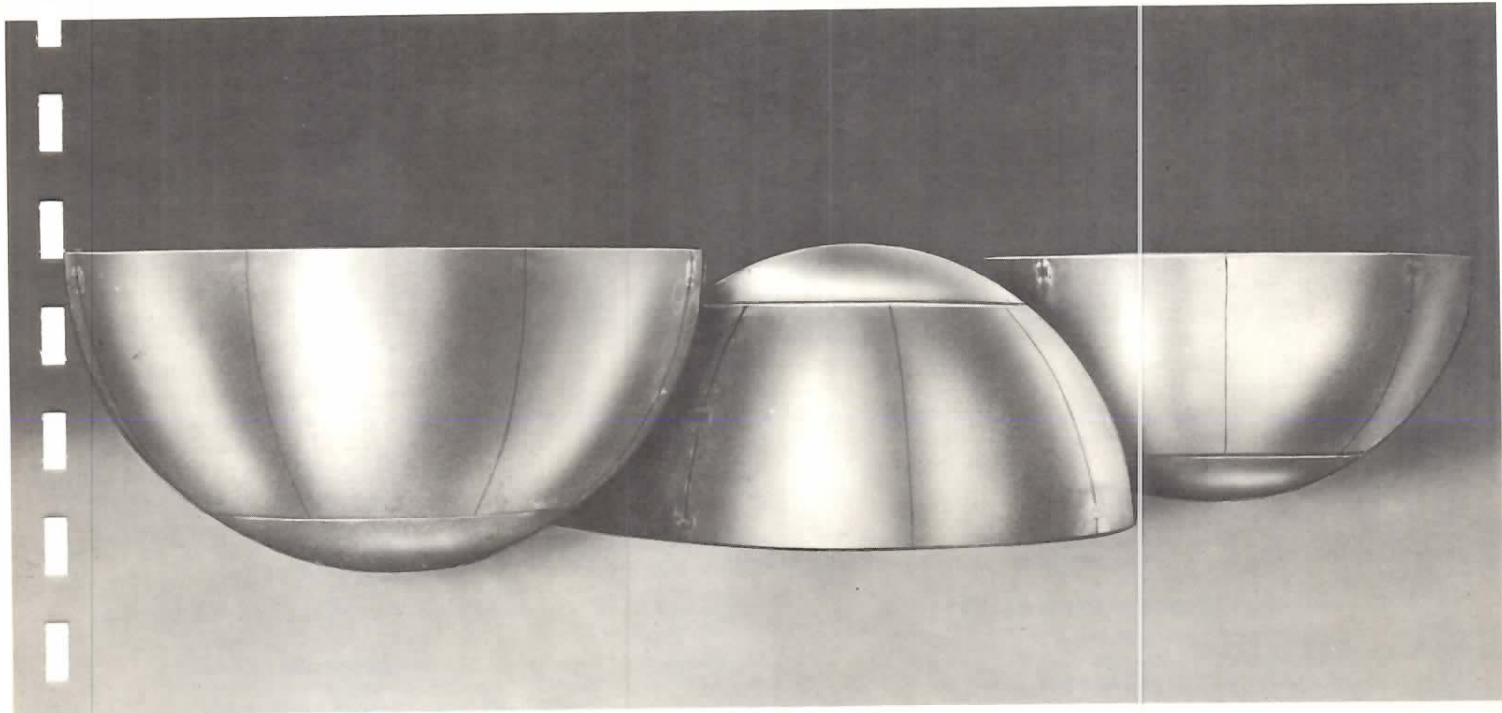
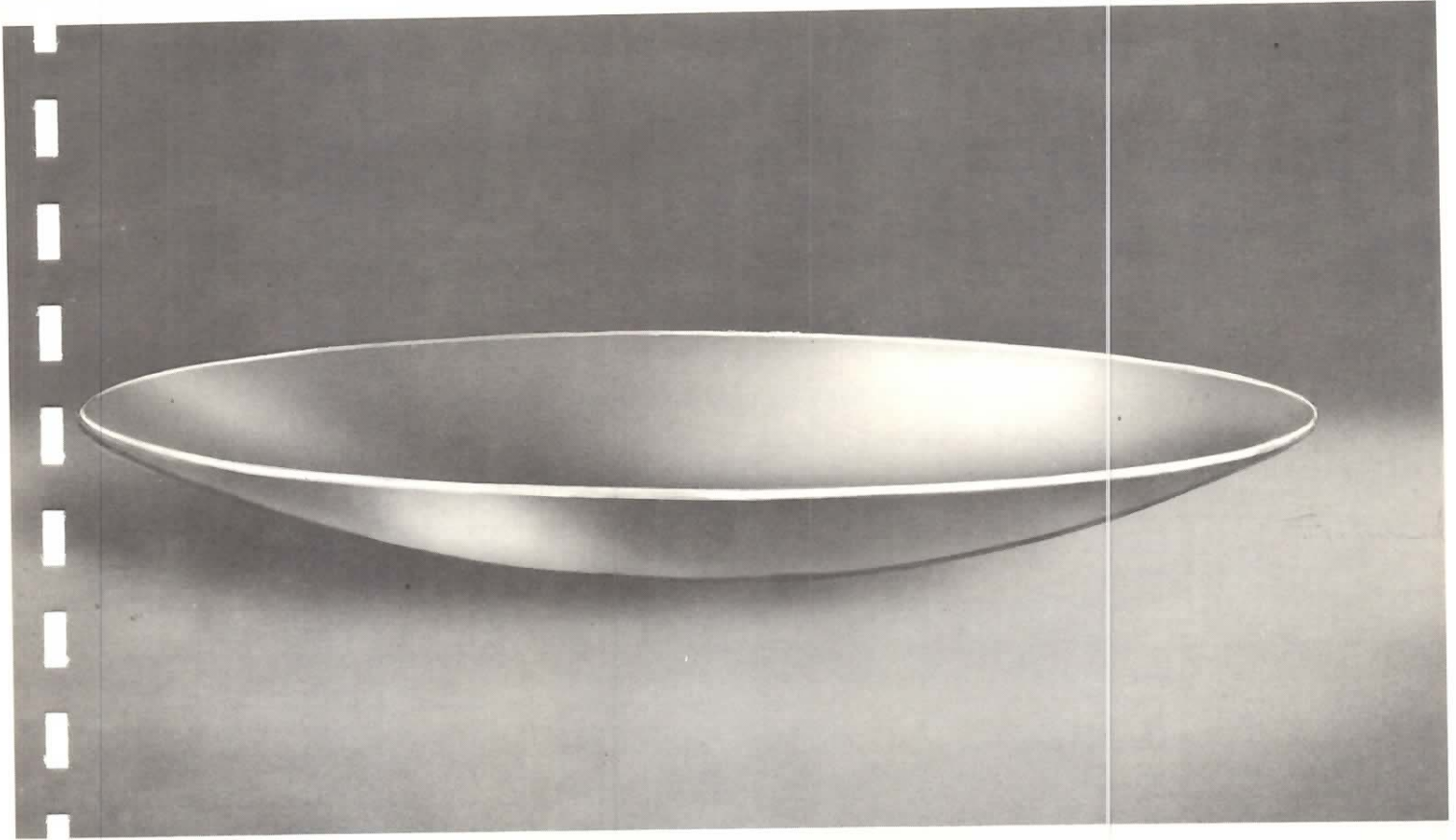
\* Maximum Straight Flanges shown can be exceeded in most cases. For Knuckle Radius greater than shown, refer for quotation. Dish radii other than shown can be furnished on practically all sizes. Prices are based on maximum Inside Knuckle Radius of 3xT and Straight Flange 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2", or fraction thereof, for excess Straight Flange. Flat sizes are based on 1 1/2" Straight Flange. For heads of dimensions other than shown, refer to flat size formula, Page 13.

Sizes below heavy line require circles beyond limits of our mills. The one size immediately above can be furnished in one piece for circle sizes given; larger circle sizes must be checked with Plate Size Card page 99. All sizes beyond mill limits can be furnished with one welded seam, see page 80 for welding details. References: Page 10 complete information required on heads. Page 78 machining information and list prices. Page 87-89 fluing manholes and flueholes. Page 90 manhole and handhole fittings. Page 110 circle weights

*Dished Only Heads*



# DISHED ONLY HEADS



# DISHED ONLY HEADS

List prices shown are 80% of Standard F&D, and are applicable when DR is up to but not including 6" less than OD or greater.

When DR is 6" up to but not including 12" less than OD, list price will be 80% of ASME F&D.

When DR is less than OD by 12" or more, list price will be 80% of Elliptical F&D.

## Information required on orders and inquiries:

Quantity.

Grade of steel.

O.D.—Outside diameter.

T—Thickness (furnished nom. unless otherwise specified).

D.R.—Dish radius.

Machining or gas cutting, if required.

Any other special work.

## List prices for forming only (metal not included).

### ALL DIMENSIONS IN INCHES

THICKNESS			3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8
O.D.	Dish Radius*	Flat Size	LIST PRICES										
12	12	13 1/2	\$16.00	16.50	18.00	18.00	19.50	19.50	21.50	24.00	27.00	40.50	...
14	14	15 1/2	\$16.00	16.50	18.00	18.00	19.50	19.50	21.50	24.00	27.00	40.50	60.50
16	16	18	\$16.00	16.50	18.00	18.00	19.50	19.50	21.50	24.00	27.00	40.50	60.50
18	18	20	\$16.00	16.50	18.00	18.00	19.50	19.50	21.50	24.00	27.00	40.50	60.50
20	20	22	\$16.00	17.50	19.00	19.00	21.50	21.50	23.00	24.50	29.50	52.00	70.50
22	22	24	\$16.00	17.50	19.00	19.00	21.50	21.50	23.00	24.50	29.50	52.00	70.50
24	24	26	\$16.00	17.50	19.00	19.00	21.50	21.50	23.00	24.50	29.50	52.00	70.50
30	30	32 1/2	\$17.00	18.50	21.00	21.00	24.50	24.50	27.00	29.50	35.00	57.00	80.50
36	36	38 1/2	\$20.50	21.50	23.00	23.00	25.50	25.50	29.50	32.50	39.00	64.00	90.50
42	42	45	\$23.00	24.50	27.00	27.00	29.50	29.50	34.00	38.00	46.00	74.00	101.00
48	48	51	\$24.50	27.00	29.50	29.50	34.00	34.00	38.00	43.00	51.50	84.00	111.00
54	54	57 1/2	\$35.50	37.00	42.00	42.00	47.00	47.00	54.00	60.50	70.50	92.50	121.00
60	60	63 1/2	\$42.00	43.50	48.50	48.50	54.00	54.00	60.50	67.00	80.50	101.00	134.50
66	66	70	\$47.00	48.50	54.00	54.00	60.50	60.50	67.00	77.50	89.00	111.00	144.50
72	72	76	...	\$55.50	60.50	60.50	67.00	67.00	75.50	85.50	101.00	122.50	154.50
78	78	82 1/2	...	\$60.50	69.00	69.00	75.50	75.50	84.00	96.00	111.00	134.50	164.50

Sizes and thicknesses in shaded area fall within pressing category, and pressed prices may be quoted on application provided quantity warrants and dies are available.

#### \* Dish radii, other than standard shown, are as follows:

From 12 to 30" in increments of 2".  
From 36 to 132" in increments of 6".  
Also 144, 168, 192, 197, and 285.

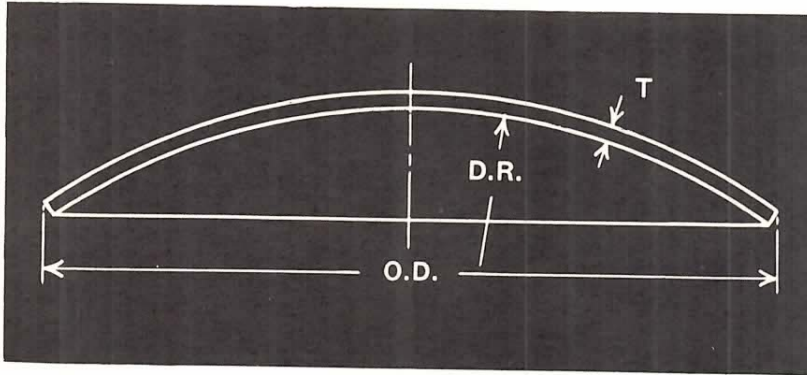
Dished Only Heads can be furnished to any of above radii greater than head diameter.

Dished Only Heads are furnished with edge radial to center line with allowance for machining or gas cutting. For any other edge finish or machining, price will be quoted on application.

For heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

# DISHED ONLY HEADS



List prices shown are 80% of Standard F&D, and are applicable when DR is up to but not including 6" less than OD or greater.

When DR is 6" up to but not including 12" less than OD, list price will be 80% of ASME F&D.

When DR is less than OD by 12" or more, list price will be 80% of Elliptical F&D.

ALL DIMENSIONS IN INCHES

List prices for forming only (metal not included).

THICKNESS			1/4	1/8	1/2	15/8	13/4	17/8	2	2 1/4	2 1/2	2 3/4	3
O.D.	Dish Radius*	Flat Size	LIST PRICES										
12	12	...	...	...	...	...	...	...	...	...	...	...	...
14	14	...	...	...	...	...	...	...	...	...	...	...	...
16	16	...	...	...	...	...	...	...	...	...	...	...	...
18	18	20	\$60.50	...	...	...	...	...	...	...	...	...	...
20	20	22	\$70.50	...	...	...	...	...	...	...	...	...	...
22	22	24	\$70.50	...	...	...	...	...	...	...	...	...	...
24	24	26	\$70.50	104.00	104.00	...	...	...	...	...	...	...	...
30	30	32 1/2	\$80.50	114.00	114.00	159.50	159.50	201.50	201.50	...	...	...	...
36	36	38 1/2	\$90.50	124.50	124.50	168.00	168.00	210.00	210.00	252.00	306.00	...	...
42	42	45	\$101.00	134.50	134.50	176.50	176.50	218.50	218.50	265.50	326.00	396.50	...
48	48	51	\$111.00	144.50	144.50	185.00	185.00	228.50	228.50	279.00	346.00	413.50	480.50
54	54	57 1/2	\$121.00	156.00	156.00	196.50	196.50	240.00	240.00	289.00	356.00	426.50	497.50
60	60	63 1/2	\$134.50	168.00	168.00	208.50	208.50	252.00	252.00	302.50	369.50	440.00	510.50
66	66	70	\$144.50	181.50	181.50	220.00	220.00	262.00	262.00	314.00	381.50	453.50	524.00
72	72	76	\$154.50	196.50	196.50	235.00	235.00	275.50	275.50	327.50	395.00	467.00	537.50
78	78	82 1/2	\$164.50	206.50	206.50	248.50	248.50	290.50	290.50	342.50	410.00	480.50	554.50

\* Dish radii, other than standard shown, are as follows:

From 12 to 30" in increments of 2".  
 From 36 to 132" in increments of 6".  
 Also 144, 168, 192, 197, and 285.

Dished Only Heads can be furnished to any of above radii greater than head diameter.

Dished Only Heads are furnished with edge radial to center line with allowance for machining or gas cutting. For any other edge finish or machining, price will be quoted on application.

For heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.  
 Page 90 manhole and hanchole fittings.  
 Page 110 circle weights.  
 Page 100 approximate volume of dish in gallons.

# DISHED ONLY HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

THICKNESS			3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8
O.D.	Dish Radius*	Flat Size	LIST PRICES										
84	84	88 1/2	...	\$69.00	77.50	77.50	84.00	84.00	94.00	107.50	124.50	148.00	178.00
90	90	95	...	\$77.50	84.00	84.00	94.00	94.00	104.00	119.50	138.00	161.50	191.50
96	96	101	...	\$84.00	94.00	94.00	104.00	104.00	116.00	131.00	151.00	176.50	205.00
102	102	107 1/2	...	\$94.00	104.00	104.00	114.00	114.00	127.50	144.50	166.50	191.50	222.00
108	108	113 1/2	...	...	114.00	114.00	126.00	126.00	141.00	161.50	185.00	208.50	238.50
114	114	120	...	...	126.00	126.00	138.00	138.00	154.50	176.50	201.50	227.00	255.50
120	120	126	...	...	138.00	138.00	151.00	151.00	168.00	191.50	218.50	245.50	272.00
126	126	132 1/2	...	...	...	149.50	164.50	164.50	185.00	208.50	237.00	264.00	290.50
132	132	138 1/2	...	...	...	161.50	178.00	178.00	198.00	222.00	252.00	277.00	306.00
138	144	145	...	...	...	168.00	185.00	185.00	205.00	232.00	260.50	285.50	312.50
144	144	151	...	...	...	174.50	195.00	195.00	215.00	238.50	267.00	292.50	319.00
150	144	157 1/2	...	...	...	...	211.50	211.50	230.00	255.50	284.00	309.00	336.00
156	168	163 1/2	...	...	...	...	211.50	211.50	230.00	255.50	284.00	309.00	336.00
162	168	170	...	...	...	...	...	225.00	248.50	272.00	302.50	329.50	353.00
168	168	176	...	...	...	...	...	225.00	248.50	272.00	302.50	329.50	353.00
180	168	188 1/2	...	...	...	...	...	252.00	265.50	292.50	319.00	349.50	373.00
192	192	...	...	...	...	...	...	...	PRICES ON APPLICATION				...

List prices shown are 80% of Standard F&D, and are applicable when DR is up to but not including 6" less than O.D.

When DR is 6" up to but not including 12" less than O.D., list price will be 80% of ASME F&D.

When DR is less than O.D. by 12" or more, list price will be 80% of Elliptical F&D.

\* Dish radii, other than standard shown, are as follows:

- From 12 to 30" in increments of 2".
- From 36 to 132" in increments of 6".
- Also 144, 168, 192, 197, and 285.

Dished Only Heads can be furnished to any of above radii greater than head diameter.

Dished Only Heads are furnished with edge radial to center line with allowance for machining or gas cutting. For any other edge finish or machining, price will be quoted on application.

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

For heads of dimensions other than shown, refer to flat size formula, Page 13.

- References:
- Page 10 complete information required on heads.
  - Page 78 machining information and list prices.
  - Pages 87 - 89 fluing manholes and flueholes.
  - Page 90 manhole and handhole fittings.
  - Page 110 circle weights.
  - Page 100 approximate volume of dish in gallons.

# DISHED ONLY HEADS

List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

THICKNESS			1¼	1⅜	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3
O.D.	Dish Radius*	Flat Size	LIST PRICES										
84	84	88½	\$178.00	218.50	218.50	265.50	265.50	306.00	306.00	359.50	426.50	497.50	571.00
90	90	95	\$191.50	230.00	230.00	279.00	279.00	322.50	322.50	376.50	443.50	514.00	588.00
96	96	101	\$205.00	243.50	243.50	292.50	292.50	341.00	341.00	393.00	463.50	534.00	608.00
102	102	107½	\$222.00	257.00	257.00	306.00	306.00	356.00	356.00	413.50	484.00	554.50	628.50
108	108	113½	\$238.50	272.00	272.00	322.50	322.50	373.00	373.00	433.50	504.00	574.50	652.00
114	114	120	\$255.50	289.00	289.00	339.50	339.50	391.50	391.50	450.00	527.50	598.00	675.50
120	120	126	\$272.00	306.00	306.00	356.00	356.00	410.00	410.00	470.50	551.00	621.50	699.00
126	126	132½	\$290.50	322.50	322.50	373.00	373.00	428.50	428.50	490.50	574.50	647.00	726.00
132	132	138½	\$306.00	336.00	336.00	386.50	386.50	447.00	447.00	510.50	594.50	672.00	752.50
138	144	145	\$312.50	344.50	344.50	396.50	396.50	463.50	463.50	531.00	615.00	689.00	779.50
144	144	151	\$319.00	353.00	353.00	403.00	403.00	470.50	470.50	541.00	625.00	709.00	810.00
150	144	157½	\$336.00	369.50	369.50	420.00	420.00	487.00	487.00	558.00	638.50	722.50	...
156	144	163½	\$336.00	369.50	369.50	420.00	420.00	487.00	487.00	558.00	638.50	722.50	...
162	168	170	\$353.00	390.00	390.00	437.00	437.00	504.00	504.00	574.50	655.00	...	...
168	168	176	\$353.00	390.00	390.00	437.00	437.00	504.00	504.00	574.50	655.00	...	...
180	168	188½	\$373.00	410.00	410.00	457.00	457.00	537.50	537.50	638.50	...	...	...
192	192	...	...	PRICES ON APPLICATION						...	...	...	...

List prices shown are 80% of Standard F&D, and are applicable when DR is up to but not including 6" less than O.D.

When DR is 6" up to but not including 12" less than O.D., list price will be 80% of ASME F&D.

When DR is less than O.D. by 12" or more, list price will be 80% of Elliptical F&D.

\* Dish radii, other than standard shown, are as follows:

From 12 to 30" in increments of 2".  
From 36 to 132" in increments of 6".  
Also 144, 168, 192, 197, and 285.

Dished Only Heads can be furnished to any of above radii greater than head diameter.

Dished Only Heads are furnished with edge radial to center line with allowance for machining or gas cutting. For any other edge finish or machining, price will be quoted on application.

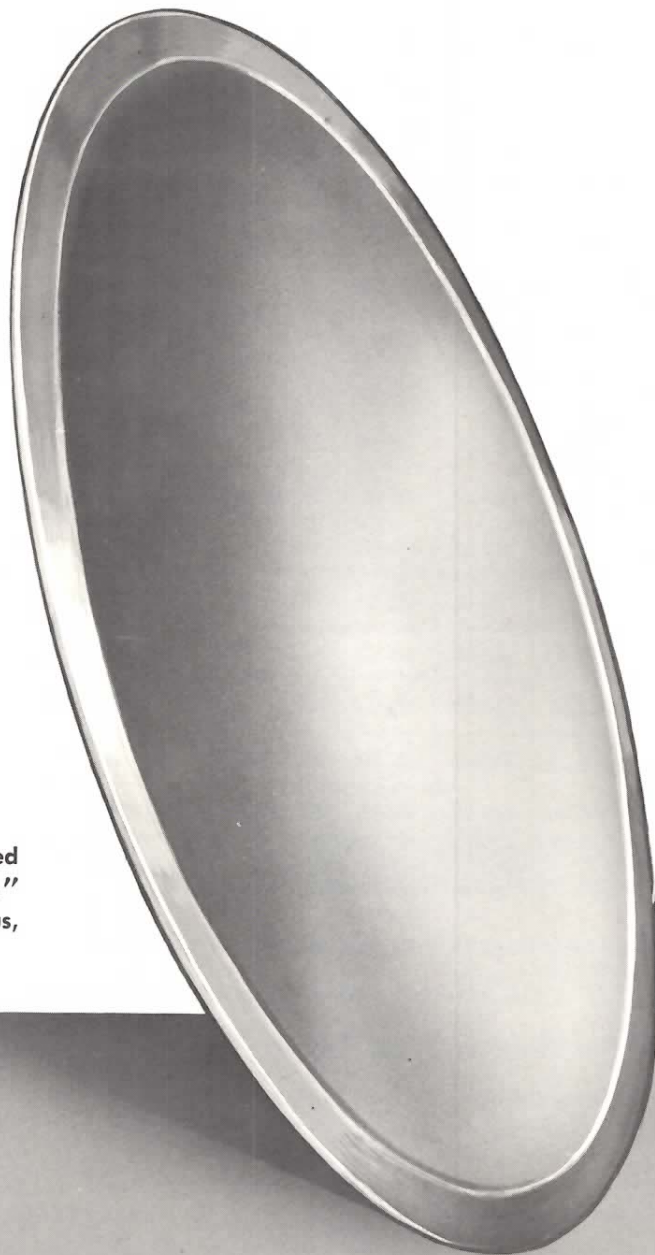
Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

For heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.  
Page 100 approximate volume of dish in gallons.

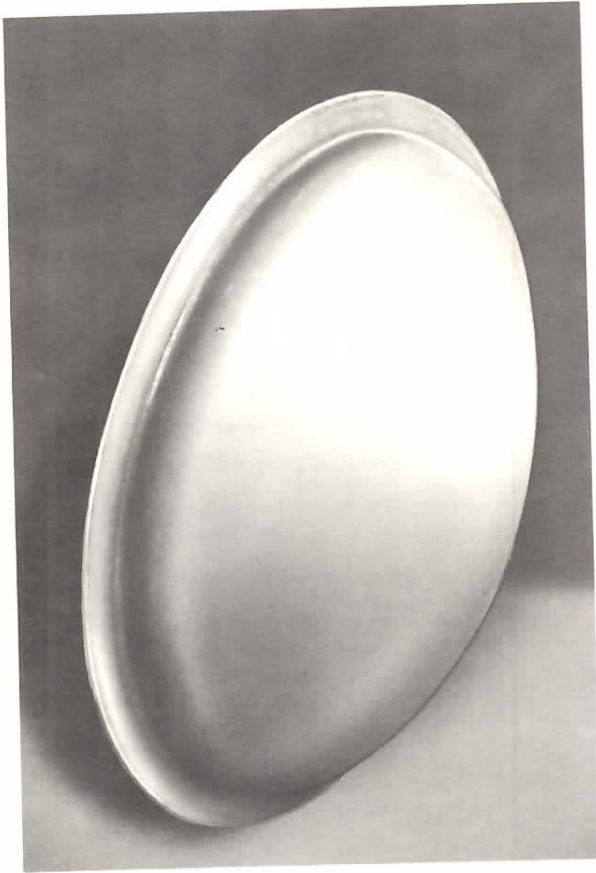


# Flared and Dished Heads

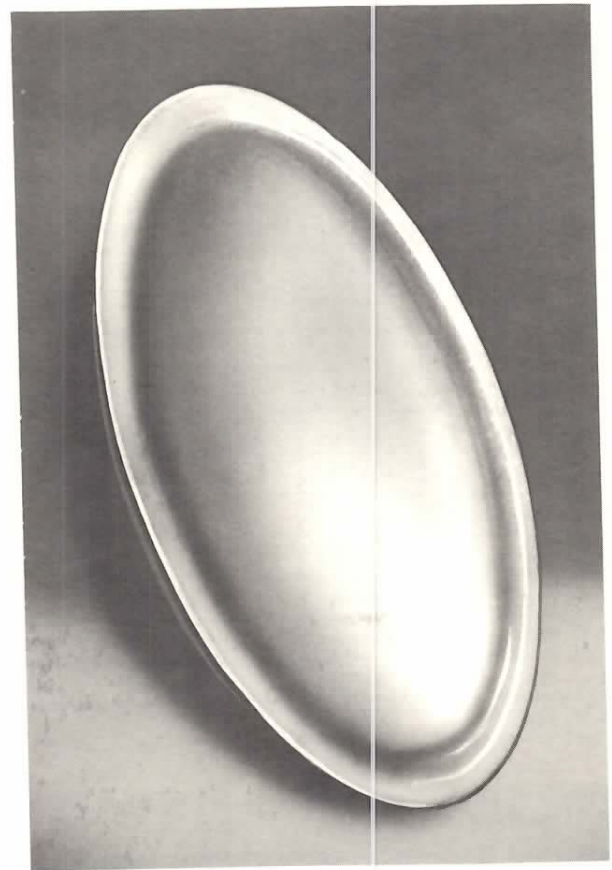


Flared and Dished Head, formed from Herculoy, 128" O.D. x  $\frac{3}{4}$ " Thick, 120" I.D., 120" Dish Radius, 4" Flat Flange.

# FLARED AND DISHED HEADS



Two views of a special Flared and Dished Head. The head is 1/2" thick with 48" O.D. of head and 51" O.D. of flared flange. Dish Radius is 42", Knuckle Radius is 2-7/8" and Flange is 2".



# FLARED AND DISHED HEADS

If overall height or port diameter is important, so specify on inquiries and orders. We cannot guarantee exact overall or corner radius.

**Information required on orders and inquiries:**

- Quantity.
- Grade of steel.
- O.D.—Outside diameter.
- I.D.—Inside diameter.
- T—Thickness (furnished nom. unless otherwise specified).
- D.R.—Dish radius.
- Machining or gas cutting, if required.
- Any other special work.

**List prices for forming only (metal not included).**

ALL DIMENSIONS IN INCHES

THICKNESS				3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
O.D.	* NOM I.D.	Dish Radius	Flat Size	LIST PRICES								
18	12	12	18 1/2	\$20.50	21.00	22.50	22.50	24.50	24.50	27.00	29.50	34.00
24	18	18	25	\$20.50	22.00	23.50	23.50	27.00	27.00	28.50	30.50	37.00
30	24	24	31	\$21.50	23.00	26.50	26.50	30.50	30.50	34.00	37.00	44.00
36	30	30	37 1/2	\$25.50	27.00	28.50	28.50	32.00	32.00	37.00	40.50	49.00
42	36	36	43 1/2	\$28.50	30.50	34.00	34.00	37.00	37.00	42.00	47.50	57.50
48	42	42	50	\$30.50	34.00	37.00	37.00	42.00	42.00	47.50	54.00	64.00
54	48	48	56	\$44.00	46.00	52.50	52.50	59.00	59.00	67.00	75.50	88.00
60	54	54	62 1/2	\$52.50	54.50	61.00	61.00	67.00	67.00	75.50	84.00	101.00
66	60	60	68 1/2	\$59.00	61.00	67.00	67.00	75.50	75.50	84.00	96.50	111.50
72	66	66	75	...	\$69.50	75.50	75.50	84.00	84.00	94.50	107.00	126.00
78	72	72	81	...	\$75.50	86.00	86.00	94.50	94.50	105.00	119.50	138.50
84	78	78	87 1/2	...	\$86.00	96.50	96.50	105.00	105.00	117.50	134.50	155.50
90	84	84	93 1/2	...	\$96.50	105.00	105.00	117.50	117.50	130.00	149.00	172.00
96	90	90	100	...	\$105.00	117.50	117.50	130.00	130.00	145.00	164.00	189.00
102	96	96	106	...	\$117.50	130.00	130.00	143.00	143.00	159.50	180.50	208.00
108	102	102	112 1/2	...	\$130.00	143.00	143.00	157.50	157.50	176.50	201.50	231.00
114	108	108	118 1/2	...	...	\$157.50	157.50	172.00	172.00	193.00	220.50	252.00
120	114	114	125	...	...	\$172.00	172.00	189.00	189.00	210.00	239.50	273.00
126	120	120	131	...	...	\$187.00	187.00	206.00	206.00	231.00	260.50	296.00
132	126	126	137 1/2	...	...	...	\$201.50	222.50	222.50	248.00	277.00	315.00
138	132	132	143 1/2	...	...	...	\$210.00	231.00	231.00	256.00	290.00	325.50
144	138	132	149 3/4	...	...	...	...	...	\$243.50	269.00	298.00	334.00 *
150	144	144	156	...	...	...	...	...	\$264.50	287.50	319.00	355.00

\* Tolerance on I.D. is plus 0" minus 3/4" up to and including 96"; over 96" I.D., plus 0" minus 1 1/2".

Width of Flared Flange can be varied from standard shown, for which prices will be quoted on request.

Dish radii, other than those shown, can be furnished on many sizes.

Sizes below heavy line require circles beyond limits of our mills.

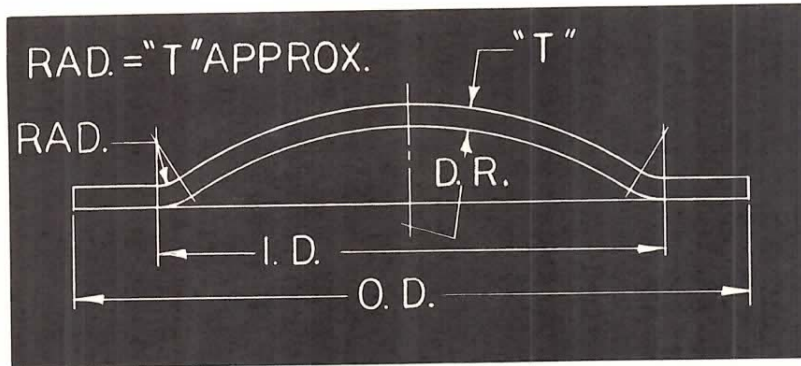
All sizes beyond mill limits can be furnished with one welded seam.

See page 80 for welding details.

For heads of dimensions other than shown, refer to flat size formula, Page 13.

- References:
- Page 10 complete information required on heads.
  - Page 78 machining information and list prices.
  - Pages 87 - 89 fluing manholes and flueholes.
  - Page 90 manhole and handhole fittings.
  - Page 110 circle weights.

# FLARED AND DISHED HEADS



List prices for forming only (metal not included).

ALL DIMENSIONS IN INCHES

THICKNESS				1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
O.D.	* NOM I.D.	Dish Radius	Flat Size	LIST PRICES								
18	12	12	18 1/2	\$50.50	...	...	...	...	...	...	...	...
24	18	18	25	\$65.00	88.00	88.00	130.00	130.00	...	...	...	...
30	24	24	31	\$71.50	101.00	101.00	143.00	143.00	...	...	...	...
36	30	30	37 1/2	\$80.00	113.50	113.50	155.50	155.50	210.00	...	...	...
42	36	36	43 1/2	\$92.50	126.00	126.00	168.00	168.00	220.50	220.50	...	...
48	42	42	50	\$105.00	138.50	138.50	180.50	180.50	231.00	231.00	...	...
54	48	48	56	\$115.50	151.00	151.00	195.50	195.50	245.50	245.50	300.50	300.50
60	54	54	62 1/2	\$126.00	168.00	168.00	210.00	210.00	260.50	260.50	315.00	315.00
66	60	60	68 1/2	\$138.50	180.50	180.50	227.00	227.00	275.00	275.00	327.50	327.50
72	66	66	75	\$153.50	193.00	193.00	245.50	245.50	294.00	294.00	344.50	344.50
78	72	72	81	\$168.00	206.00	206.00	258.50	258.50	311.00	311.00	363.50	363.50
84	78	78	87 1/2	\$185.00	222.50	222.50	273.00	273.00	332.00	332.00	382.00	382.00
90	84	84	93 1/2	\$201.50	239.50	239.50	287.50	287.50	348.50	348.50	403.00	403.00
96	90	90	100	\$220.50	256.00	256.00	304.50	304.50	365.50	365.50	426.50	426.50
102	96	96	106	\$239.50	277.00	277.00	321.50	321.50	382.00	382.00	445.00	445.00
108	102	102	112 1/2	\$260.50	298.00	298.00	340.00	340.00	403.00	403.00	466.00	466.00
114	108	108	118 1/2	\$283.50	319.00	319.00	361.00	361.00	424.00	424.00	489.50	489.50
120	114	114	125	\$306.50	340.00	340.00	382.00	382.00	445.00	445.00	512.50	512.50
126	120	120	131	\$329.50	363.50	363.50	403.00	403.00	466.00	466.00	535.50	535.50
132	126	126	137 1/2	\$346.50	382.00	382.00	420.00	420.00	483.00	483.00	558.50	558.50
138	132	132	143 1/2	\$357.00	390.50	390.50	430.50	430.50	495.50	495.50	579.50	579.50
144	138	132	149 3/4	\$365.50	399.00	399.00	441.00	441.00	504.00	504.00	588.00	588.00
150	144	144	156	\$386.50	420.00	420.00	462.00	462.00	525.00	525.00	609.00	609.00

\* Tolerance on I.D. is plus 0" minus 3/4" up to and including 96"; over 96" I.D., plus 0" minus 1 1/2".

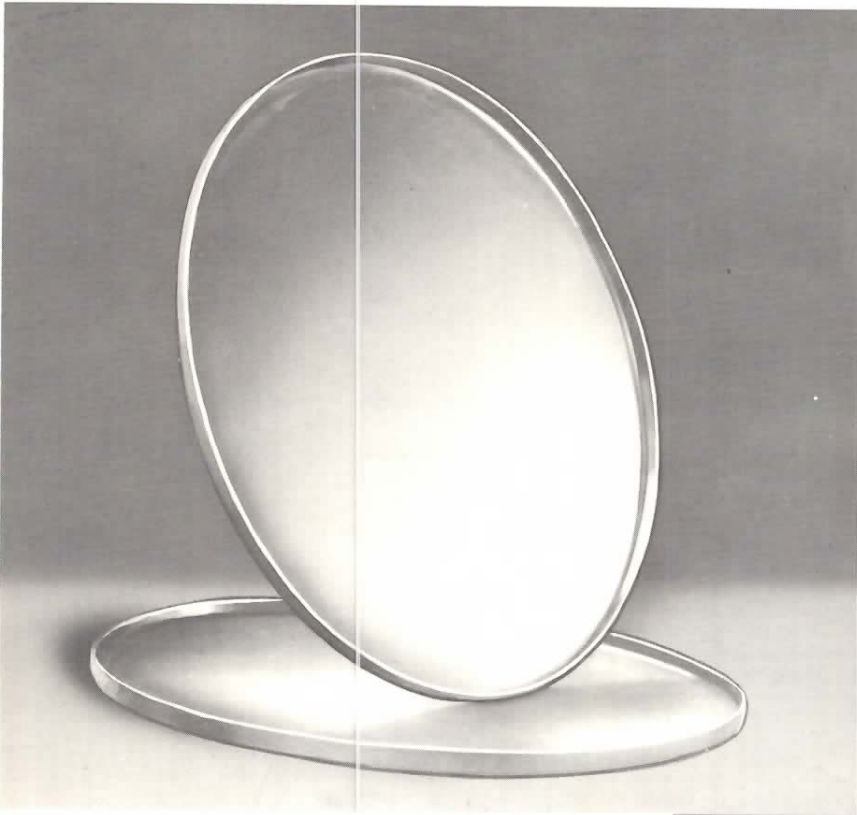
Width of Flared Flange can be varied from standard shown, for which prices will be quoted on request.

Dish radii, other than those shown, can be furnished on many sizes. Sizes below heavy line require circles beyond limits of our mills.

All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

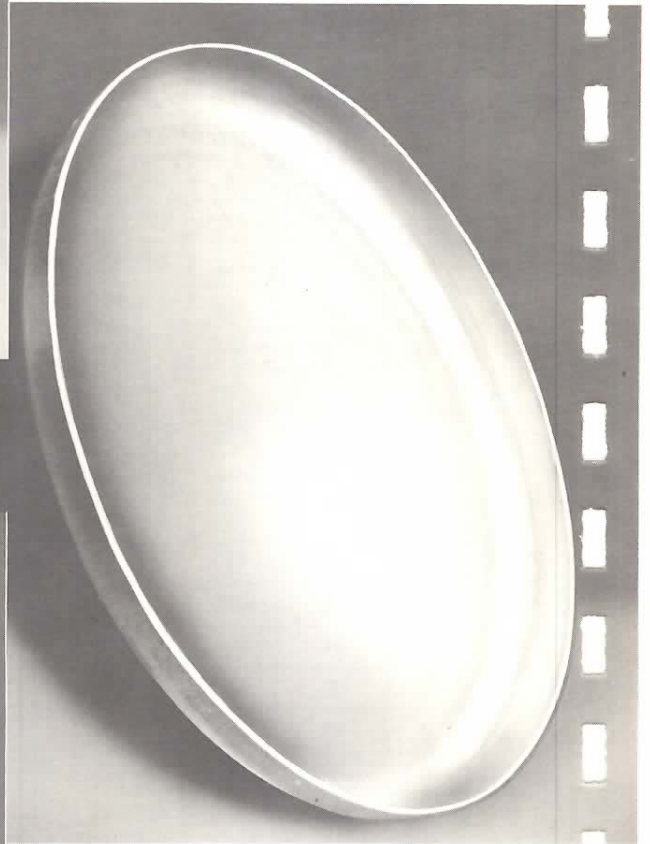
For heads of dimensions other than shown, refer to flat size formula, Page 13.

References: Page 10 complete information required on heads.  
Page 78 machining information and list prices.  
Pages 87 - 89 fluing manholes and flueholes.  
Page 90 manhole and handhole fittings.  
Page 110 circle weights.

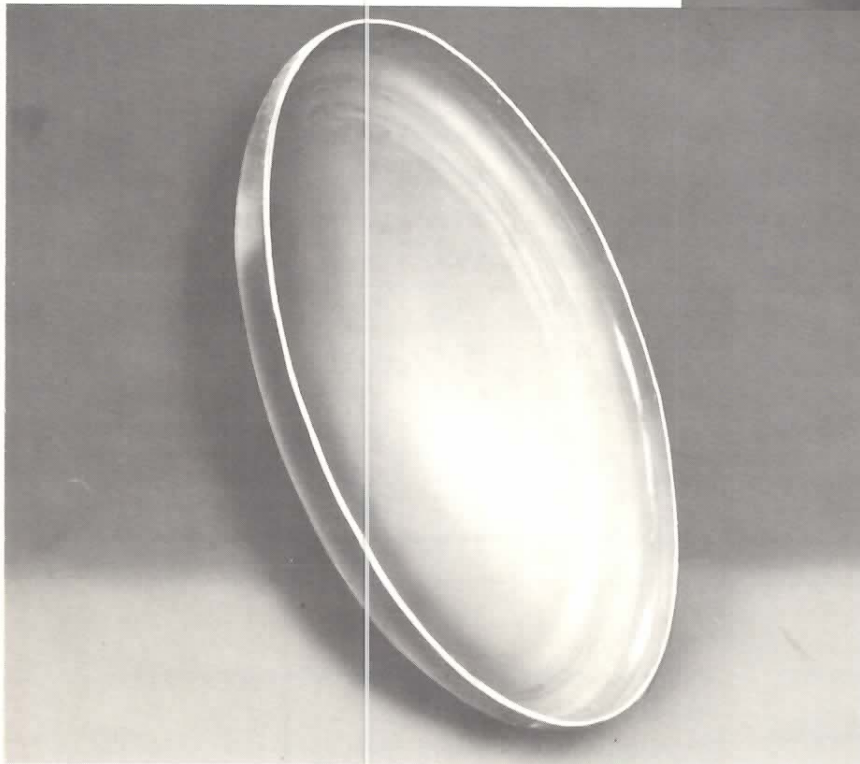


Flanged and Dished heads of Deoxidized Copper,  $\frac{1}{4}$ " thick, 72" O.D., 72" Dish Radius,  $4\frac{3}{8}$ " Inside Knuckle Radius,  $2\frac{1}{2}$ " Straight Flange.

Flanged only heads of Deoxidized Copper,  $\frac{5}{16}$ " thick, 84" O.D.,  $\frac{5}{8}$ " Inside Knuckle, 2" Straight Flange.



Flanged and Dished Heads of Deoxidized Copper,  $\frac{5}{16}$ " thick, 84" O.D., 84" Dish Radius,  $5\frac{1}{8}$ " Inside Knuckle Radius, 2" Straight Flange.



# Flanged and Shallow Dished Heads

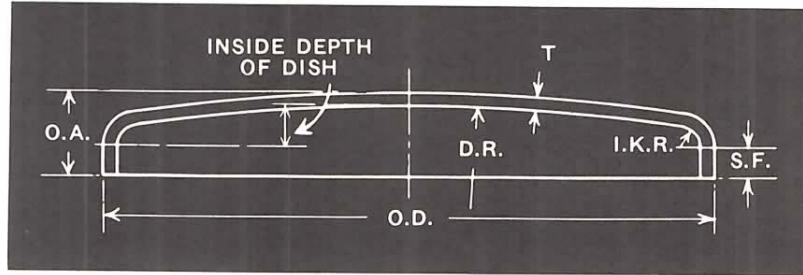


Flanged and Shallow Dished Head, 205 1/4" O.D., 5/8" Thick, 285" Dish Radius, 2" Knuckle Radius, 3" Straight Flange, made from two-piece welded circle.

# FLANGED AND SHALLOW DISHED HEADS

## Information required on orders and inquiries:

- Quantity.
- Grade of steel.
- O.D.—Outside diameter.
- T—Thickness (furnished nom. unless otherwise specified).
- IKR—Inside knuckle radius.
- D.R.—Dish radius.
- { SF—Straight flange.
- { OA—Outside overall height.
- Cannot maintain both. Specify the more important dimension.
- Machining or gas cutting, if required.
- Any other special work.



Prices will be quoted on application

### ALL DIMENSIONS IN INCHES

	Dish Radius	96			108			120			144					
		Thickness..	Std. S.F. ..	I. D. D. ....	Volume (Gals.)	Flat Size .....	Thickness..	Std. S.F. ..	I. D. D. ....	Volume (Gals.)	Flat Size .....	Thickness..	Std. S.F. ..	I. D. D. ....	Volume (Gals.)	Flat Size .....
O.D.		1/4	1 1/2-2 1/2	65/8	62	77 3/4	1/4	1 1/2-2 1/2	8	102	90 1/8	1/4	1 1/2-2 1/2	8 1/16	145	102 1/2
	Thickness..	5/16-3/8	1 1/2-3	6 13/16	66	78	5/16-3/8	1 1/2-3	8 1/4	108	90 3/8	5/16-3/8	1 1/2-3	8 5/16	149	102 3/4
	Std. S.F. ..	3/16-1/2	1 1/2-3 1/2	7 1/16	71	78 1/2	3/16-1/2	1 1/2-3 1/2	8 7/16	112	90 5/8	3/16-1/2	1 1/2-3 1/2	9 1/8	157	103
66	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
72	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
78	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
84	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
90	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
102	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
108	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
114	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
120	I. D. D. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Forming lists are same as Standard F&D.

Recommend maximum SF of 2 1/2" wherever possible. Longer SF than shown can be furnished in some cases.

Prices are based on maximum IKR of 3xT and SF 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2" or fraction thereof for excess IKR and/or SF.

Volume in gallons shown is approximate for DR and IKR, exclusive of SF portion of head, and is based on IKR of 3 times thickness.

Flat sizes shown are based on 1 1/2" SF and IKR of 3 times thickness.

- References: Page 10 complete information required on heads.
- Page 13 flat size formula.
- Page 78 machining information and list prices.
- Pages 87 - 89 fluing manholes and flueholes.
- Page 90 manhole and handhole fittings.
- Page 91 storage tank manhole frames and covers.
- Page 110 circle weights.

# FLANGED AND SHALLOW DISHED HEADS

Prices will be quoted on application

ALL DIMENSIONS IN INCHES

	Dish Radius	192			197			285			
O.D.	Thickness..	1/4	5/16-3/8	7/16-1/2	1/4	5/16-3/8	7/16-1/2	1/4	5/16-3/8	7/16-1/2	...
	Std. S.F. ..	1 1/2-2 1/2	1 1/2-3	1 1/2-3 1/2	1 1/2-2 1/2	1 1/2-3	1 1/2-3 1/2	1 1/2-2 1/2	1 1/2-3	1 1/2-3 1/2	...
66	I. D. D.....	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...
72	I. D. D.....	...	...	...	37/8	43/16	4 1/2	...	...	...	...
	Volume (Gals.)	...	...	...	39	46	53	...	...	...	...
	Flat Size .....	...	...	...	77 3/4	78	78 1/2	...	...	...	...
78	I. D. D.....	...	...	...	...	...	...	...	...	...	...
	Volume (Gals.)	...	...	...	...	...	...	...	...	...	...
	Flat Size .....	...	...	...	...	...	...	...	...	...	...
84	I. D. D.....	...	...	...	5 1/16	5 3/8	5 5/8	...	...	...	...
	Volume (Gals.)	...	...	...	68	76	83	...	...	...	...
	Flat Size .....	...	...	...	90 1/8	90 3/8	90 5/8	...	...	...	...
90	I. D. D.....	...	...	...	5 3/4	6	6 5/16	...	...	...	...
	Volume (Gals.)	...	...	...	87	95	105	...	...	...	...
	Flat Size .....	...	...	...	96 5/16	96 9/16	96 13/16	...	...	...	...
96	I. D. D.....	6 5/8	6 7/8	7 3/16	6 7/16	6 3/4	7	4 11/16	4 15/16	5 1/4	...
	Volume (Gals.)	112	121	132	109	120	129	83	93	105	...
	Flat Size .....	102 1/2	102 3/4	103	102 1/2	102 3/4	103	101 1/2	101 3/4	102	...
102	I. D. D.....	7 3/8	7 11/16	7 5/16	...	...	...	5 3/16	5 1/2	5 3/4	...
	Volume (Gals.)	139	151	161	...	...	...	102	115	126	...
	Flat Size .....	108 11/16	108 7/8	109 1/8	...	...	...	107 5/8	107 7/8	108 1/8	...
108	I. D. D.....	8 1/4	8 1/2	8 3/4	8 1/16	8 5/16	8 9/16	5 3/4	6	6 5/16	...
	Volume (Gals.)	174	185	196	171	182	193	126	138	152	...
	Flat Size .....	114 7/8	115	115 1/4	114 7/8	115	115 1/4	113 3/4	114	114 1/4	...
114	I. D. D.....	9 1/8	9 3/8	9 5/8	...	...	...	6 5/16	6 5/8	6 7/8	...
	Volume (Gals.)	212	222	236	...	...	...	152	167	180	...
	Flat Size .....	121 1/16	121 1/4	121 1/2	...	...	...	119 7/8	120	120 1/4	...
120	I. D. D.....	10 1/16	10 5/16	10 9/16	...	...	...	6 15/16	7 3/16	7 1/2	...
	Volume (Gals.)	260	271	285	...	...	...	183	197	212	...
	Flat Size .....	127 1/4	127 1/2	127 3/4	...	...	...	126	126 1/4	126 1/2	...
126	I. D. D.....	11 1/16	11 5/16	11 1/2	...	...	...	7 5/8	7 7/8	8 1/8	...
	Volume (Gals.)	310	322	337	...	...	...	222	237	252	...
	Flat Size .....	133 1/2	133 3/4	134	...	...	...	132 1/8	132 3/8	132 1/2	...
132	I. D. D.....	...	12 3/8	12 9/16	...	...	...	...	8 9/16	8 13/16	...
	Volume (Gals.)	...	388	401	...	...	...	...	280	297	...
	Flat Size .....	...	139 3/4	140	...	...	...	...	138 1/2	138 3/4	...
138	I. D. D.....	...	13 7/16	13 11/16	...	...	...	...	9 1/4	9 1/2	...
	Volume (Gals.)	...	460	475	...	...	...	...	325	344	...
	Flat Size .....	...	146	146 1/4	...	...	...	...	144 1/2	144 7/8	...
144 <sup>A</sup>	I. D. D.....	...	14 5/8	14 13/16	...	...	...	...	10	10 1/4	...
	Volume (Gals.)	...	544	558	...	...	...	...	380	400	...
	Flat Size .....	...	152 1/4	152 1/2	...	...	...	...	150 3/4	151	...

▲ Flat circles for 144" heads approach maximum sizes available from our mills and will probably have to be furnished with one welded seam. See page 80 for welding details.

Forming lists are same as Standard F&D.

Recommend maximum SF of 2 1/2" wherever possible. Longer SF than shown can be furnished in some cases.

Prices are based on maximum IKR of 3xT and SF 1 1/2" to not exceeding standard shown. Add 5% to list price for each additional 1/2" or fraction thereof for excess IKR and/or SF.

Volume in gallons shown is approximate for DR and IKR, exclusive of SF portion of head, and is based on IKR of 3 times thickness.

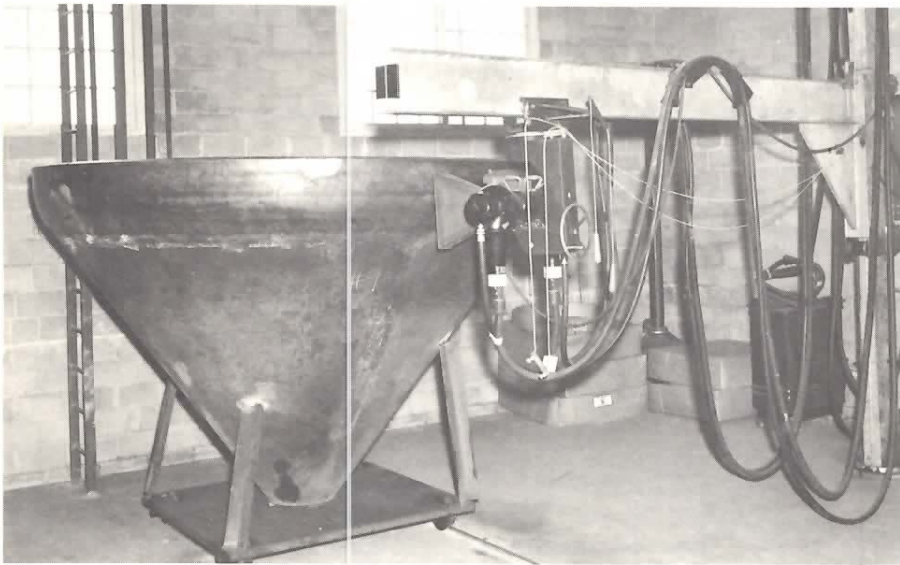
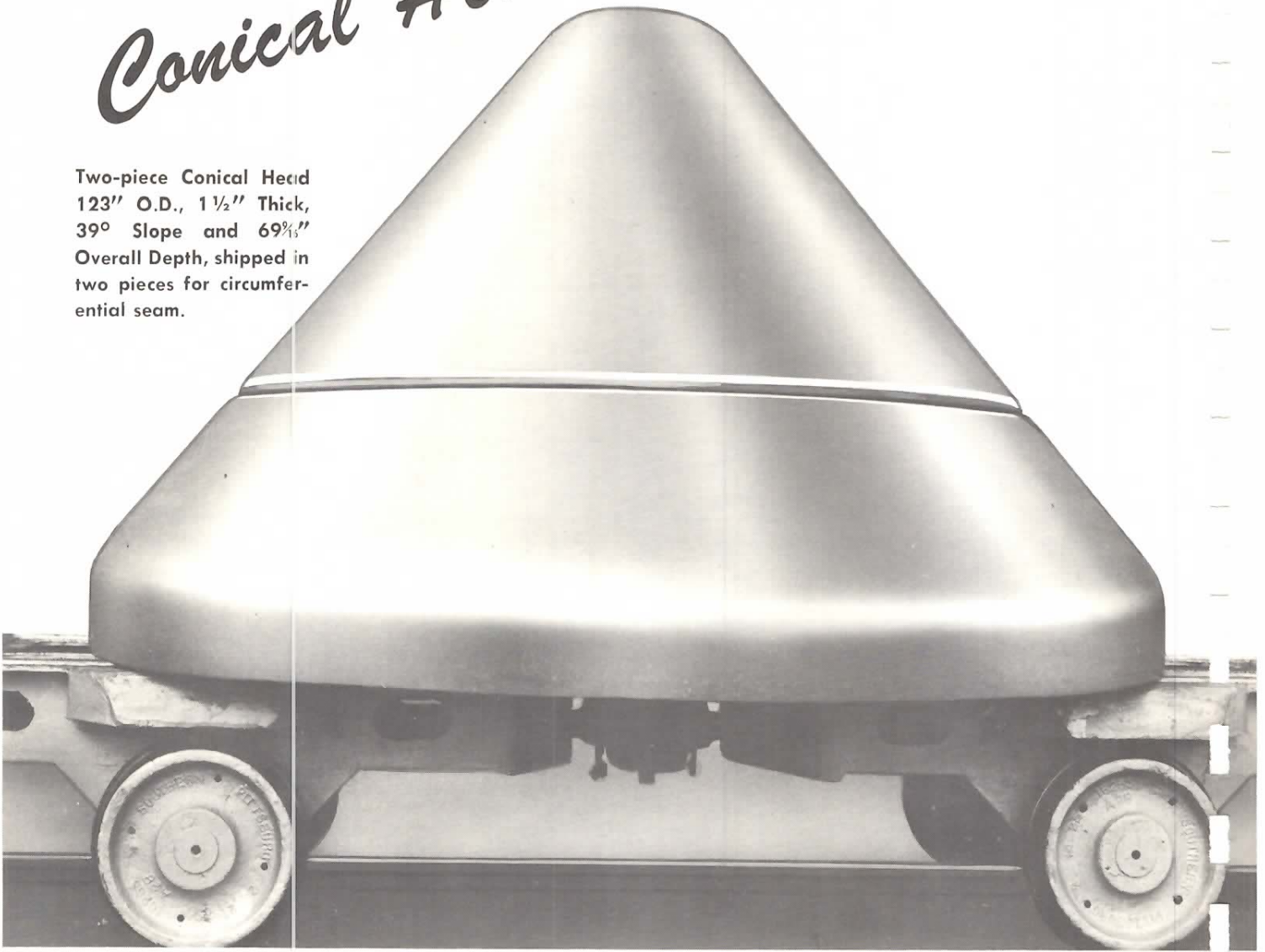
Flat sizes shown are based on 1 1/2" SF and IKR of 3 times thickness.

References: Page 10 complete information required on heads.  
 Page 13 flat size formula.  
 Page 90 manhole and handhole fittings.  
 Page 91 storage tank manhole frames and covers.  
 Page 110 circle weights.  
 Page 78 machining information and list prices.  
 Pages 87 - 89 fluing manholes and flueholes.



# Conical Heads

Two-piece Conical Head  
123" O.D., 1 1/2" Thick,  
39° Slope and 69 1/2"  
Overall Depth, shipped in  
two pieces for circumferential seam.



X-raying weld seam on  
large conical head.

# CONICAL HEADS

Six Conical Heads being taken from Flanging Department. Heads are 120" I.D. at large end, 1 1/8" Thick with 58 1/4" Overall Depth.



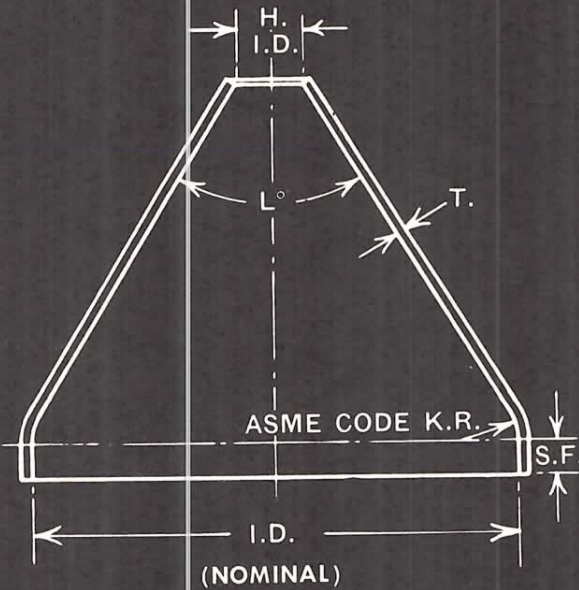
Conical Head, 99 1/8" O.D., x 2 1/8" Thick. 45° Slope, 14" Inside Knuckle Radius, 3" Straight Flange, 41 3/8" Overall Depth.



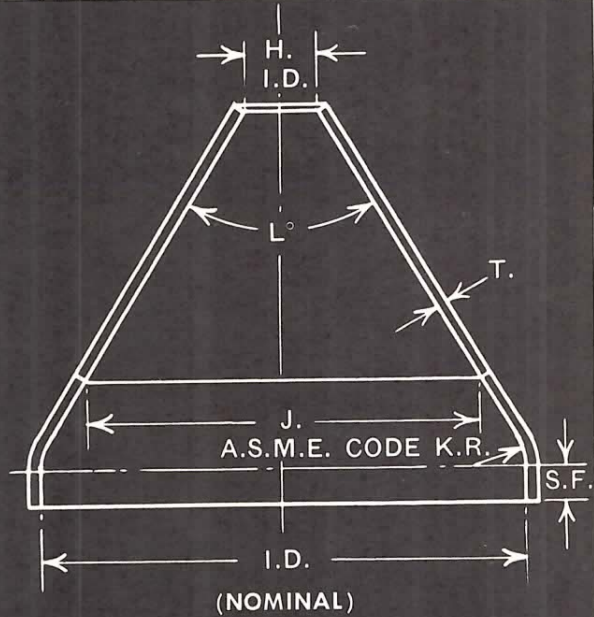
# CONICAL HEADS

## CONICAL HEADS

SEAMLESS-TYPE A

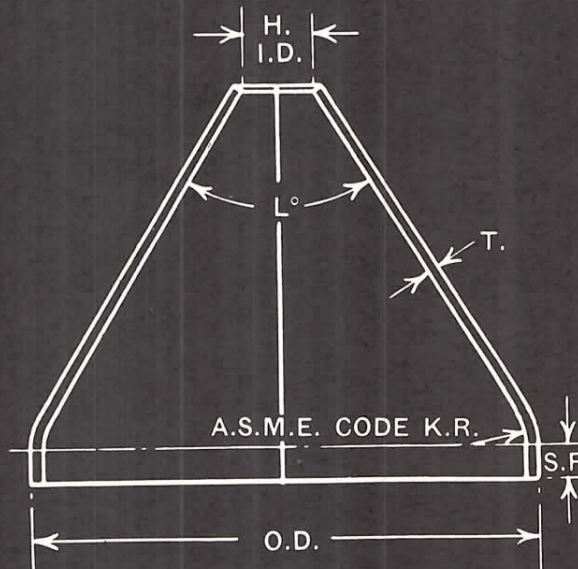


TWO PIECE-TYPE B  
WITH CIRCUMFERENTIAL SEAM



## SEGMENTAL PRESSED

TYPE D



# CONICAL HEADS

(ASME CODE)

(Prices on Application)

INFORMATION REQUIRED ON ORDERS AND INQUIRIES

Quantity.  
Grade of steel.

Diameter.  
T—Thickness (See note\*)

L°—Included angle.  
SF—Straight flange.

H—I.D. Hole—specify largest acceptable.  
Machining or other special work.

ALL DIMENSIONS IN INCHES

TYPE A AND B CONES								TYPE D CONES							
I.D. Inside Diam.	Type	L° Included Angle	T* Thickness		S.F. Straight Flange	H I.D. Hole Min.	J Seam Diam.	O.D. Outside Diam.	Type	L° Included Angle	T* Thickness		S.F. Straight Flange	H I.D. Hole Min.	J Seam Diam.
			Min.	Max.							Min.	Max.			
48	A	113°28'	5/16	1	1 1/2-3	7	...	48			5/16	1	1 1/2-3	6	
54	A	113°28'	5/16	1	1 1/2-3	7	...	54			5/16	1	1 1/2-3	6	
60	A	113°28'	3/8	1	1 1/2-3	7	...	60			5/16	1	1 1/2-3	6	
66	A	113°28'	3/8	1	1 1/2-3	7	...	66			5/16	1	1 1/2-3	6	
72	A	113°28'	3/8	1	1 1/2-3	7	...	72			3/8	1	1 1/2-3	6	
78	A	113°28'	1/2	2	1 1/2-3 1/2	5	...	78			3/8	1	1 1/2-3	6	
84	A	113°28'	1/2	2	1 1/2-3 1/2	5	...	84	SEE NOTES BELOW		3/8	1	1 1/2-3	6	SEE NOTES BELOW
90	A	113°28'	5/8	2	1 1/2-4	5	...	90			3/8	1	1 1/2-3	6	
96	A	113°28'	5/8	2	1 1/2-4	5	...	96			3/8	1	1 1/2-3	6	
48	A	90°	3/8	1	1 1/2-3	5	...	102			3/8	1	1 1/2-3	6	
54	A	90°	7/16	1	1 1/2-3	5	...	108			7/16	1	1 1/2-3	6	
60	A	90°	1/2	1	1 1/2-3	5	...	114			7/16	1	1 1/2-3	6	
66	A	90°	9/16	1	1 1/2-3	5	...	120			1/2	1	1 1/2-3	6	
72	A	90°	9/16	2	1 1/2-3	18	...	126			1/2	1	1 1/2-3	6	
78	A	90°	9/16	2	1 1/2-3	18	...	132			9/16	1	1 1/2-3	6	
84	A	90°	9/16	2	1 1/2-3	18	...	138			9/16	1	1 1/2-3	6	
90	A	90°	9/16	2	1 1/2-3	18	...	144			9/16	1	1 1/2-3	6	
96	A	90°	5/8	2	1 1/2-3	30	...								
102	A	90°	5/8	2	1 1/2-3	30	...								
108	A	90°	3/4	2	1 1/2-3	30	...								
114	A	90°	3/4	2	1 1/2-3	30	...								
120	A	90°	3/4	2	1 1/2-3	30	...								
126	B	90°	7/8	2	1 1/2-3	30	102								
132	B	90°	7/8	2	1 1/2-3	30	108								
138	B	90°	7/8	2	1 1/2-3	30	112								
144	B	90°	7/8	2	1 1/2-3	30	118								
72	A	78°	5/8	2	1 1/2-3	16	...								
78	A	78°	5/8	2	1 1/2-3	16	...								
84	A	78°	5/8	2	1 1/2-3	16	...								
90	B	78°	3/4	2	1 1/2-3	16	73 1/4								
96	B	78°	3/4	2	1 1/2-3	16	73 1/4								
102	B	78°	3/4	2	1 1/2-3	16	79 1/4								
108	B	78°	7/8	2	1 1/2-3	16	79 1/4								
114	B	78°	7/8	2	1 1/2-3	16	85 1/4								
120	B	78°	7/8	2	1 1/2-2	16	91 1/4								

Type — Will be determined by size, thickness and included angle required.

L° — Angle variable to suit requirements. Prefer it to be one of the following: 60°, 70°, 80°, 90°, 113°28', 120°.

H — Minimum is shown, should specify maximum suitable for your requirements.

J — Seam diameter will be determined by other dimensions of knuckle section

While A.S.M.E. Knuckle Radii are specified above, standard Knuckle Radii can also be furnished on type D Cones.

\* Minimum thickness required at H should be specified. Excess gauges shown on page 12 are sufficient for Type D Cones. A and B types require special excess gauges depending on diameter and H dimensions.

List price for forming one-piece (Type A) cones will be:  
90° included angle or less—2 times Elliptical  
Over 90° included angle—1 1/8 times Elliptical.

List price for straight seamless cones (no IKR or SF) will be:  
90° included angle or less—1 1/2 times Elliptical.  
Over 90° included angle—1 1/8 times Elliptical.

Cone Frustums:

Flat Circle—OD, plus 2 times head SF, plus 2 times slope SF, plus 2/3 of head IKR, plus 2 times thickness. If large end or head SF

and this list is subject to standard quantity differentials.

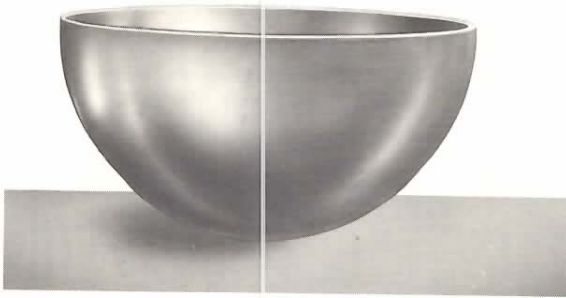
If slope SF is over 1 1/2" same charge as above will apply except there will be an additional charge of 5% of list price for each 1/2" or fraction thereof in excess of 1 1/2". The excess is to be added to the 125% of applicable list price.

There will be no charge for gas cutting the center, and at the same time there will be no scrap allowance for the center cut-out.

Maximum Straight Flange can be exceeded in most cases. Recommend it be kept to minimum.

Other Knuckle Radii are available on some sizes of Type A and B Cones. Included angles shown on Types A and B are those available with present dies.

# Hemispherical Flanged Heads



Above: Hemispherical Flanged Head, 66" I.D., 33" Inside Radius and 3/8" Thick, 3" Straight Flange.



Above: Hemispherical Flanged Head, 66" I.D., 3 1/8" Thick, 33" Spherical Radius, and 4" Straight Flange.

ALL DIMENSIONS IN INCHES

I.D. (Nom. Inside Dia.)	Roller Thickness	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
	Str. Flg.	0 to 2	0 to 3	0 to 3	0 to 3	0 to 3	0 to 4	0 to 4	0 to 4
24	Flat Size ..... List Price .... \$	38 3/16 64.00	38 1/2 74.00	38 11/16 84.00	38 7/8 95.00	39 1/8 108.00	39 3/16 151.00	39 11/16 202.00	40 1/16 218.00
30	Flat Size ..... List Price .... \$	47 3/4 81.00	47 15/16 91.00	48 1/8 101.00	48 5/16 115.00	48 1/2 135.00	48 3/4 193.00	49 1/8 227.00	49 1/2 260.00
36	Flat Size ..... List Price .... \$	57 3/16 98.00	57 3/8 108.00	57 1/16 122.00	57 3/4 135.00	57 15/16 155.00	58 1/8 218.00	58 5/16 252.00	58 15/16 302.00
40	Flat Size ..... List Price .... \$	63 3/16 115.00	63 5/8 128.00	63 13/16 145.00	64 1/16 162.00	64 1/4 182.00	64 3/16 252.00	64 13/16 286.00	65 3/16 344.00
42	Flat Size ..... List Price .... \$	66 3/16 115.00	66 3/4 128.00	67 145.00	67 3/16 162.00	67 3/8 182.00	67 1/16 252.00	67 15/16 286.00	68 3/8 344.00
48	Flat Size ..... List Price .... \$		76 3/16 149.00	76 1/16 169.00	76 5/8 186.00	76 13/16 209.00	77 286.00	77 3/8 323.00	77 3/4 382.00
50	Flat Size ..... List Price .... \$		79 3/8 218.00	79 1/16 239.00	79 3/4 265.00	79 15/16 294.00	80 1/8 328.00	80 1/2 370.00	80 15/16 428.00
52	Flat Size ..... List Price .... \$		82 1/2 218.00	82 11/16 239.00	82 7/8 265.00	83 1/16 294.00	83 1/4 328.00	83 15/16 370.00	84 1/16 428.00
54	Flat Size ..... List Price .... \$		85 5/8 218.00	85 13/16 239.00	86 265.00	86 1/4 294.00	86 7/16 328.00	86 13/16 370.00	87 3/16 428.00
60	Flat Size ..... List Price .... \$			95 1/4 277.00	95 1/16 302.00	95 3/8 332.00	95 7/8 370.00	96 1/4 416.00	96 3/8 479.00
66	Flat Size ..... List Price .... \$			104 11/16 319.00	104 7/8 344.00	105 5/16 382.00	105 1/4 420.00	105 15/16 470.00	106 1/16 538.00
72	Flat Size ..... List Price .... \$				114 3/16 391.00	114 1/2 428.00	114 11/16 470.00	115 1/16 529.00	115 1/2 605.00
78	Flat Size ..... List Price .... \$								
84	Flat Size ..... List Price .... \$				133 1/8 500.00	133 3/8 542.00	133 1/16 596.00	133 15/16 664.00	134 3/16 748.00
90	Flat Size ..... List Price .... \$								
91 1/2	Flat Size ..... List Price .... \$						145 5/16 739.00	145 3/4 815.00	146 1/8 916.00
96	Flat Size ..... List Price .... \$								

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

Flat Sizes are based on 0" S.F.

Straight Flange should be kept to minimum requirements. It can exceed that shown in most cases when necessary.

Hemispherical Heads are trimmed after forming to overall height with sufficient allowance for machining.

Submit specifications for sizes other than shown as we are

constantly increasing our die inventory.

**Dies available for 44" ID and 83 3/8" ID hemispheres.**

Segmental Hemispherical Heads can be furnished in practically any size desired without a die charge.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

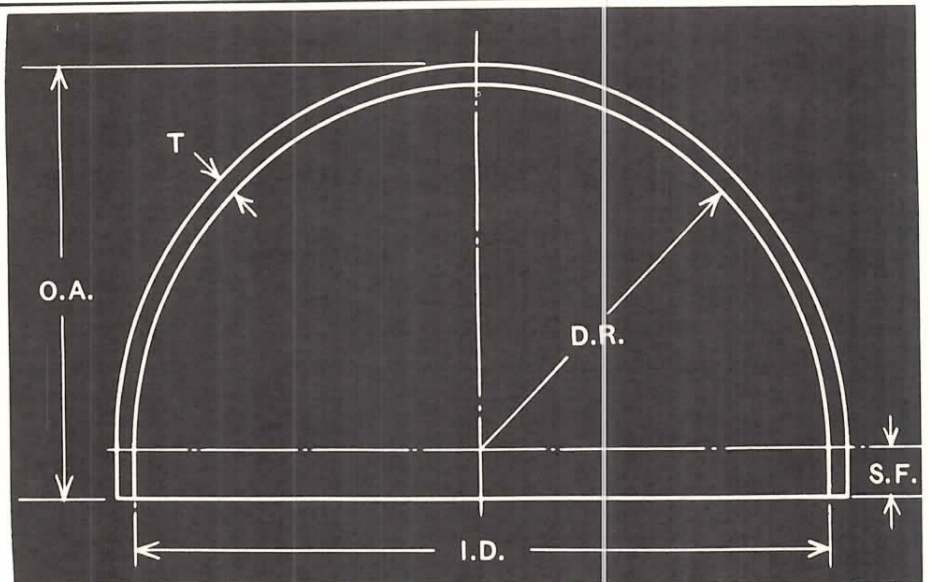
Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# HEMISPHERICAL FLANGED HEADS

Information required on orders and inquiries:

- Quantity.
- Grade of steel.
- ID—Nominal inside diameter.
- T—Minimum thickness.
- SF—Straight flange (if required).
- Machining if required.
- Any other special work.



ALL DIMENSIONS IN INCHES

I.D. (Nom. Inside Dia.)	Rolled Thickness	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2
		Str. Flg.	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4
24	Flat Size ..... List Price ....\$	40 1/2 302.00	40 7/8 395.00	41 1/4 496.00	41 5/8 546.00	42 1/16 714.00	42 7/16 907.00		
30	Flat Size ..... List Price ....\$	49 7/8 344.00	50 5/16 437.00	50 11/16 538.00	51 1/16 647.00	51 1/2 815.00	51 7/8 1008.00		
36	Flat Size ..... List Price ....\$	59 5/16 395.00	59 3/4 479.00	60 3/8 596.00	60 1/2 748.00	60 7/8 916.00	61 1/16 1067.00		
40	Flat Size ..... List Price ....\$	65 5/8 437.00	66 521.00	66 3/8 638.00	66 3/4 790.00	67 3/16 966.00	67 7/16 1117.00		
42	Flat Size ..... List Price ....\$	68 3/4 437.00	69 1/8 521.00	69 1/2 638.00	69 5/16 790.00	70 5/16 966.00	70 11/16 1117.00	71 1/8 1268.00	71 1/2 1386.00
48	Flat Size ..... List Price ....\$	78 3/16 470.00	78 7/16 571.00	78 15/16 689.00	79 3/8 840.00	79 3/4 1016.00	80 1/8 1168.00	80 1/2 1327.00	80 5/16 1445.00
50	Flat Size ..... List Price ....\$	81 1/16 529.00	81 11/16 622.00	82 1/8 731.00	82 1/2 899.00	82 7/8 1075.00	83 1/4 1235.00	83 11/16 1394.00	84 1/16 1512.00
52	Flat Size ..... List Price ....\$	84 7/16 529.00	84 7/8 622.00	85 1/4 731.00	85 5/8 899.00	86 1075.00	86 7/16 1235.00	86 13/16 1394.00	87 3/16 1512.00
54	Flat Size ..... List Price ....\$	87 5/8 529.00	88 622.00	88 3/8 731.00	88 3/4 899.00	89 3/16 1075.00	89 9/16 1235.00	89 15/16 1394.00	90 3/8 1512.00
60	Flat Size ..... List Price ....\$	97 580.00	97 7/16 680.00	97 13/16 798.00	98 3/16 958.00	98 5/8 1134.00	99 1294.00	99 3/8 1462.00	99 3/4 1596.00
66	Flat Size ..... List Price ....\$	106 1/16 638.00	106 13/16 739.00	107 1/4 865.00	107 5/8 1025.00	108 1210.00	108 3/16 1373.00	108 13/16 1546.00	109 1/16 1688.00
72	Flat Size ..... List Price ....\$	115 7/8 706.00	116 1/4 806.00	116 11/16 937.00	117 1/16 1100.00	117 7/16 1285.00	117 13/16 1453.00	118 1/4 1638.00	118 5/8 1798.00
78	Flat Size ..... List Price ....\$								
84	Flat Size ..... List Price ....\$	134 3/4 857.00	135 1/8 966.00	135 1/2 1100.00	135 7/8 1273.00	136 5/16 1462.00	136 11/16 1638.00	137 1/16 1840.00	137 1/2 2033.00
90	Flat Size ..... List Price ....\$								
91 1/2	Flat Size ..... List Price ....\$	146 1/2 1025.00	146 7/8 1142.00	147 3/16 1294.00	147 11/16 1470.00	148 1/16 1663.00	148 1/2 1856.00	148 7/8 2083.00	149 1/4 2310.00
96	Flat Size ..... List Price ....\$								

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

Flat Sizes are based on 0" S.F.

Straight Flange should be kept to minimum requirements. It can exceed that shown in most cases when necessary.

Hemispherical Heads are trimmed after forming to overall height with sufficient allowance for machining.

Submit specifications for sizes other than shown as we are constantly increasing our die inventory.

Dies available for 44" ID and 83 3/8" ID hemispheres.

Segmental Hemispherical Heads can be furnished in practically any size desired without a die charge.

References: Page 10 complete information required on heads.

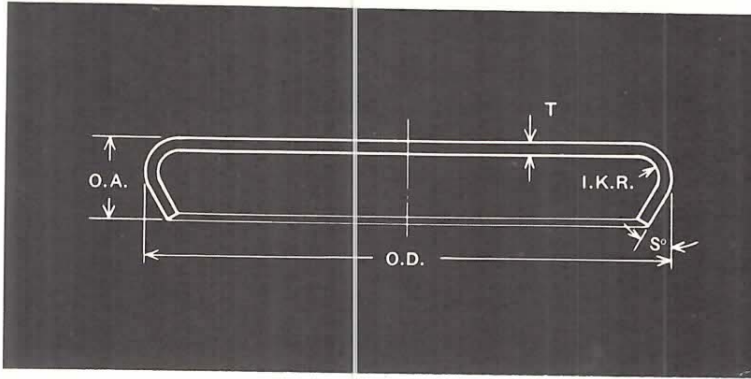
Page 78 machining information and list prices.

Page 110 circle weights.

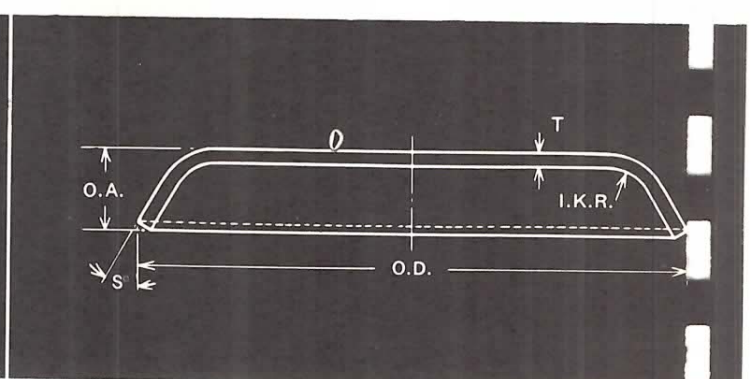
Page 100 approximate volume of dish in gallons.

# SPECIAL HEADS

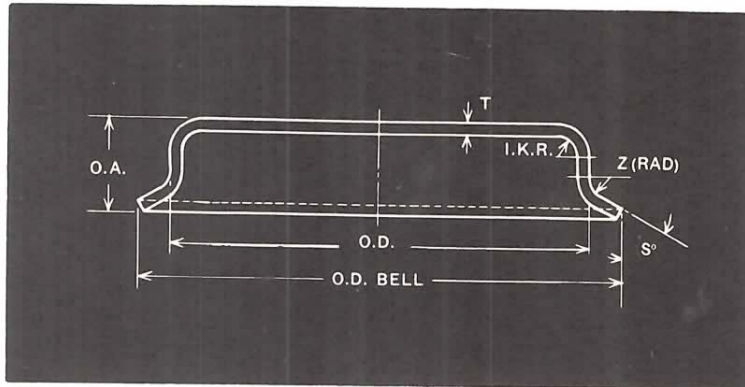
## FLANGED ONLY



Flanged Only—Toed In

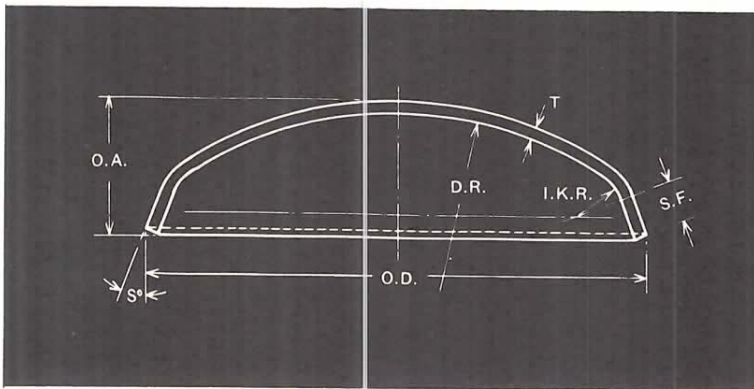


Flanged Only—Toed Out

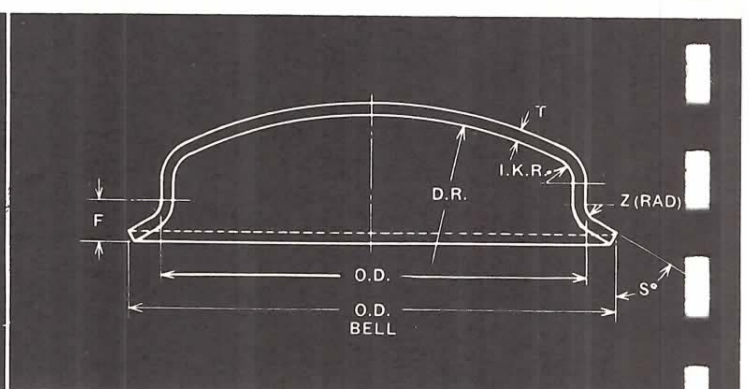


Flanged Only—Belled

## FLANGED AND DISHED



Flanged and Dished—Toed Out



Flanged and Dished—Belled

# CONICAL HEADS

(ASME CODE)

(Prices on Application)

INFORMATION REQUIRED ON ORDERS AND INQUIRIES

Quantity.  
Grade of steel.

Diameter.  
T—Thickness (See note\*)

L°—Included angle.  
SF—Straight flange.

H—I.D. Hole—specify largest acceptable.  
Machining or other special work.

ALL DIMENSIONS IN INCHES

TYPE A AND B CONES								TYPE D CONES							
I.D. Inside Diam.	Type	L° Included Angle	T*		S.F. Straight Flange	H I.D. Hole Min.	J Seam Diam.	O.D. Outside Diam.	Type	L° Included Angle	T*		S.F. Straight Flange	H I.D. Hole Min.	J Seam Diam.
			Min.	Max.							Min.	Max.			
48	A	113°28'	5/16	1	1 1/2-3	7	...	48			5/16	1	1 1/2-3	6	
54	A	113°28'	5/16	1	1 1/2-3	7	...	54			5/16	1	1 1/2-3	6	
60	A	113°28'	3/8	1	1 1/2-3	7	...	60			5/16	1	1 1/2-3	6	
66	A	113°28'	3/8	1	1 1/2-3	7	...	66			5/16	1	1 1/2-3	6	
72	A	113°28'	3/8	1	1 1/2-3	7	...	72			3/8	1	1 1/2-3	6	
78	A	113°28'	1/2	2	1 1/2-3 1/2	5	...	78			3/8	1	1 1/2-3	6	
84	A	113°28'	1/2	2	1 1/2-3 1/2	5	...	84		SEE	3/8	1	1 1/2-3	6	SEE
90	A	113°28'	5/8	2	1 1/2-4	5	...	90		NOTES	3/8	1	1 1/2-3	6	NOTES
96	A	113°28'	5/8	2	1 1/2-4	5	...	96		BELOW	3/8	1	1 1/2-3	6	BELOW
48	A	90°	3/8	1	1 1/2-3	5	...	102			3/8	1	1 1/2-3	6	
54	A	90°	7/16	1	1 1/2-3	5	...	108			7/16	1	1 1/2-3	6	
60	A	90°	1/2	1	1 1/2-3	5	...	114			7/16	1	1 1/2-3	6	
66	A	90°	9/16	1	1 1/2-3	5	...	120			1/2	1	1 1/2-3	6	
72	A	90°	9/16	2	1 1/2-3	18	...	126			1/2	1	1 1/2-3	6	
78	A	90°	9/16	2	1 1/2-3	18	...	132			9/16	1	1 1/2-3	6	
84	A	90°	9/16	2	1 1/2-3	18	...	138			9/16	1	1 1/2-3	6	
90	A	90°	9/16	2	1 1/2-3	18	...	144			9/16	1	1 1/2-3	6	
96	A	90°	5/8	2	1 1/2-3	30	...								
102	A	90°	5/8	2	1 1/2-3	30	...								
108	A	90°	3/4	2	1 1/2-3	30	...								
114	A	90°	3/4	2	1 1/2-3	30	...								
120	A	90°	3/4	2	1 1/2-3	30	...								
126	B	90°	7/8	2	1 1/2-3	30	102			L°					
132	B	90°	7/8	2	1 1/2-3	30	108								
138	B	90°	7/8	2	1 1/2-3	30	112								
144	B	90°	7/8	2	1 1/2-3	30	118								
72	A	78°	5/8	2	1 1/2-3	16	...			H					
78	A	78°	5/8	2	1 1/2-3	16	...								
84	A	78°	5/8	2	1 1/2-3	16	...								
90	B	78°	3/4	2	1 1/2-3	16	73 1/4			J					
96	B	78°	3/4	2	1 1/2-3	16	73 1/4								
102	B	78°	3/4	2	1 1/2-3	16	79 1/4								
108	B	78°	7/8	2	1 1/2-3	16	79 1/4								
114	B	78°	7/8	2	1 1/2-3	16	85 1/4								
120	B	78°	7/8	2	1 1/2-2	16	91 1/4								

Type — Will be determined by size, thickness and included angle required.

L° — Angle variable to suit requirements. Prefer it to be one of the following: 60°, 70°, 80°, 90°, 113°28', 120°.

H — Minimum is shown, should specify maximum suitable for your requirements.

J — Seam diameter will be determined by other dimensions of knuckle section

While A.S.M.E. Knuckle Radii are specified above, standard Knuckle Radii can also be furnished on type D Cones.

\* Minimum thickness required at H should be specified. Excess gauges shown on page 12 are sufficient for Type D Cones. A and B types require special excess gauges depending on diameter and H dimensions.

List price for forming one-piece (Type A) cones will be:  
90° included angle or less—2 times Elliptical  
Over 90° included angle—1 1/8 times Elliptical.

List price for straight seamless cones (no IKR or SF) will be:  
90° included angle or less—1 1/2 times Elliptical.  
Over 90° included angle—1 1/8 times Elliptical.

Cone Frustums:

Flat Circle—OD, plus 2 times head SF, plus 2 times slope SF, plus 2/3 of head IKR, plus 2 times thickness. If large end or head SF machined, add 1".

Forming—When slope SF is 1 1/2" or less, list price will be governed by style of head determined by IKR (Standard or ASME) plus 25%;

and this list is subject to standard quantity differentials.

If slope SF is over 1 1/2" same charge as above will apply except there will be an additional charge of 5% of list price for each 1/2" or fraction thereof in excess of 1 1/2". The excess is to be added to the 125% of applicable list price.

There will be no charge for gas cutting the center, and at the same time there will be no scrap allowance for the center cut-out.

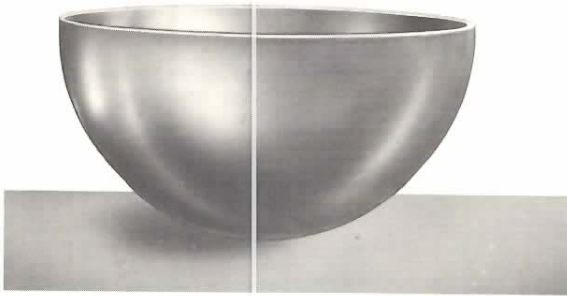
Maximum Straight Flange can be exceeded in most cases. Recommend it be kept to minimum.

Other Knuckle Radii are available on some sizes of Type A and B Cones. Included angles shown on Types A and B are those available with present dies.

We are constantly adding to our die equipment. Other angles will be quoted on request.



# Hemispherical Flanged Heads



Above: Hemispherical Flanged Head, 66" I.D., 33" Inside Radius and 3/8" Thick, 3" Straight Flange.



Above: Hemispherical Flanged Head, 66" I.D., 3/8" Thick, 33" Spherical Radius, and 4" Straight Flange.

ALL DIMENSIONS IN INCHES

I.D. (Nom. Inside Dia.)	Rolled Thickness  Str. Flg.	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2
		0 to 2	0 to 3	0 to 3	0 to 3	0 to 3	0 to 4	0 to 4	0 to 4
24	Flat Size ..... List Price .... \$	38 3/16 64.00	38 1/2 74.00	38 11/16 84.00	38 7/8 95.00	39 1/8 108.00	39 3/16 151.00	39 11/16 202.00	40 1/16 218.00
30	Flat Size ..... List Price .... \$	47 3/4 81.00	47 15/16 91.00	48 1/8 101.00	48 5/16 115.00	48 1/2 135.00	48 3/4 193.00	49 1/8 227.00	49 1/2 260.00
36	Flat Size ..... List Price .... \$	57 3/16 98.00	57 3/8 108.00	57 7/16 122.00	57 3/4 135.00	57 11/16 155.00	58 1/8 218.00	58 5/16 252.00	58 15/16 302.00
40	Flat Size ..... List Price .... \$	63 3/16 115.00	63 3/8 128.00	63 13/16 145.00	64 1/16 162.00	64 1/4 182.00	64 7/16 252.00	64 13/16 286.00	65 3/16 344.00
42	Flat Size ..... List Price .... \$	66 1/16 115.00	66 3/4 128.00	67 145.00	67 3/16 162.00	67 3/8 182.00	67 7/16 252.00	67 15/16 286.00	68 3/8 344.00
48	Flat Size ..... List Price .... \$		76 3/16 149.00	76 7/16 169.00	76 5/8 186.00	76 13/16 209.00	77 286.00	77 3/8 323.00	77 3/4 382.00
50	Flat Size ..... List Price .... \$		79 3/8 218.00	79 9/16 239.00	79 3/4 265.00	79 15/16 294.00	80 1/8 328.00	80 1/2 370.00	80 15/16 428.00
52	Flat Size ..... List Price .... \$		82 1/2 218.00	82 11/16 239.00	82 7/8 265.00	83 1/16 294.00	83 1/4 328.00	83 11/16 370.00	84 1/16 428.00
54	Flat Size ..... List Price .... \$		85 5/8 218.00	85 13/16 239.00	86 265.00	86 1/4 294.00	86 7/16 328.00	86 13/16 370.00	87 3/16 428.00
60	Flat Size ..... List Price .... \$			95 1/4 277.00	95 7/16 302.00	95 5/8 332.00	95 7/8 370.00	96 1/4 416.00	96 5/8 479.00
66	Flat Size ..... List Price .... \$			104 11/16 319.00	104 7/8 344.00	105 1/16 382.00	105 1/4 420.00	105 11/16 470.00	106 1/16 538.00
72	Flat Size ..... List Price .... \$				114 5/16 391.00	114 1/2 428.00	114 11/16 470.00	115 1/16 529.00	115 1/2 605.00
78	Flat Size ..... List Price .... \$								
84	Flat Size ..... List Price .... \$				133 1/8 500.00	133 3/8 542.00	133 5/8 596.00	133 13/16 664.00	134 3/16 748.00
90	Flat Size ..... List Price .... \$								
91 1/2	Flat Size ..... List Price .... \$						145 5/16 739.00	145 3/4 815.00	146 1/8 916.00
96	Flat Size ..... List Price .... \$								

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

Flat Sizes are based on 0" S.F.

Straight Flange should be kept to minimum requirements. It can exceed that shown in most cases when necessary.

Hemispherical Heads are trimmed after forming to overall height with sufficient allowance for machining.

Submit specifications for sizes other than shown as we are

constantly increasing our die inventory.

Dies available for 44" ID and 83 3/8" ID hemispheres.

Segmental Hemispherical Heads can be furnished in practically any size desired without a die charge.

References: Page 10 complete information required on heads.

Page 78 machining information and list prices.

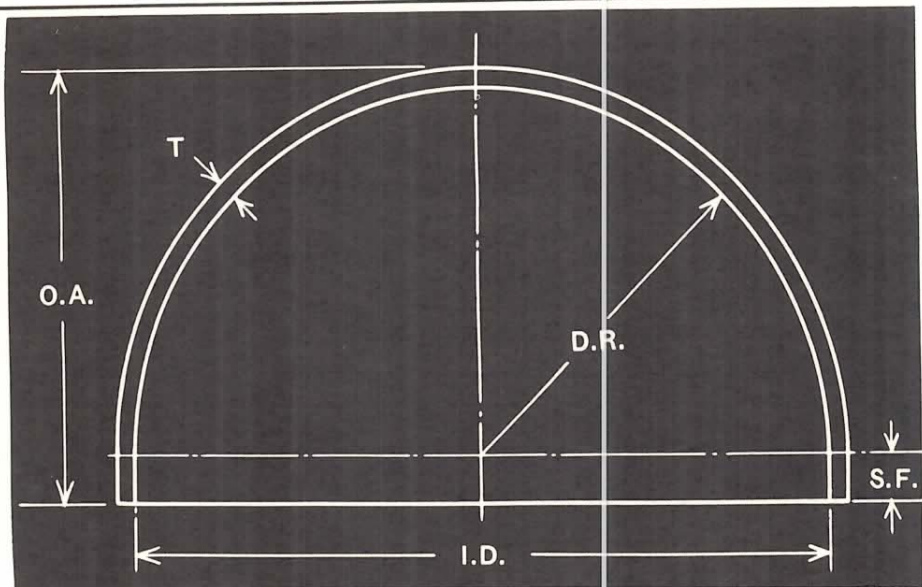
Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

# HEMISPHERICAL FLANGED HEADS

Information required on orders and inquiries:

- Quantity.
- Grade of steel.
- ID—Nominal inside diameter.
- T—Minimum thickness.
- SF—Straight flange (if required).
- Machining if required.
- Any other special work.



ALL DIMENSIONS IN INCHES

I.D. (Nom. Inside Dia.)	Rolled Thickness	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2
		Str. Flg.	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4
24	Flat Size . . . . List Price . . . . \$	40 1/2 302.00	40 7/8 395.00	41 1/4 496.00	41 5/8 546.00	42 1/16 714.00	42 7/16 907.00		
30	Flat Size . . . . List Price . . . . \$	49 7/8 344.00	50 3/16 437.00	50 11/16 538.00	51 1/16 647.00	51 1/2 815.00	51 7/8 1008.00		
36	Flat Size . . . . List Price . . . . \$	59 5/16 395.00	59 3/4 479.00	60 1/8 596.00	60 1/2 748.00	60 7/8 916.00	61 3/16 1067.00		
40	Flat Size . . . . List Price . . . . \$	65 5/8 437.00	66 521.00	66 3/8 638.00	66 3/4 790.00	67 3/16 966.00	67 7/16 1117.00		
42	Flat Size . . . . List Price . . . . \$	68 3/4 437.00	69 1/8 521.00	69 1/2 638.00	69 15/16 790.00	70 3/16 966.00	70 11/16 1117.00	71 1/8 1268.00	71 1/2 1386.00
48	Flat Size . . . . List Price . . . . \$	78 3/16 470.00	78 7/16 571.00	78 15/16 689.00	79 3/8 840.00	79 3/4 1016.00	80 1/8 1168.00	80 1/2 1327.00	80 5/16 1445.00
50	Flat Size . . . . List Price . . . . \$	81 1/16 529.00	81 11/16 622.00	82 1/8 731.00	82 1/2 899.00	82 7/8 1075.00	83 1/4 1235.00	83 11/16 1394.00	84 1/16 1512.00
52	Flat Size . . . . List Price . . . . \$	84 7/16 529.00	84 7/8 622.00	85 1/4 731.00	85 5/8 899.00	86 1075.00	86 7/16 1235.00	86 13/16 1394.00	87 3/16 1512.00
54	Flat Size . . . . List Price . . . . \$	87 5/8 529.00	88 622.00	88 3/8 731.00	88 3/4 899.00	89 3/16 1075.00	89 9/16 1235.00	89 15/16 1394.00	90 3/8 1512.00
60	Flat Size . . . . List Price . . . . \$	97 580.00	97 7/16 680.00	97 13/16 798.00	98 3/16 958.00	98 5/8 1134.00	99 1294.00	99 3/8 1462.00	99 3/4 1596.00
66	Flat Size . . . . List Price . . . . \$	106 3/16 638.00	106 3/8 739.00	107 1/4 865.00	107 5/8 1025.00	108 1210.00	108 7/16 1373.00	108 13/16 1546.00	109 3/16 1688.00
72	Flat Size . . . . List Price . . . . \$	115 7/8 706.00	116 1/4 806.00	116 11/16 937.00	117 1/16 1100.00	117 7/16 1285.00	117 13/16 1453.00	118 1/4 1638.00	118 5/8 1798.00
78	Flat Size . . . . List Price . . . . \$								
84	Flat Size . . . . List Price . . . . \$	134 3/4 857.00	135 1/8 966.00	135 1/2 1100.00	135 7/8 1273.00	136 3/16 1462.00	136 11/16 1638.00	137 1/16 1840.00	137 1/2 2033.00
90	Flat Size . . . . List Price . . . . \$								
91 1/2	Flat Size . . . . List Price . . . . \$	146 1/2 1025.00	146 7/8 1142.00	147 7/16 1294.00	147 11/16 1470.00	148 1/16 1663.00	148 1/2 1856.00	148 7/8 2083.00	149 1/4 2310.00
96	Flat Size . . . . List Price . . . . \$								

Sizes below heavy line require circles beyond limits of our mills. All sizes beyond mill limits can be furnished with one welded seam. See page 80 for welding details.

Flat Sizes are based on 0" S.F.

Straight Flange should be kept to minimum requirements. It can exceed that shown in most cases when necessary.

Hemispherical Heads are trimmed after forming to overall height with sufficient allowance for machining.

Submit specifications for sizes other than shown as we are constantly increasing our die inventory.

**Dies available for 44" ID and 83 3/8" ID hemispheres.**

Segmental Hemispherical Heads can be furnished in practically any size desired without a die charge.

References: Page 10 complete information required on heads.

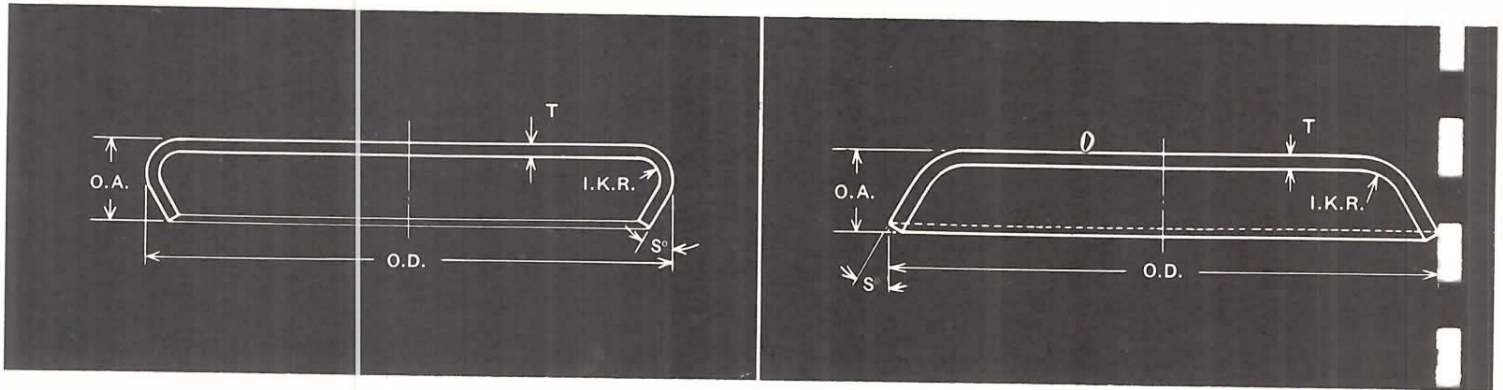
Page 78 machining information and list prices.

Page 110 circle weights.

Page 100 approximate volume of dish in gallons.

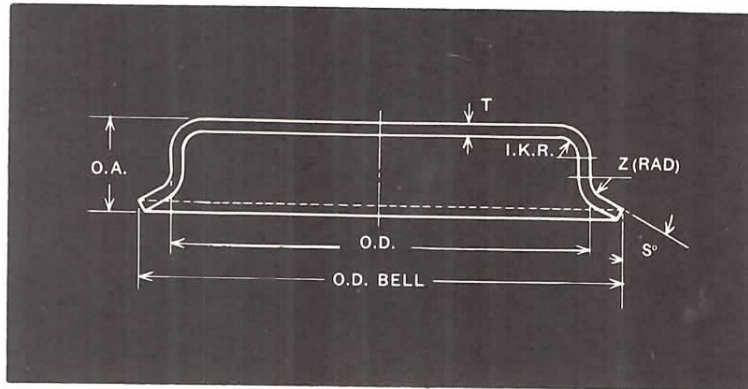
# SPECIAL HEADS

## FLANGED ONLY



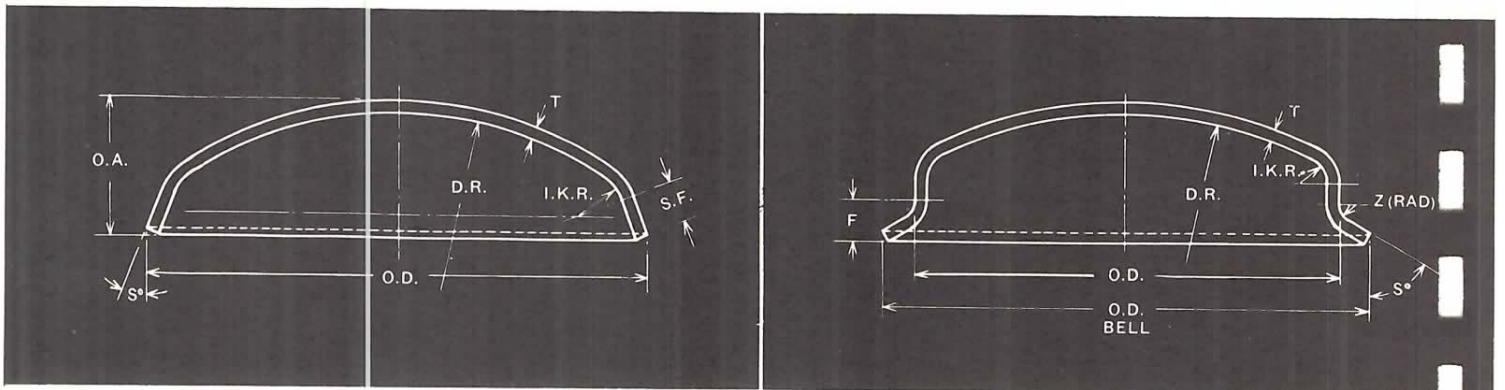
Flanged Only—Toed In

Flanged Only—Toed Out



Flanged Only—Belled

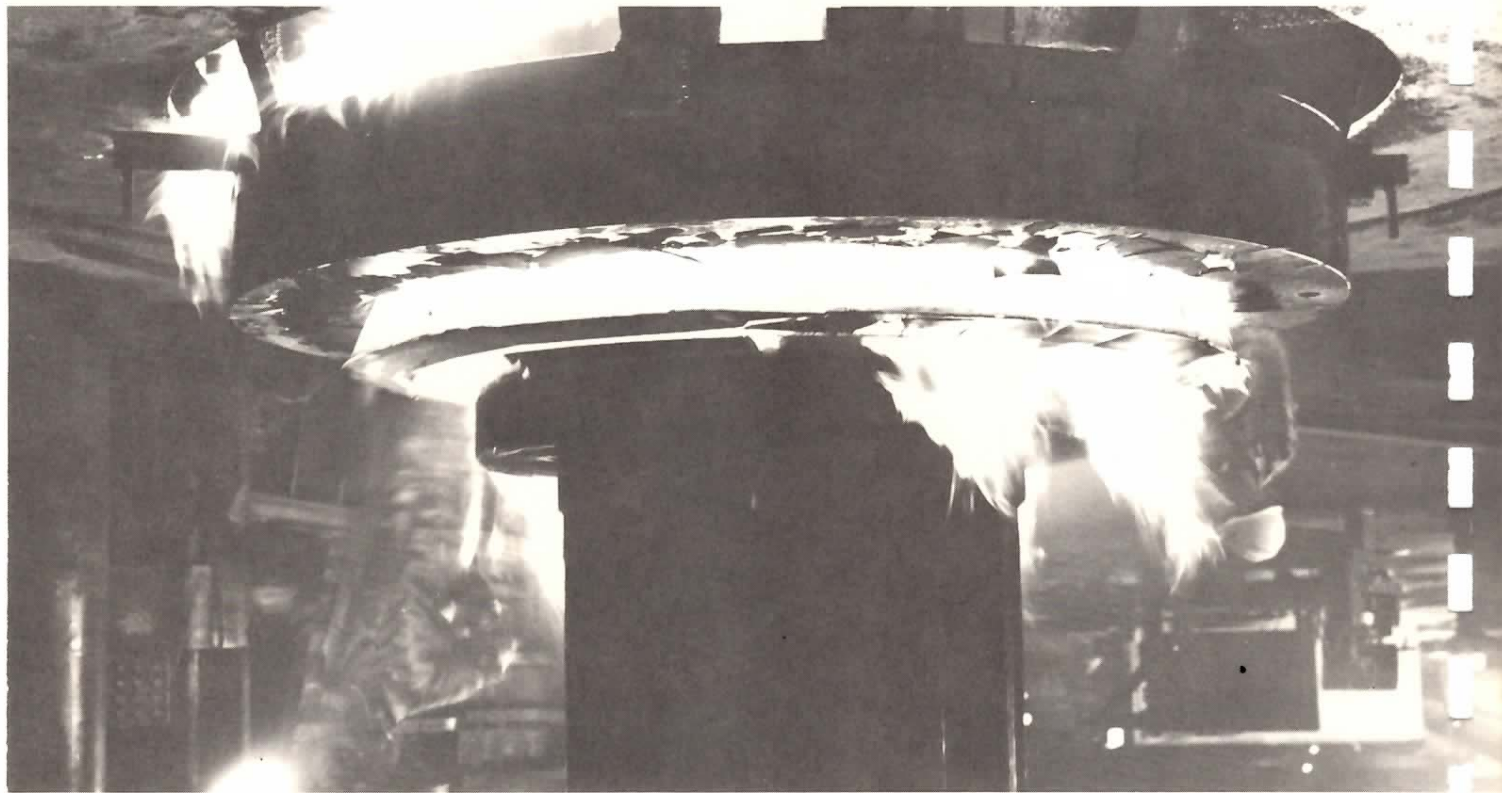
## FLANGED AND DISHED



Flanged and Dished—Toed Out

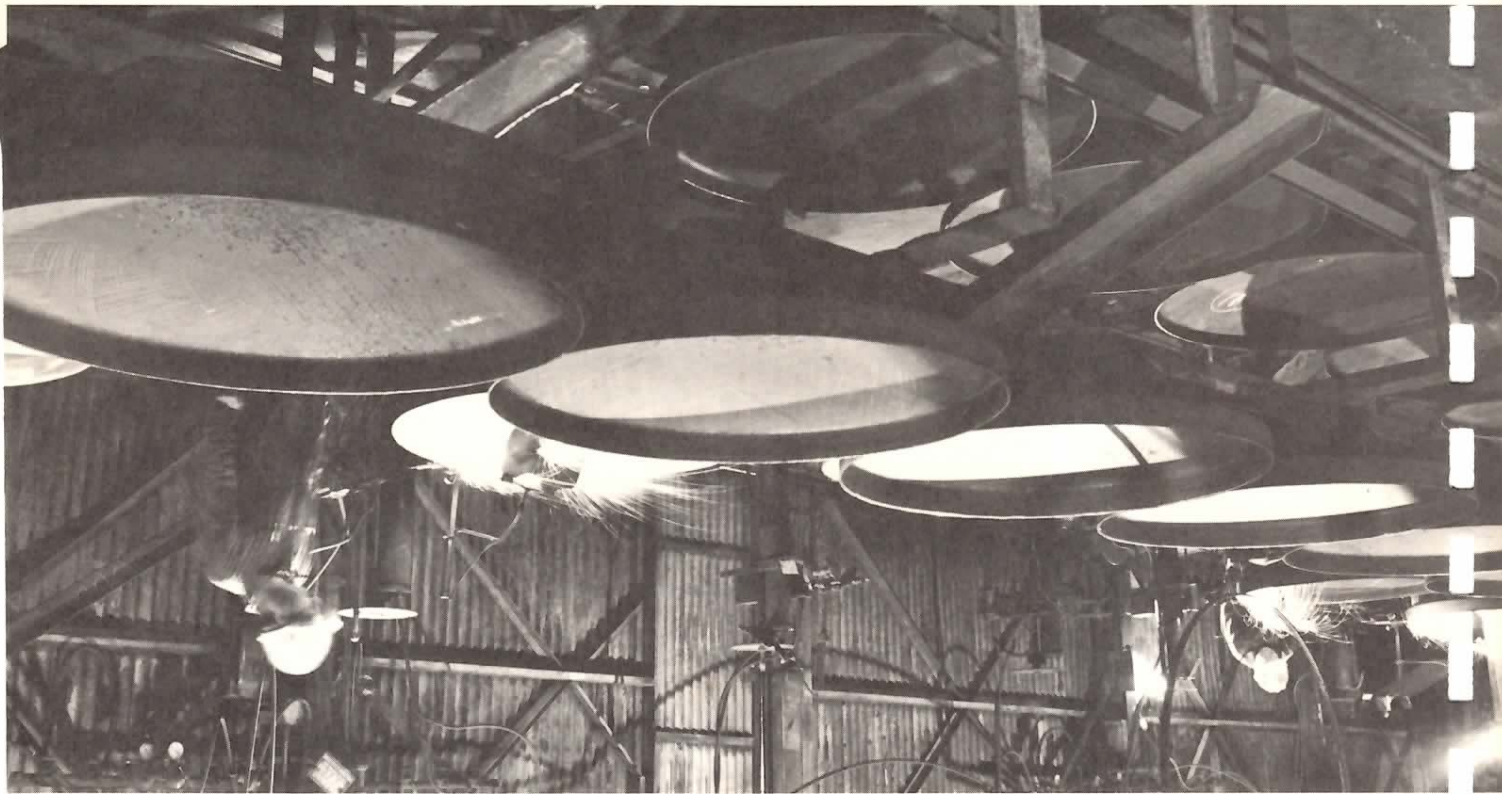
Flanged and Dished—Belled

# MACHINING OF HEADS



Below: Flanged & dished cold pressed heads being trimmed and inspected.

Above: 3000 ton press forms 57-3/4" O.D.; 5" gauge hemispherical head weighing approximately 7500 lbs.



# MACHINING OF HEADS

## Prices

List prices cover machining as indicated by the standard machining styles shown below, these prices applying on heads made of carbon steels to standard specifications. Prices subject to change without notice.

For prices on other grades of steel, alloy metals, etc., see page 15.

Prices on special machining, not covered by standard styles, will be quoted on application.

Quantity differentials are applicable to these list prices. Refer to our latest edition of discounts and extras.

## Sizes

For intermediate sizes or thicknesses, list price for next larger size or heavier thickness applies.

## Machining Allowance

Where heads are to be machined full length of straight flange, either inside or outside diameter, (not both), head thickness must exceed flange thickness by at least  $\frac{1}{8}$ " to provide machining allowance. If machined both inside and outside, head thickness must exceed flange thickness at least  $\frac{1}{8}$ ". This is not in addition to excess gauge added for minimum thickness heads (refer Page 12). The greater of the two is to be used, not both.

Machining charges are based on the rolled thickness.

## Dimensions Required for Ordering Machined Heads

Style and type of machining.

Degree of bevel.

Width of land zone.

Recommend furnishing sketch of machining details.

When both Overall Depth and Straight Flange are given, specify the more important dimension as both cannot be maintained.

For Style C-6, C-7 and D specify T (Head Thickness), S (Shell Thickness) and I.D. or O.D. When I.D. is specified, T must exceed S at least  $\frac{1}{8}$ ".

Thickness at or near edge of flange on hot spun heads may in some cases exceed ordered thickness due to thickening of metal in forming. When this excess thickness is objectionable, it is recommended a machining style be specified which will provide for removing this excess metal and specify "S" (shell) thickness.

When both O.D. and I.D. are machined with 4 to 1 taper, Style D-11 machining will apply.

When 4 times the difference between rolled thickness and thickness S exceeds "1½S," list price will be Style C plus 10% for each ½" or fraction thereof in excess of "1½S."

When vertical height of taper (4 times difference between rolled thickness and "1½S") exceeds "1½S" on Style D there will be a charge of 10% for each ½" or fraction thereof in excess of "1½S."

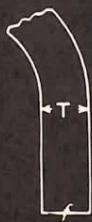
When machining is required on face of O.D. or I.D. (not both) list for Style D will apply provided distance face of flange is to be machined does not exceed "1½S."

When machining is required on face of both O.D. and I.D. list will be Style D plus 80% provided distance face of flange is to be machined does not exceed "1½S."

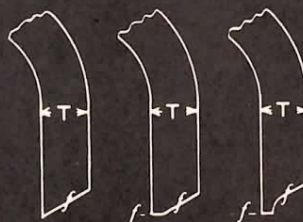
### STANDARD STYLES FOR MACHINING HEADS

MACHINING  
OF HEADS

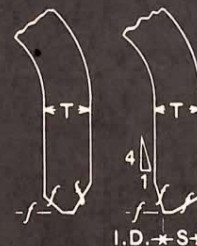
78



1  
STYLE A



2 3 4  
STYLE B



5 6  
STYLE C

# MACHINING OF HEADS

## LIST PRICES FOR MACHINING HEADS

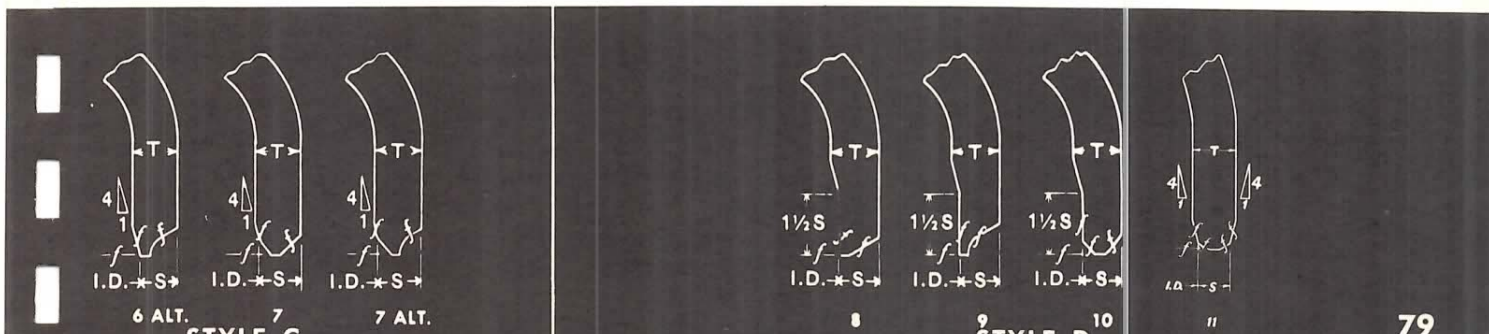
OUTSIDE DIAMETER	STYLE	THICKNESS								
		Up to 1/2" incl.	Over 1/2" to 3/4" incl.	Over 3/4" to 1" incl.	Over 1" to 1 1/4" incl.	Over 1 1/4" to 1 1/2" incl.	Over 1 1/2" to 1 3/4" incl.	Over 1 3/4" to 2" incl.	Over 2" to 2 1/2" incl.	Over 2 1/2" to 3" incl.
Up to and incl. 24"	A	\$6.00	10.50	12.00	15.00	16.50	.....	.....	.....	.....
	B & C	7.50	12.00	13.50	18.00	19.50	.....	.....	.....	.....
	D	12.00	15.00	16.50	21.00	22.50	.....	.....	.....	.....
Over 24" to 36" incl.	A	\$13.50	15.00	16.50	22.50	24.00	27.00	28.50	.....	.....
	B & C	15.00	18.00	19.50	25.50	27.00	30.00	34.50	.....	.....
	D	19.50	22.50	24.00	31.50	33.00	37.50	45.00	.....	.....
Over 36" to 48" incl.	A	\$16.50	19.50	21.00	27.00	28.50	30.00	31.50	33.00	36.00
	B & C	19.50	22.50	24.00	31.50	33.00	34.50	37.50	45.00	51.00
	D	24.00	28.50	30.00	39.00	40.50	42.00	48.00	57.00	64.50
Over 48" to 60" incl.	A	\$21.00	25.50	27.00	34.50	36.00	37.50	39.00	42.00	45.00
	B & C	25.50	30.00	31.50	40.50	42.00	45.00	49.50	61.50	69.00
	D	31.50	36.00	39.00	51.00	52.50	57.00	63.00	78.00	88.50
Over 60" to 72" incl.	A	\$25.50	28.50	30.00	39.00	40.50	42.00	43.50	46.50	49.50
	B & C	28.50	33.00	34.50	43.50	45.00	49.50	54.00	66.00	76.50
	D	36.00	39.00	42.00	54.00	57.00	63.00	67.50	88.50	105.00
Over 72" to 84" incl.	A	\$30.00	34.50	36.00	45.00	46.50	48.00	49.50	52.50	57.00
	B & C	34.50	37.50	40.50	52.50	54.00	58.50	61.50	76.50	87.00
	D	40.50	45.00	48.00	61.50	64.50	70.50	76.50	102.00	114.00
Over 84" to 96" incl.	A	\$33.00	37.50	39.00	51.00	52.50	54.00	55.50	58.50	63.00
	B & C	37.50	42.00	45.00	57.00	60.00	64.50	69.00	84.00	99.00
	D	43.50	51.00	52.50	67.50	69.00	76.50	84.00	111.00	124.50
Over 96" to 108" incl.	A	\$36.00	40.50	45.00	54.00	57.00	58.50	60.00	63.00	67.50
	B & C	40.50	45.00	51.00	61.50	64.50	70.50	76.50	90.00	111.00
	D	46.50	54.00	57.00	72.00	73.50	81.00	90.00	120.00	135.00
Over 108" to 120" incl.	A	\$42.00	45.00	51.00	60.00	61.50	63.00	66.00	70.50	75.00
	B & C	45.00	51.00	57.00	67.50	69.00	75.00	81.00	99.00	118.50
	D	51.00	60.00	63.00	75.00	78.00	87.00	96.00	129.00	147.00
Over 120" to 132" incl.	A	\$54.00	58.50	61.50	64.50	66.00	69.00	70.50	75.00	79.50
	B & C	60.00	63.00	69.00	72.00	73.50	79.50	85.50	108.00	126.00
	D	64.50	75.00	78.00	81.00	82.50	93.00	103.50	139.50	156.00
Over 132" to 144" incl.	A	\$57.00	61.50	67.50	69.00	72.00	73.50	76.50	84.00	88.50
	B & C	63.00	67.50	75.00	76.50	78.00	87.00	96.00	117.00	132.00
	D	67.50	79.50	82.50	85.50	87.00	99.00	111.00	147.00	166.50
Over 144" to 160" incl.	A	\$63.00	67.50	73.50	75.00	76.50	81.00	85.50	93.00	99.00
	B & C	67.50	73.50	81.00	84.00	85.50	96.00	111.00	132.00	150.00
	D	72.00	84.00	87.00	90.00	93.00	106.50	120.00	156.00	183.00
Over 160" to 176" incl.	A	\$84.00	90.00	96.00	105.00	111.00	117.00	123.00	129.00	138.00
	B & C	90.00	96.00	105.00	114.00	123.00	135.00	150.00	171.00	186.00
	D	105.00	120.00	135.00	141.00	150.00	165.00	180.00	204.00	231.00
Over 176" to 192" incl.	A	105.00	111.00	117.00	135.00	144.00	153.00	162.00	168.00	180.00
	B & C	117.00	123.00	129.00	144.00	159.00	174.00	189.00	210.00	225.00
	D	138.00	156.00	183.00	195.00	210.00	225.00	240.00	255.00	279.00

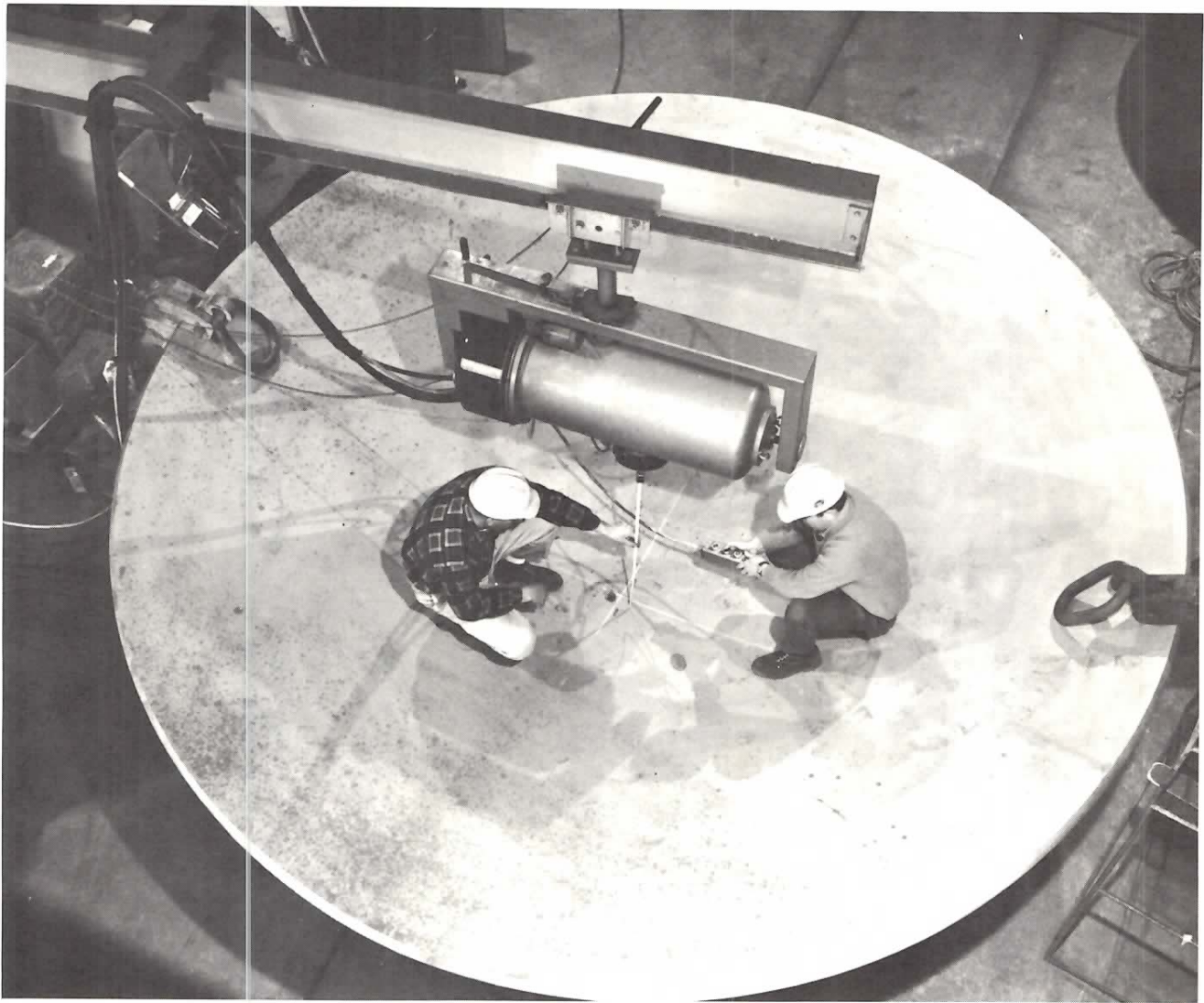
Sizes over 192" Diameter can be beveled to styles A, B2, B3, C5, C6 and C7 only, for which prices will be quoted on application. When machining on O.D. or I.D. or both is required in excess of "1 1/2 S," the extra charge will be 10% of list for Style D per 1/2" of excess or fraction thereof, computed on the total of machining in excess of "1 1/2 S." For example:

### 120" O.D. x 5/8" thick, 3" straight flange

Entire SF machined OD or ID (not both) for butt welding to 1/2" shell plate.  
 Amount of machining 3"  
 1 1/2 S 3/4"  
 Excess machining 2 1/4" or 50%  
 List for Style D \$60.00  
 Plus 50% excess 30.00  
 Total list for machining OD or ID entire length of SF \$90.00

Entire SF machined OD and ID for butt welding to 1/2" shell plate.  
 Amount of machining (2 x 3") 6"  
 Permissible machining (2 x "1 1/2 S") 1 1/2"  
 Excess machining 4 1/2" or 90%  
 List for Style D \$ 60.00  
 Plus 80% for OD 48.00  
 Plus 90% for excess machining 54.00  
 Total list for machining OD and ID entire length of SF \$162.00





**X-raying weld on two-piece head. This high efficiency machine will X-ray 3-inch gauge steel.**

To furnish the large diameter heads required it is necessary, in some cases, that the flat circle be made from two half circles welded. This is due to the flat circles being beyond the capacity of mills to produce in one piece.

We have produced heads of this type for a number of years, and the results have been excellent. The so-called two-piece head, as we make it, should not be confused with heads made up and welded after forming. The weld seam, being welded in flat plate, is flush and a perfect fit; so much so that we have had customers request the seam be marked to enable them to find it. The heating and forming *after welding*

produces a weld of such characteristics that X-Ray inspection seldom results in any repairs being necessary.

The welding is done by the Multi Pass, Submerged Arc, Automatic Method, by welders qualified according to ASME, and other codes.

For ASME a joint efficiency of 100% is permissible. When this or other specifications requiring them are applicable, stress relieving, radiographing, and Code inspection are also performed as part of the process.

Orders or inquiries for heads or other items involving welding should give complete welding specifications.

**TABLE UW-12 MAXIMUM ALLOWABLE JOINT EFFICIENCIES FOR ARC AND GAS WELDED JOINTS**

No.	Type of Joint Description	Thickness Limitations	Degree of Examination		
			(a) Fully Radiographed <sup>1</sup>	(b) Spot Examined <sup>2</sup>	(c) Not Spot Examined <sup>3</sup>
(1)	Butt joints as attained by double-welding or by other means which will obtain the same quality of deposited weld metal on the inside and outside weld surfaces to agree with the requirements of Par. UW-35. Welds using metal backing strips which remain in place are excluded.	None	1.00	0.85	0.70
(2)	Single-welded butt joint with backing strip other than those included under (1).	None	0.90	0.75	0.65
(3)	Single-welded butt joint without use of backing strip.	Circumferential joints only, not over $\frac{5}{8}$ in. thick and not over 24 in. outside diameter.	..	..	0.60
(4)	Double full-fillet lap joint.	Longitudinal joints not over $\frac{3}{8}$ in. thick. Circumferential joints <sup>4</sup> not over $\frac{5}{8}$ in. thick.	..	..	0.55
(5)	Single full-fillet lap joints with plug welds.	Circumferential joints <sup>4</sup> for attachment of heads not over 24 in. outside diameter to shells not over $\frac{1}{2}$ in. thick.	..	..	0.50
(6)	Single full-fillet lap joints without plug welds.	(a) For the attachment of heads convex to pressure to shells not over $\frac{5}{8}$ in. required thickness, only with use of fillet weld on inside of shell; or for attachment of heads having pressure on either side, to shells not over 24 in. inside diameter and not over $\frac{1}{4}$ in. required thickness with fillet weld on outside of head flange only. (b)	..	..	0.45

<sup>1</sup> See Pars. UW-12(b) and UW-51.

<sup>2</sup> See Pars. UW-12(c) and UW-52.

<sup>3</sup> See Par. UW-12(d).

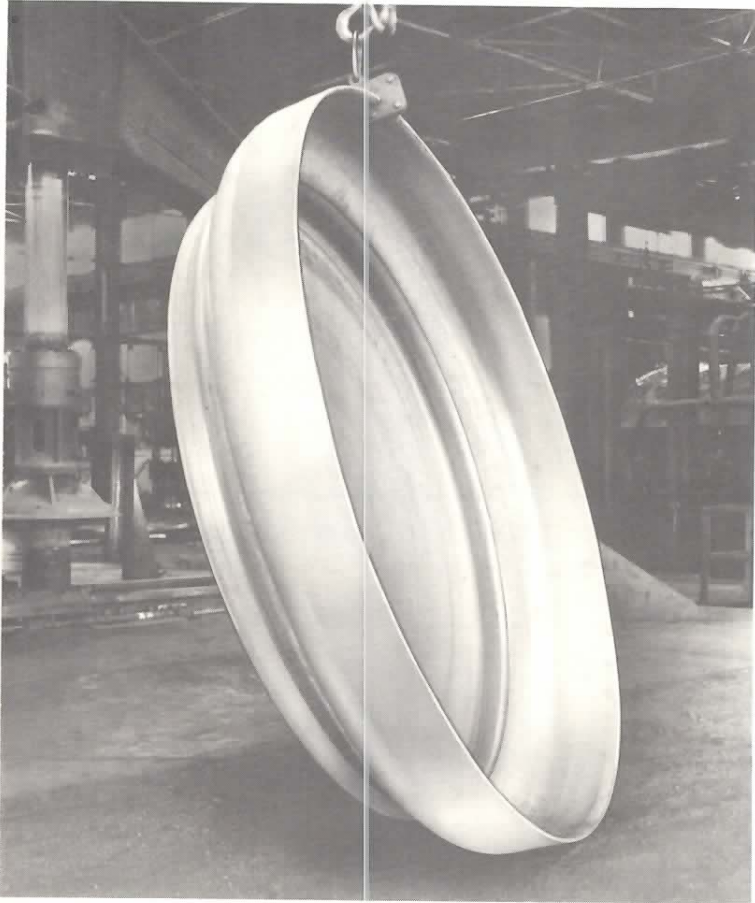
<sup>4</sup> Joints attaching hemispherical heads to shells are excluded.

**The above table is for reference purposes only.**

The ASME Code and others are all designed as a code for safe practice in design, construction or repairs of pressure vessels. The applicable code should be carefully studied before construction of a vessel is begun.



# SPECIAL HEADS



36" Inside diameter x  $\frac{5}{8}$ " thick hemisphere with two 20" diameter flued openings, flued radially 45° from center line

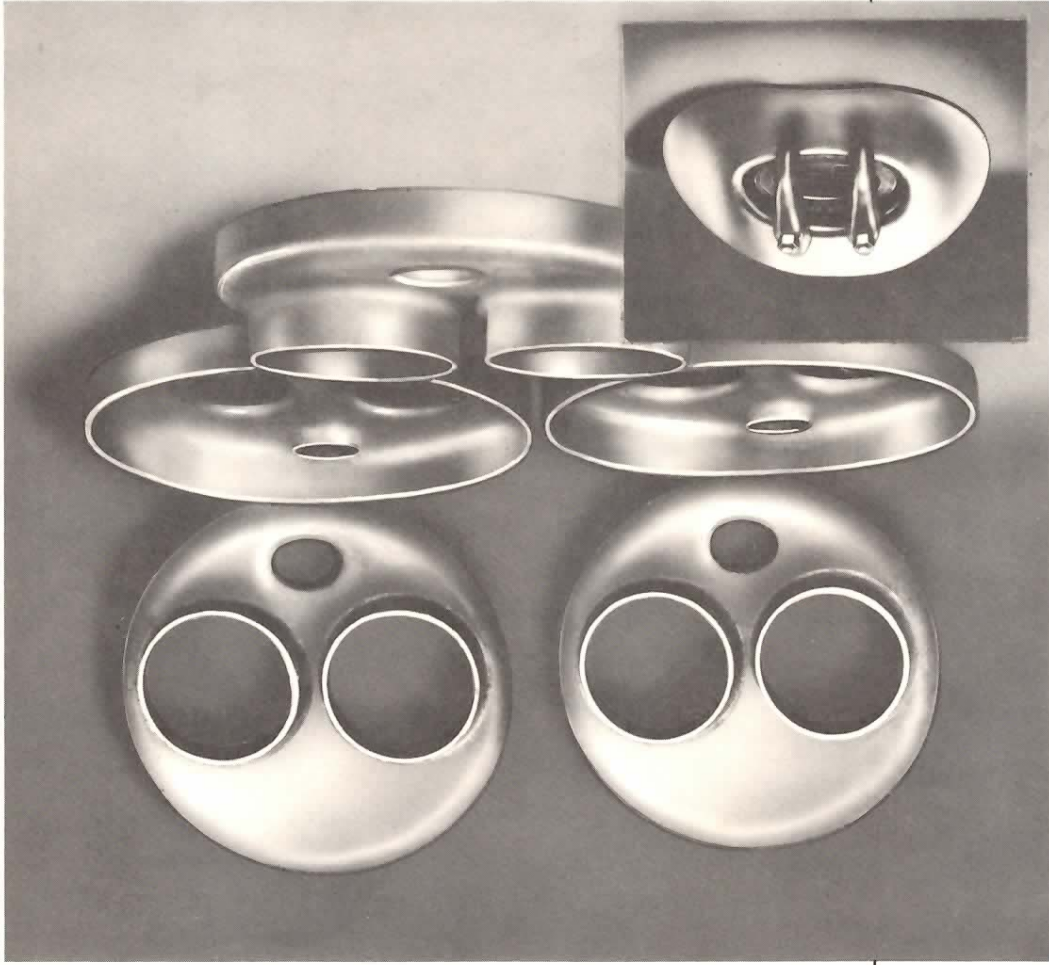
Flanged and Dished Head with specially large Flued Opening. Head is 122  $\frac{1}{2}$ " O.D.,  $\frac{3}{4}$ " Thick with 3  $\frac{1}{2}$ " Straight Flange. The Flue Hole is 106" I.D. after cutting out center. This method of manufacture is used only on Flue Holes of extremely large diameters.



Automatic Welding Machine set up to make a weld on a Conical Head.



Dome Heads 55  $\frac{1}{2}$ " O.D., 2  $\frac{1}{4}$ " Thick and 7" Straight Flange, with flued opening in center.



**FLUE HOLES, MANHOLES,  
HANDHOLES, SADDLES,  
AND FITTINGS**



**FLUE HOLES,  
MANHOLES, ETC.**

# GENERAL INFORMATION

---

## Flue Holes — Manholes Handholes — Saddles

### Prices

List prices are per hole covering forming only of Flue Holes, Manholes or Handholes. The price of Saddles *includes the metal cost* as well as fluing.

These prices are based on carbon steels to standard specifications. See page 15 for alloys or other metals.

Material cut out of centers will be retained by us.

Flue holes in flanged and dished or dished only heads—prices are based on fluing on radial line only.

Flue holes off center, flued parallel to center line—2 x list.

Prices subject to quantity differentials, as covered by our latest edition of discounts and extras.

Prices subject to change without notice.

### Sizes

Sizes beyond those listed will be quoted on application.

All flued openings are made to inside diameter. If O.D. is specified, this will be nominal.

### Inside Knuckle Radius

MANHOLES, HANDHOLES, AND SADDLES: List prices apply for knuckle radius furnished to standard shop practice. When a specified knuckle radius must be maintained or when subject to U. S. Navy or U. S. Coast Guard Specification and Inspection, prices will be quoted on application.

FLUE HOLES: To facilitate manufacture, it is requested that standard knuckle radius be specified wherever possible. When standard knuckle radius is specified we will furnish radius between one and three times thickness.

When subject to U. S. Navy or U. S. Coast Guard Specification and Inspection, prices will be quoted on application.

### Location

In flanged only or flanged and dished heads, manholes or flue holes located off center should not be closer than 2½" from outside edge of flange opening to inside edge of head flange. In other type heads this dimension is variable according to size and type, but in no case closer than 2½". *Distance should be as much greater as space and specifications permit.*

# Flue Holes — Manholes Handholes — Saddles

Maximum spacing from center of opening to outside of head is 83½".  
Always specify direction of flue manholes or flue holes, whether in the same or opposite direction from flange of head.  
For dimensions exceeding above limits, submit inquiry with sketch.

## Thickness

When a specified minimum head thickness is to be maintained, price is based on the increased thickness. Extra thickness required is shown under heads, page 12. If minimum thickness of flanged section of opening is required (and if banding is not satisfactory in case of manholes, handholes or saddles) prices will be quoted on application. ASME Code Par. UG 32 regarding thickness of flued openings permits thickness of integrally flanged openings to thin out provided thickness is not less than required for cylindrical shell of equal diameter.

## Machining

Prices of manholes, handholes and saddles include facing for flat gasket bearing surface. Price of flue holes does not include machining. Flue holes can be machined at costs shown on page 79, using O.D. of flue hole to determine list price applying.

## Banding

Manholes or saddles in metal thickness less than 1" require reinforcing bands to meet specifications which require ¼" minimum gasket seat.

## Tolerance on Flue Holes

Inside circumference as follows:

Up to 48" I.D. Incl.	3/8"	3/16"
Over 48" I.D.	1/2"	1/4"
	<i>Std. Tolerance</i> (Plus or Minus)	<i>Re-Sized Tolerance</i> (Plus or Minus)

These tolerances apply for gauges up to and including 2½". For heavier gauges tolerance will be furnished upon application.

Resizing list is 40% of List Price of Flanged Only Head of same O.D. as flue hole I.D.

When ordered to outside diameter, holes will be flued to equivalent inside diameter arrived at by deducting two times thickness from O.D. and above tolerances will apply to this I.D.

# TYPES OF FLUED HEADS

## FLANGED ONLY

FLUE HOLES

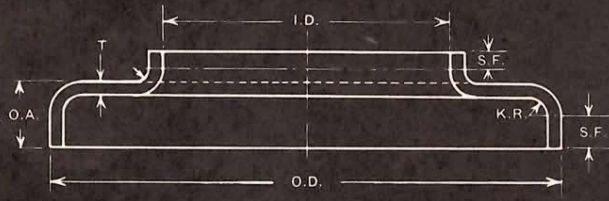


Fig. 1

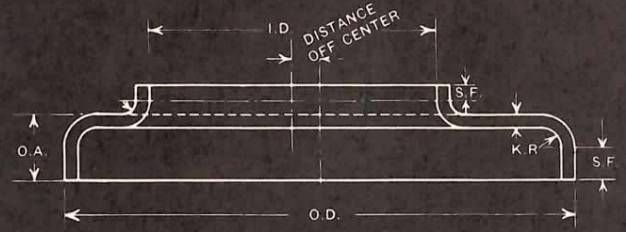


Fig. 2

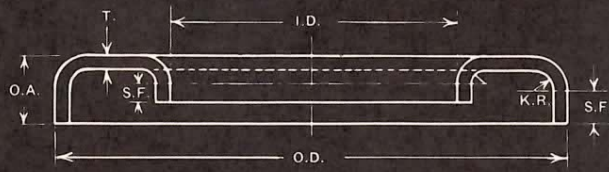


Fig. 3

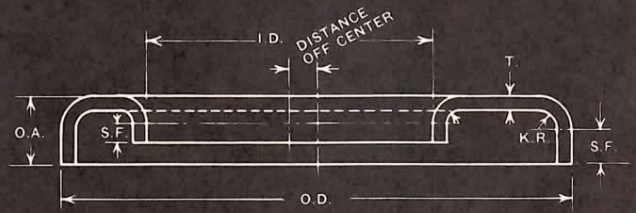


Fig. 4

## FLANGED AND DISHED

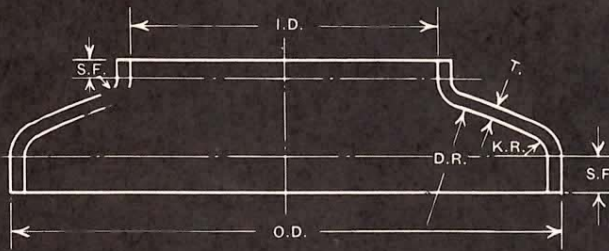


Fig. 5

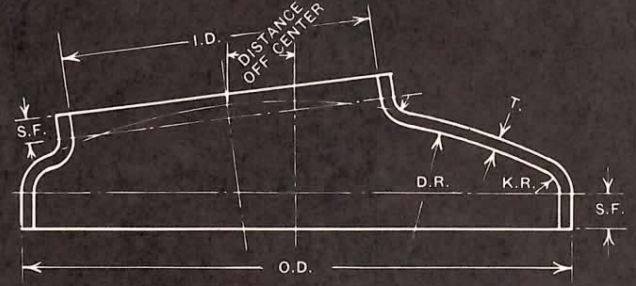


Fig. 6

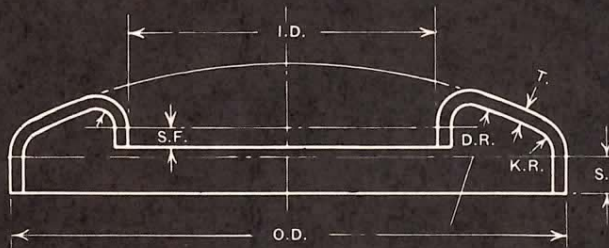


Fig. 7

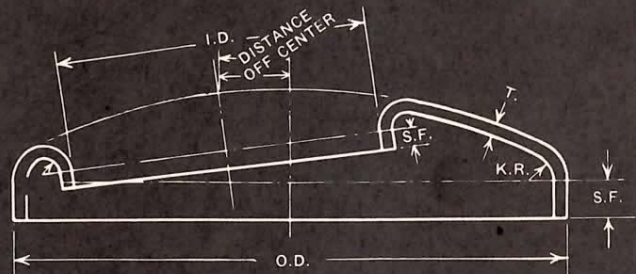


Fig. 8

# FLUE HOLES

## LIST PRICES FOR FLUE HOLES

Prices for Intermediate Diameters and Thicknesses Will Be Quoted, But in No Case Will Price Be Less Than Next Larger Diameter or Heavier Thickness Listed

ALL DIMENSIONS IN INCHES

I.D. and 1/2 Under	THICKNESS												
	3	2 3/4	2 1/2	2	1 3/4	1 1/2	1 1/4	1	3/8	3/4	1/2	1/4	
6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	\$107.00	\$96.00	\$85.50	\$75.00	\$64.00	\$57.00	\$50.00	\$42.50	\$35.50	\$32.00	\$28.50	\$25.00	\$21.50
17, 18, 19, 20	135.50	121.00	110.50	96.00	85.50	75.00	64.00	57.00	48.00	42.50	37.50	32.00	26.50
22, 24	164.00	149.50	131.50	117.50	103.00	92.50	82.00	71.00	60.50	53.50	46.50	39.00	32.00
26, 28	192.00	174.50	156.50	142.50	124.50	110.50	98.00	85.50	75.00	64.00	57.00	48.00	39.00
30, 32	220.50	203.00	181.50	164.00	146.00	128.00	114.00	101.50	87.00	76.50	66.00	57.00	46.50
34, 36	249.00	228.00	206.50	185.00	165.50	147.50	131.50	117.50	99.50	87.00	75.00	64.00	53.50
38, 40	281.00	256.50	231.50	206.50	185.00	165.50	146.00	131.50	114.00	99.50	85.50	71.00	58.50
42, 44	309.50	281.00	256.50	228.00	206.50	185.00	164.00	146.00	128.00	110.50	96.00	80.00	66.00
46, 48	334.50	306.00	277.50	249.00	224.50	203.00	178.00	160.00	139.00	121.00	103.00	87.00	71.00
50, 52	363.00	334.50	302.50	270.50	245.50	220.50	196.00	171.00	153.00	131.50	114.00	96.00	78.50
54, 56	391.50	359.50	327.50	292.00	263.50	238.50	213.50	188.50	165.50	142.50	123.00	103.00	85.50
58, 60	420.00	384.50	349.00	313.50	285.00	256.50	228.00	203.00	178.00	153.00	131.50	110.50	89.00
62, 64, 66										149.50	128.00	107.00	89.00
68, 70, 72									176.50	146.00	133.50	113.50	90.00
74, 76, 78									188.50	158.50	146.00	133.50	113.50
80, 82, 84									213.50	176.50	163.50	151.50	139.00
											190.50	169.00	151.50

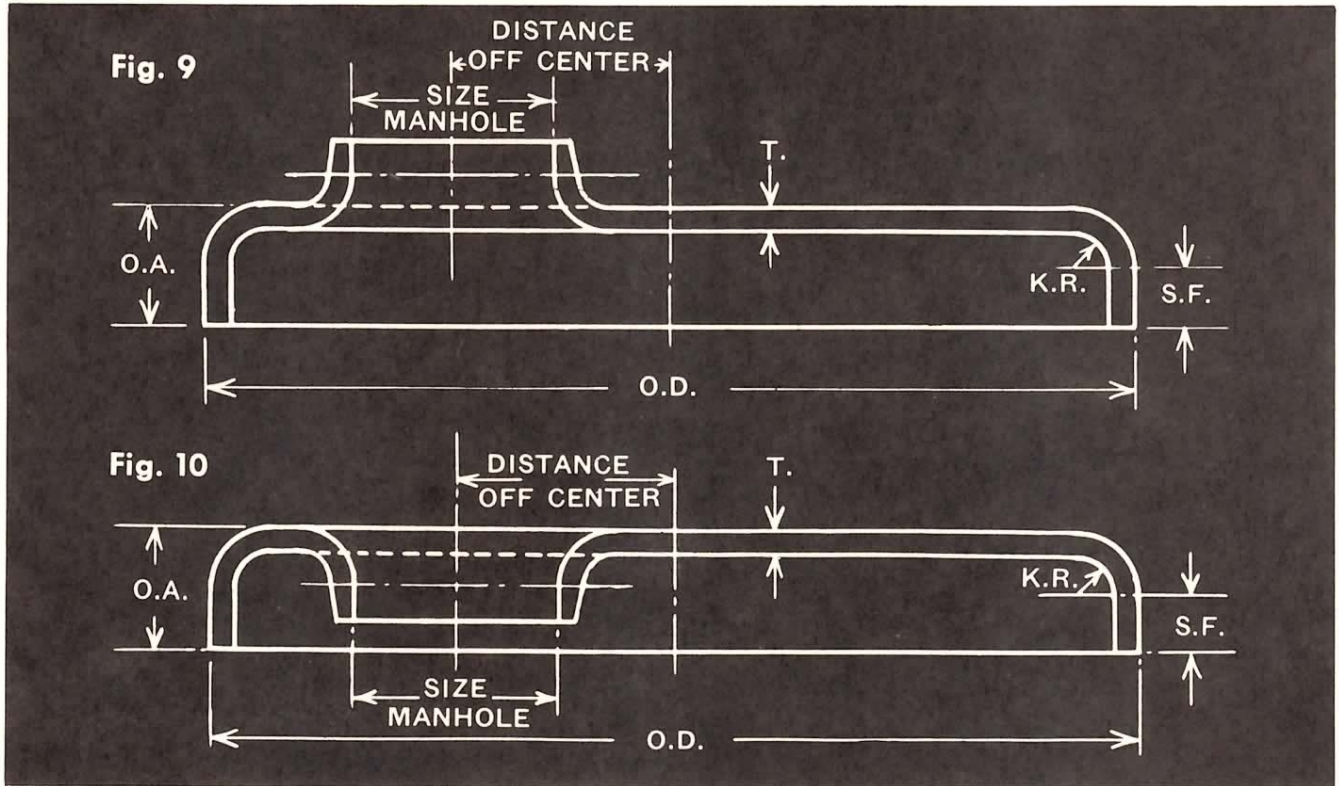
Since dies may not be available for all of these sizes, especially over 60", an extra charge for dies may be assessed.

Flue holes larger than shown above—prices on application.

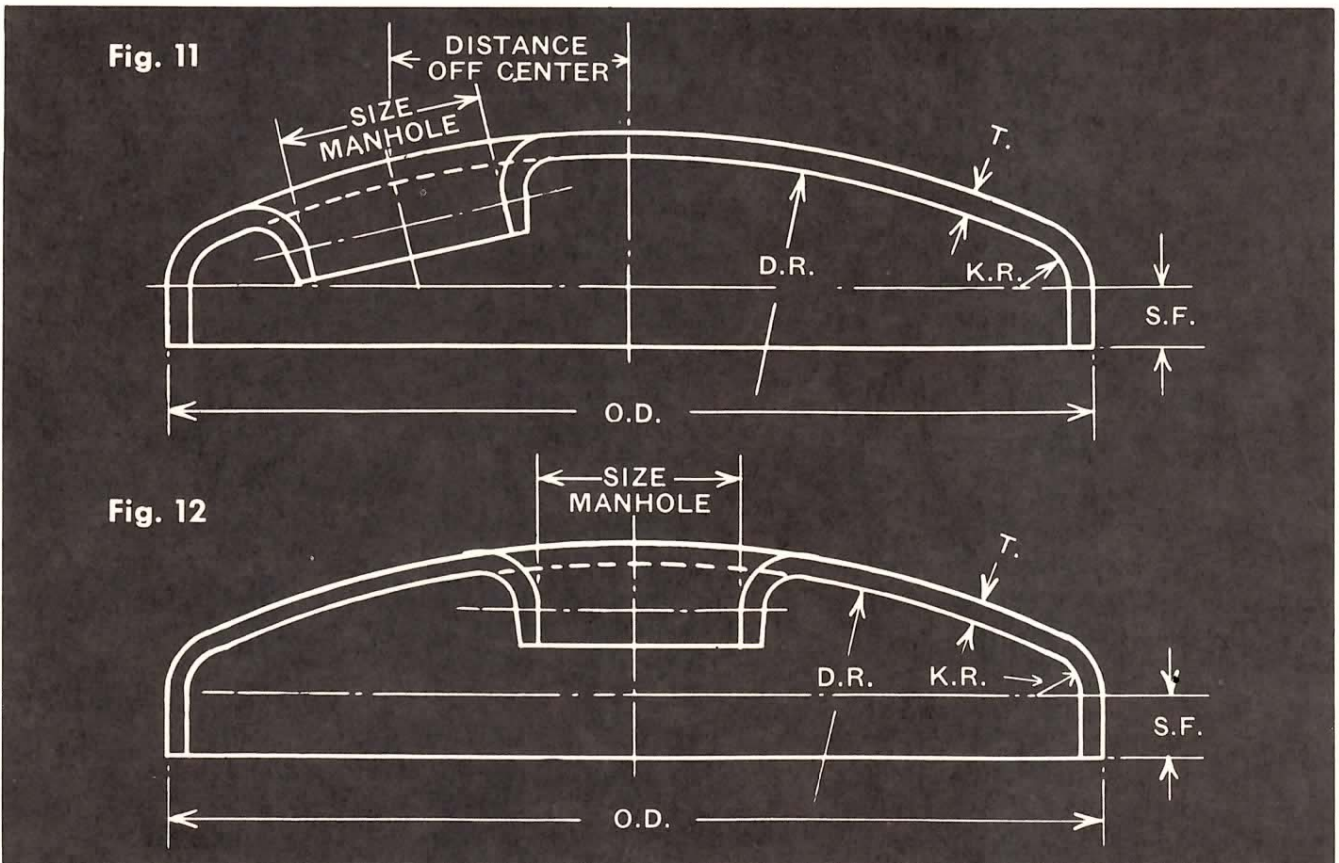
Flued openings are formed to the I.D., which is the reverse of head forming. Thinning takes place on the O.D. in forming, thus making it impractical to maintain an accurate O.D. We suggest flued openings be ordered to the I.D. If not, we will convert the O.D. to I.D. by deducting two times ordered gauge from O.D. specified.

# MANHOLES AND HANDHOLES

## FLANGED ONLY HEADS



## FLANGED AND DISHED HEADS



MANHOLES  
HANDHOLES

# HANDHOLES AND MANHOLES

## LIST PRICE FOR HANDHOLES AND MANHOLES

List Prices Cover Fluing and Facing the Gasket Surface, and Are in Addition to Head Forming and Metal Costs

ALL DIMENSIONS IN INCHES

HEAD THICKNESS	SIZE HANDHOLE OR MANHOLE							
	4 x 6	6 x 8	8 x 10	10 x 16	11 x 15	12 x 16	14 x 18	18 x 24
Under 3/4	\$25.00	\$25.00	\$25.00	\$32.00	\$32.00	\$32.00	\$35.50	\$42.50
3/4 and under 7/8	28.50	28.50	28.50	35.50	35.50	35.50	39.00	46.50
7/8 and under 1 1/8	32.00	32.00	32.00	39.00	39.00	39.00	42.50	53.50
1 1/8 and under 1 1/2	35.50	35.50	35.50	42.50	42.50	42.50	46.50	60.50
1 1/2 and under 1 3/4	46.50	46.50	46.50	50.00	50.00	50.00	53.50	75.00
1 3/4 and under 2	53.50	53.50	53.50	57.00	57.00	57.00	64.00	83.50
2 and under 2 1/4	57.00	57.00	57.00	64.00	64.00	64.00	71.00	94.50
2 1/4 and under 2 1/2	64.00	64.00	64.00	71.00	71.00	71.00	78.50	108.50
2 1/2 and under 2 3/4	71.00	71.00	71.00	78.50	78.50	78.50	86.00	124.50
2 3/4 and under 3	78.50	78.50	78.50	86.00	86.00	86.00	94.50	142.50
3	86.00	86.00	86.00	94.50	94.50	94.50	104.00	162.50
Over 3 to 3 1/4 Incl.	94.50	94.50	94.50	104.00	104.00	104.00	114.50	184.50
Over 3 1/4 to 3 1/2 Incl.	104.00	104.00	104.00	114.50	114.50	114.50	126.00	207.50

Over 3 1/2" thick - prices on application. Specifications requiring 1/2" minimum gasket surface will require heads less than 1" thick to be banded. Banding costs are shown below. Refer to page 90 for fittings. Recommend ordering fittings with the heads to insure proper fit and bolt length.

## LIST PRICE FOR REINFORCING BANDS

(Shrunk Around Opening)

Prices Are in Addition to Regular Fluing Costs

ALL DIMENSIONS IN INCHES

TYPE BAND	SIZE HANDHOLE OR MANHOLE TO BE BANDED							
	4 x 6	6 x 8	8 x 10	10 x 16	11 x 15	12 x 16	14 x 18	18 x 24
A Tack welded 4 places on underside	\$ 5.50	\$ 7.00	\$ 9.00	\$10.50	\$10.50	\$10.50	\$12.50	\$21.50
B Doweled 4 places topside 4 tack welds underside	8.50	10.00	12.50	14.00	14.00	14.00	15.50	24.50
C Continuous fillet weld on underside	11.50	14.00	15.50	17.00	17.00	17.00	18.50	32.00
D V weld on face. Continuous fillet weld on underside	17.00	17.00	18.50	23.00	23.00	23.00	26.00	40.00

Bands are furnished 1/2" x 1 1/2" for all specifications, except Canadian Interprovincial Regulations which are 3/4" x 1 1/2".



# MANHOLE AND HANDHOLE FITTINGS

Size & Thickness (Inches)	For Use With	Working Pressure P.S.I.	Yokes			Weight Per Set (Lbs.)	
			No.	Spread	Height		
4 x 6 x 3/8	Flued Opening	900	1	8 1/2	3 1/2	7 1/2	
6 x 8 x 7/16	Flued Opening	825	1	8 1/2	3 1/2	12 1/2	
6 x 9 x 1/4	Flued Opening	300	1	8 1/2	3 1/2	8	
8 x 10 x 1/2	Flued Opening	650	1	13 1/2	4	21	
10 x 16 x 1/2	Flued Opening	200	2	15	6	47 1/2	
10 x 16 x 1/2	Ring	200	2	13 1/2	4	43 1/2	
11 x 15 x 1/4	Flued Opening	150	1	15	6	24	
11 x 15 x 1/4	Ring	150	1	13 1/2	4	22	
11 x 15 x 1/4	Flued Opening	150	2	15	6	32	
11 x 15 x 1/4	Ring	150	2	13 1/2	4	28	PRICES
11 x 15 x 5/16	Flued Opening	300	2	15	6	35 1/2	ON
11 x 15 x 5/16	Ring	300	2	13 1/2	4	31 1/2	APPLICATION
11 x 15 x 1/2	Flued Opening	600	2	15	6	49	
11 x 15 x 1/2	Ring	600	2	13 1/2	4	45	
12 x 16 x 1/4	Flued Opening	150	2	15	6	34	
12 x 16 x 1/4	Ring	150	2	13 1/2	4	30	
12 x 16 x 1/2	Flued Opening	500	2	15	6	53	
12 x 16 x 1/2	Ring	500	2	13 1/2	4	49	
14 x 18 x 5/8	Flued Opening	300	2	18	6	85	
14 x 18 x 5/8	Ring	300	2	15	6	79	
18 x 24 x 5/8	Flued Opening	200	2	26	8	140 1/2	
18 x 24 x 5/8	Ring	200	2	18	6	123 1/2	

## MATERIAL:

Standard Covers are steel plate, SA 285-C Flange grade.

**FINISH:** Covers are given a final straightening operation to insure true flat gasket surface. All covers 3/8" and thicker can be machined on gasket surface at an extra charge.

**GASKETS:** 3/16" thick 3-ply wire inserted folded asbestos gaskets

are standard, but 1/4" rubber gaskets may be specified. Thin hard sheet gaskets cannot be recommended for sealing on pressed cover surfaces.

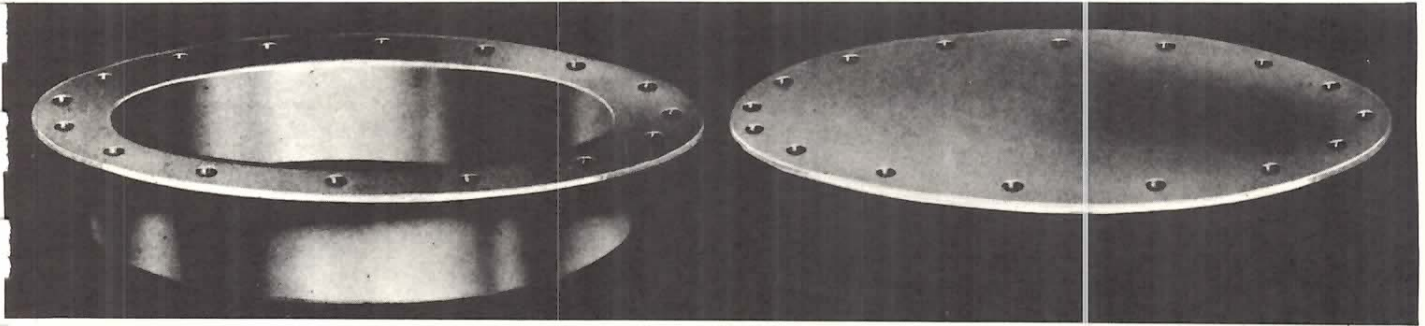
No warranty on gasket service is expressed or implied. Responsibility is limited to quality and workmanship of metallic parts as proven by vessel fabricators hydrostatic shop test, liability is limited to replacement or credit for defective parts only.

WHEN FITTINGS ARE ORDERED WITH RINGS, THEY ARE INVOICED AT LOWEST PRICE (LOT OF 50) REGARDLESS OF QUANTITY.

COVERS IN STAINLESS, EVERDUR, CUPRO NICKEL, AND ALUMINUM ARE AVAILABLE.



# STORAGE TANK MANHOLE FRAMES AND COVERS



ALL DIMENSIONS IN INCHES

Size	Thickness of Frame and Cover	Stock Number	Weight (lbs.)	Inside Diameter	Outside Diameter	Overall Flange Depth	Diameter Bolt Circle	Bolt Holes		Price
								Number	Diameter	
16	1/4	802	44	16	20 1/2	3 1/2	19	16	1 9/32	On Application
18	1/4	812	50	18	22 1/2	3 3/4	21	18	1 9/32	On Application
18	5/16	813	70	18	22 1/2	3 3/4	21	18	1 9/32	On Application
20	1/4	822	59	20	25 1/2	3 3/4	23 1/8	20	1 9/32	On Application
20	5/16	823	78	20	25 1/2	3 3/4	23 1/8	20	1 9/32	On Application

These manholes and covers meet the requirements of the Underwriters' Laboratories for use on storage tanks containing hazardous liquids, either above or underground.

Holes are for 1/2" diameter bolts. Bolts are not furnished.

Above sizes are carried in stock; other sizes can be furnished on application.

## ELLIPTICAL MANHOLE RINGS FOR LOW PRESSURE VESSELS

Regularly made of SA-306 Grade 55 steel, formed, welded, sized, and one edge faced for flat gasket bearing surface.

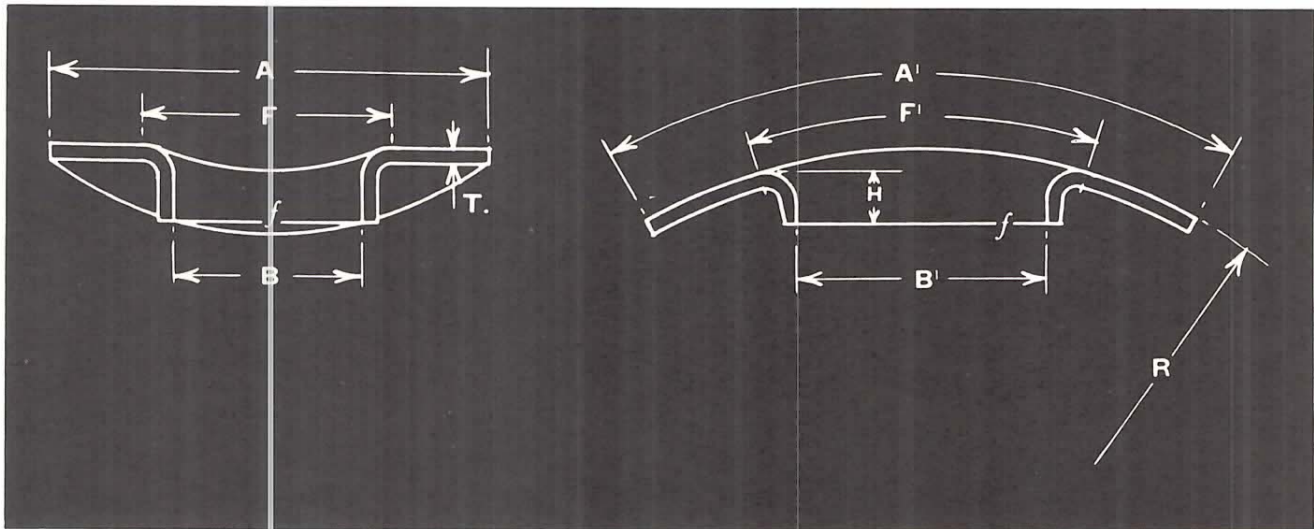


RING AND FITTING ASSEMBLIES

Size & Wall	Weight (Lbs.)		NET PRICE IN QUANTITY OF							
	3" Deep	4" Deep	3" Deep			4" Deep				
			1 to 24	25 to 49	50 or more	1 to 24	25 to 49	50 or more		
11" x 15" x 1/2"	18	24								
11" x 15" x 3/4"	27	36								
12" x 16" x 1/2"	20	26								
12" x 16" x 3/4"	29	38								
14" x 18" x 3/4"	32	43								
14" x 18" x 1"	43	57								
18" x 24" x 1"	57	76								
18" x 24" x 1 1/4"	70	94								

Other sizes, thicknesses and depths can be furnished on application.

# HANDHOLE AND MANHOLE SADDLES



Prices include material, forming and facing, F.O.B. Claymont; but do not include fittings. See latest edition of discount and extra sheet for quantity differentials and variation in net price due to fluctuation in base price of steel.

Shell openings for welded construction are usually two times thickness greater than  $F \times F'$  dimensions. Saddles requiring  $\frac{1}{16}$ " minimum gasket surface (ASME or other codes) must be banded when less than 1" thick.

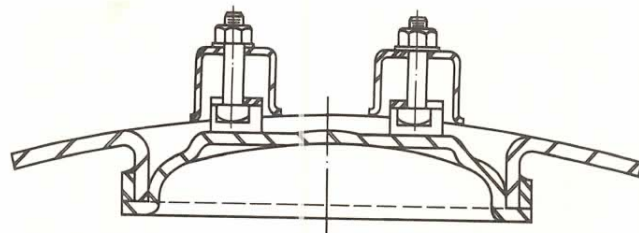
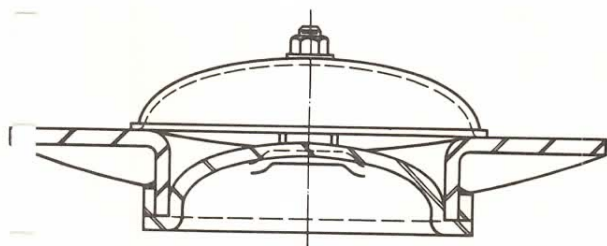
The following information should be furnished when ordering saddles:

- †1. Type: Type A will be furnished unless otherwise noted.
- \*2. T: Thickness.
- \*3. R: Radius of shell or head.
- †4. Specify whether cylindrical or spherical radius. We will furnish curved to cylindrical radius unless otherwise specified.
- †5. Curving: Regular—Long dimension girthwise.  
Irregular—Short dimension girthwise.  
We will furnish curved regular unless otherwise specified.
- \*6. Banding: If required, specify style. Refer to page 89.
- †7. Construction: ASME will be furnished unless otherwise specified. For U. S. Navy or Coast Guard specifications prices will be quoted on application.
8. Depth H: Regularly furnished with minimum H dimension  $3XT$  when T is not over  $1\frac{1}{2}$ ". Over  $1\frac{1}{2}$ ", H is  $T + 3$ ".
- \*9. Fittings: Specify if required. When required, fittings of proper size will be furnished Refer to Page 90.
- †10. Material: A.S.T.M. A-285, Grade C, Firebox Quality unless otherwise specified.

\*—Items 2, 3, 6, and 9 listed above must be specified when ordering.

†—Items 1, 4, 5, 7, and 10 will be furnished to our standard unless otherwise specified by customer.

# HANDHOLE AND MANHOLE SADDLES



Standard Manhole Saddle with Fittings

## TYPE A (STANDARD)

ALL DIMENSIONS IN INCHES

Size B x B' x T	A x A'	F x F'	Approximate Shipping Weight (Lbs.)	Cylindrical Curving	LIST PRICES			
					DIAMETER			Any Spherical Radius
					24" to 30" Inc.	31" to 36" Inc.	Over 36"	
4 x 6 x 5/8	15 x 17	8 x 10	37	Regular	\$46.00	\$42.50	\$35.50	\$46.00
				Irregular	54.50	51.00	44.00	
4 x 6 x 1	15 x 17	8 x 10	60	Regular	67.50	63.50	53.00	67.50
				Irregular	81.50	76.00	66.00	
6 x 8 x 5/8	18 x 20	10 x 12	51	Regular	57.00	53.00	44.00	57.00
				Irregular	68.00	63.50	55.00	
6 x 8 x 1	18 x 20	10 x 12	81	Regular	85.00	79.00	66.00	85.00
				Irregular	101.00	95.00	82.00	
8 x 10 x 5/8	21 x 23	12 x 14	65	Regular	63.50	58.50	49.00	63.50
				Irregular	75.00	70.50	61.00	
8 x 10 x 1	21 x 23	12 x 14	106	Regular	90.00	83.50	70.00	90.00
				Irregular	107.00	100.00	86.50	
10 x 16 x 5/8	26 x 30	15 1/2 x 19 1/2	107	Regular	75.00	69.00	58.00	75.00
				Irregular	88.50	83.00	72.00	
10 x 16 x 1	28 x 32	16 1/2 x 20 1/2	198	Regular	113.50	105.00	88.50	113.50
				Irregular	134.50	126.00	109.00	
10 x 16 x 1 1/4	28 x 32	16 1/2 x 20 1/2	248	Regular	138.00	127.50	107.50	138.00
				Irregular	163.00	153.00	132.50	
11 x 15 x 5/8	24 x 28	14 1/2 x 18 1/2	91	Regular	69.00	63.50	53.50	69.00
				Irregular	81.50	76.50	66.50	
11 x 15 x 7/8	24 x 28	15 1/2 x 19 1/2	127	Regular	83.50	77.50	65.00	83.50
				Irregular	99.00	93.00	80.50	
11 x 15 x 1	26 x 30	15 1/2 x 19 1/2	170	Regular	103.50	96.00	80.50	103.50
				Irregular	123.00	115.00	100.00	
11 x 15 x 1 1/4	26 x 30	15 1/2 x 19 1/2	213	Regular	125.00	115.50	97.00	125.00
				Irregular	148.00	138.50	120.00	
12 x 16 x 5/8	26 x 30	15 1/2 x 19 1/2	106	Regular	77.00	71.00	59.50	77.00
				Irregular	91.50	85.50	74.00	
12 x 16 x 7/8	26 x 30	16 1/2 x 20 1/2	148	Regular	95.00	88.00	74.00	95.00
				Irregular	112.50	105.50	91.50	
12 x 16 x 1	28 x 32	16 1/2 x 20 1/2	196	Regular	116.00	107.00	90.00	116.00
				Irregular	137.00	128.50	111.50	
12 x 16 x 1 1/4	28 x 32	16 1/2 x 20 1/2	244	Regular	140.00	130.00	109.00	140.00
				Irregular	166.00	156.00	135.00	

## TYPE B (SMALL)

11 x 15 x 5/8	19 x 23*	14 1/2 x 18 1/2	55	Regular	60.50	55.50	46.50	60.50
				Irregular	71.50	67.00	58.00	
11 x 15 x 1	22 x 26*	15 1/2 x 19 1/2	122	Regular	91.50	84.50	71.00	91.50
				Irregular	108.50	99.00	88.00	
12 x 16 x 5/8	19 x 23*	15 1/2 x 19 1/2	54	Regular	64.00	59.50	49.50	64.00
				Irregular	76.50	71.50	62.00	
12 x 16 x 1	22 x 26*	16 1/2 x 20 1/2	120	Regular	97.00	90.00	75.50	97.00
				Irregular	115.50	108.00	93.50	

\*Type B Saddles, having small A x A', are for welded construction.

# MEMORANDUM

---

**ENGINEER.  
DATA**

**ENGINEERING  
DATA**



# USEFUL INFORMATION

Formula for determining depth of dish:

*Flanged and dished heads*

$$\text{Depth of Dish} = \text{Radius of Dish} \text{ minus } \sqrt{A^2 \text{ minus } B^2}$$

A = Inside Radius of Dish minus Inside Knuckle Radius

B = One-half Inside Diameter minus Inside Knuckle Radius

$$\text{Outside Overall Height} = \text{Depth of Dish} + \text{Thickness} + \text{Straight Flange}$$

*Dished only heads*

Use same formula, letting

A = Inside Radius of Dish

B = One-half Inside Diameter

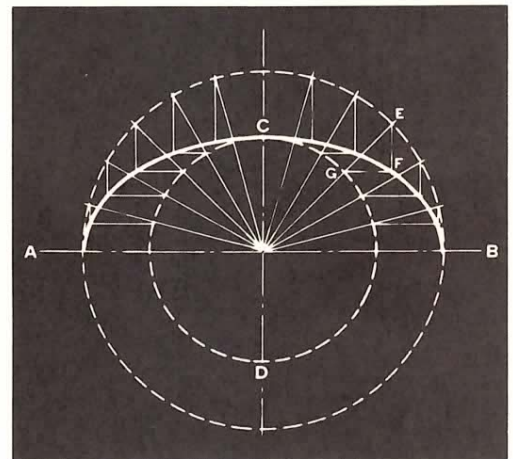
Inside Radius of dish of a dished only head when inside diameter and inside depth are given may be determined by the following:

$$\text{Radius} = \frac{\left(\frac{\text{I.D.}}{2}\right)^2 + \text{Inside Depth}^2}{2 \times \text{Inside Depth}}$$

To lay out a semi-elliptical contour when depth and diameter are known:

Draw an ellipse whose major axis AB equals diameter and minor axis CD equals twice the depth. Draw concentric circles whose diameters equal the axes AB and CD. From A to B on upper half of larger diameter mark off spaces, the more spaces the more accurate the ellipse. Draw lines from center through each of these points. Draw vertical lines from points on outer circle as EF and horizontal lines from corresponding points on inner circle as GF intersecting EF. Intersection of these lines give points on the ellipse.

Example of ellipse layout



Dished heads with pressure on concave side (standard application) are called plus heads.

Dished heads with pressure on convex side are minus heads and maximum allowable working pressure is 60% of that on plus heads.

Circumference of a circle = Diameter  $\times$  3.1416.

Diameter of a circle = Circumference  $\times$  .31831.

Area of a circle = Diameter<sup>2</sup>  $\times$  .7854.

Weight per square foot of steel = Thickness  $\times$  40.8.

Thickness of steel plates = Pounds per square foot  $\times$  .245.

Weight per square foot of Copper = Thickness  $\times$  46.512.

Weight per square foot of Aluminum = Thickness  $\times$  14.04.

Weight of a circle = Area in square feet  $\times$  weight per square foot.

Doubling diameter of a circle increases area four times.

# USEFUL INFORMATION

Doubling diameter of a pipe or cylinder increases its capacity four times.

A gallon of water (U. S. Standard) weighs 8½ pounds and contains 231 cubic inches.

1 U. S. Gallon = .832702 British Imperial Gallons.

1 British Imperial Gallon = 1.20091 U. S. Gallons.

A cubic foot of water contains 7½ gallons and weighs 62½ pounds.

The pressure in pounds per square inch of a column of water = Height in feet  $\times$  .434.

1 millimeter = .03937 inches.

1 inch = 25.4 millimeters.

1 meter = 3.2809 feet or 39.37 inches.

1 foot = .304801 meters.

To convert kilograms per square millimeter to tensile strength per square inch and vice versa:

Tensile Strength =  $\text{KG/MM}^2 \times 1422.282$ .

$\text{KG/MM}^2 = \text{Tensile Strength} \times .000703$ .

Degrees Fahrenheit = Degrees Centigrade  $\times 1.8 + 32$ .

Degrees Centigrade = Degrees Fahrenheit  $- 32 \div 1.8$ .

Linear Expansion per inch, per Deg. F = Lin. Exp. Per Deg. C  $\times 5 \div 9$ .

Linear Expansion per inch, per Deg. C = Lin. Exp. Per Deg. F  $\times 9 \div 5$ .

## Approximate Physical Properties of More Commonly Used Metals

	Density	Lbs. Per Cu. In.	Wt. Per Sq. Ft. 1" Thick	Approximate Minimum Tensile Strength P.S.I. (Soft Temper)	Melt. Point Degrees Fahrenheit	Coefficient of Linear Expansion Per Inch Per Degree F.
Aluminum	2.70	.0975	14.04	13,000	1215	.000128
Admiralty Brass	8.54	.309	44.50	45,000	1643	.000103
Carbon Steels	7.84	.2833	40.8	45,000 to 70,000	2550	.000067
Cast Iron	7.20	.261	37.584	12,000	1830	.000059
Commercial Bronze	8.80	.318	45.79	32,000	1859	.0000968
Copper	8.94	.323	46.512	34,000	1981	.000093
Durimet	7.88	.285	41.04	100,000	2444	
Everdur	8.46	.306	44.06	50,000	1679	.0000936
Hastelloy A	8.80	.318	45.79	100,000 to 140,000	2372	.0000595
Hastelloy B	9.25	.334	48.10	120,000 to 150,000	2372	.000056
Inconel	8.55	.308	44.35	80,000	2416	.0000716
Ingot Iron	7.87	.284	40.896	40,000 to 45,000	2795	.000067
Konel	8.56	.308	44.35	100,000	2450	.0000595
Lead	11.34	.409	58.896	1,800	620	.000159
Magnesium	1.74	.0628	9.043	30,000	1204	.000149
Monel	8.84	.318	45.93	65,000	2372	.000077
Nickel	8.90	.322	46.368	65,000	2646	.000073
Red Brass	8.67	.313	45.07	43,000	1760	.0000975
Silver	10.5	.38	54.72	1,200	1760	.000107
Stainless (14-18 Cr.)	7.70	.280	40.48	70,000 to 90,000	2650	.000050
Stainless (18Cr.-8Ni.)	7.93	.290	41.34	80,000 to 90,000	2500	.000096
Tin	7.3	.264	38.016	2,000	450	.000124
Zinc	7.14	.258	37.152	18,000 (sheet)	787	.000162



# WORKING PRESSURE FOR DISHED HEADS

The ASME Boiler & Pressure Vessel Code, Section VIII, Unfired Pressure Vessels, states that the required thickness at the thinnest point after forming of ellipsoidal, torispherical, conical and hemispherical heads under pressure on the concave side (plus heads), shall be computed by the appropriate for-

mulas in various paragraphs. For estimating purposes only, we list below some formulas that can be used to determine the thickness requirements for ASME dished heads having pressure on the concave side, working temperature minus 20° F. to plus 650° F., no corrosion allowance.

### Elliptical (2 to 1 Ratio)

$$t = \frac{PD}{2SE - 0.2P} \quad \text{or} \quad P = \frac{2SEt}{D + 0.2t}$$

### Torispherical (F&D with IKR not less than 6% of OD, DR not greater than OD)

$$t = \frac{0.885PL}{SE - 0.1P} \quad \text{or} \quad P = \frac{SEt}{0.885L + 0.1t}$$

### Hemispherical (thickness not over 0.356L or P not over 0.665SE)

$$t = \frac{PL}{2SE - 0.2P} \quad \text{or} \quad P = \frac{2SEt}{L + 0.2t}$$

t = minimum thickness  
 P = design pressure  
 D = inside diameter  
 \*S = maximum allowable stress  
 E = lowest efficiency of any joint in the head; for hemispherical heads this includes head-to-shell joint. Dished heads

of full hemispherical shape, concave to pressure, need not have integral skirt. For seamless heads, use E equals 1, except for hemispherical heads furnished without a skirt, in which case the head-to-shell joint must be considered.  
 L = inside spherical radius

\*S = Stress values for various grades of steel

SA-283	Grade A - 10350	Grade B - 11500	Grade C - 12650	Grade D - 12650
SA-285	Grade A - 11250	Grade B - 12500	Grade C - 13750	
SA-455	Grade A - 18750	Grade B - 18250		
SA-515	Grade 55 - 13750	Grade 60 - 15000		
SA-516	Grade 55 - 13750	Grade 60 - 15000		
SA-204	Grade A - 16250	Grade B - 17500	Grade C - 18750	

# THEORETICAL WEIGHTS OF STEEL

INCHES		POUNDS PER SQUARE FOOT
DECIMAL	FRACTIONAL	
.0625	1/16	2.55
.078125	5/64	3.1875
.09375	3/32	3.825
.109375	7/64	4.4625
.125	1/8	5.1
.140625	9/64	5.7375
.15625	5/32	6.375
.171875	11/64	7.0125
.1875	3/16	7.65
.203125	13/64	8.2875
.21875	7/32	8.925
.234375	15/64	9.5625
.250	1/4	10.2
.265625	17/64	10.837
.28125	9/32	11.475
.296875	19/64	12.112
.3125	5/16	12.75
.328125	21/64	13.387
.34375	11/32	14.025
.359375	23/64	14.662
.375	3/8	15.3
.390625	25/64	15.937
.40625	13/32	16.575
.421875	27/64	17.212
.4375	7/16	17.85
.453125	29/64	18.487
.46875	15/32	19.125
.484375	31/64	19.762
.500	1/2	20.40
.515625	33/64	21.037
.53125	17/32	21.675
.546875	35/64	22.312
.5625	9/16	22.950

INCHES		POUNDS PER SQUARE FOOT
DECIMAL	FRACTIONAL	
.578125	37/64	23.587
.59375	19/32	24.225
.609375	39/64	24.862
.625	5/8	25.5
.640625	41/64	26.137
.65625	21/32	26.775
.671875	43/64	27.412
.6875	11/16	28.050
.703125	45/64	28.687
.71875	23/32	29.325
.734375	47/64	29.962
.750	3/4	30.6
.765625	49/64	31.237
.78125	25/32	31.875
.796875	51/64	32.512
.8125	13/16	33.150
.828125	53/64	33.787
.84375	27/32	34.425
.859375	55/64	35.062
.875	7/8	35.7
.890625	57/64	36.337
.90625	29/32	36.975
.921875	59/64	37.612
.9375	15/16	38.250
.953125	61/64	38.887
.96875	31/32	39.525
.984375	63/64	40.162
1.000	1	40.8
1.01562	1 1/64	41.437
1.03125	1 1/32	42.075
1.04687	1 3/64	42.712
1.0625	1 1/16	43.350

### Sizes of Sheared and Gas Cut Steel Circles

Thickness	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4
Dia. of Circles		130	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152

Thickness	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6
Dia. of Circles	152	144	144	144	144	138	138	138	138	132	132	132	132	126	126	120	120

Note: For sizes slightly beyond those shown, take up for special consideration.

# Approximate Volumes of Heads and Shells in U. S. Gallons

1 Gallon = .134 Cubic Foot

1 Cubic Foot = 7.480519 Gallons

1 U. S. Gallon = .8327 British Imperial Gallon

1 British Imperial Gallon = 1.20091 U. S. Gallons

ALL DIMENSIONS IN INCHES

Diameter	Dished Only	STANDARD F. & D.			A.S.M.E. F. & D.			2:1 Elliptical	Hemi-spherical	Cylindrical Shells or Str. Flg. of Heads	
		THICKNESS			THICKNESS					Per Foot	Per Inch
		1/2	1	1 1/2	1/2	1	1 1/2				
12	0.42	0.68	...	...	0.68	...	...	0.98	2.0	6.0	0.49
14	0.64	1.0	...	...	1.0	...	...	1.6	3.1	8.0	0.67
16	0.95	1.4	2.5	...	1.4	2.5	...	2.3	4.6	10.4	0.87
18	1.4	2.1	3.0	...	1.9	3.0	...	3.3	6.6	13.2	1.1
20	1.9	2.7	3.3	4.1	2.5	3.3	4.1	4.5	9.1	16.3	1.4
22	2.5	3.4	4.0	4.6	3.4	4.0	4.6	6.0	12.1	19.8	1.7
24	3.2	4.3	5.2	5.6	4.3	5.2	6.0	7.8	15.7	23.5	2.0
26	4.1	5.6	6.4	7.3	5.7	6.4	7.3	10.0	19.9	27.6	2.3
28	5.1	6.7	7.8	8.7	7.2	7.8	8.7	12.4	24.9	32.0	2.7
30	6.3	7.8	9.3	10.6	8.6	9.3	10.6	15.3	30.6	36.7	3.1
36	10.9	13.2	15.3	17.2	15.2	15.3	17.2	26.4	52.9	52.9	4.4
42	17.3	20.5	25.2	26.6	24.2	23.7	26.6	42.0	84.0	72.0	6.0
48	25.8	29.8	37.0	40.9	36.1	37.0	40.9	62.7	125.3	94.0	7.8
54	36.7	41.9	50.3	55.4	52.0	52.1	55.4	89.2	178.5	119.0	9.9
60	50.4	56.8	68.3	73.3	71.6	72.4	73.3	122.4	244.8	147.0	12.2
66	67.0	74.7	83.0	95.5	96.2	97.0	95.5	162.9	325.8	177.7	14.8
72	87.0	98.0	105.0	122.0	124.0	125.0	122.0	211.5	423.0	211.5	17.6
78	110.7	124.0	134.0	149.0	167.0	161.0	153.0	268.9	537.8	248.2	20.7
84	138.2	156.0	165.0	187.0	211.1	197.5	192.0	335.9	671.7	287.9	24.0
90	170.0	186.0	203.0	212.0	257.0	250.0	239.0	413.1	826.2	330.5	27.5
96	206.3	223.0	245.0	254.0	310.0	302.0	292.0	501.4	1002.7	376.0	31.3
102	247.0	268.0	291.0	303.0	374.0	362.0	350.0	601.0	1203.0	425.0	35.0
108	294.0	319.0	342.0	357.0	440.0	430.0	413.0	714.0	1428.0	476.0	40.0
114	346.0	370.0	398.0	417.0	519.0	507.0	493.0	840.0	1679.0	530.0	44.0
120	403.0	439.0	456.0	504.0	605.0	590.0	576.5	979.0	1958.0	588.0	49.0
126	467.0	494.0	530.0	584.0	701.0	682.0	699.3	1134.0	2267.0	648.0	54.0
132	526.0	569.0	632.0	657.0	813.2	791.6	771.6	1303.0	2607.0	711.0	59.0
138	613.0	682.0	714.0	731.0	926.0	903.0	910.0	1489.0	2978.0	777.0	65.0
144	696.0	739.0	775.0	817.0	1026.2	1002.2	1033.0	1692.0	3384.0	846.0	71.0
156	885.0	1029.0	1065.0	1101.0	1367.0	1339.0	1311.0	2151.0	4303.0	993.0	83.0
168	1106.0	1159.0	1220.0	1259.0	...	1763.0	1723.0	2687.0	5374.0	1152.0	96.0
180	1360.0	1565.0	1585.0	1629.0	...	2075.0	2031.0	3304.0	6608.0	1322.0	110.0
192	1651.0	1720.0	1790.0	1850.0	...	2400.0	2361.0	4011.0	8022.0	1504.0	125.0
204	...	...	...	...	...	2991.0	2913.0	4811.0	9622.0	1698.0	141.0
216	...	...	...	...	...	3638.0	3602.0	5711.0	11421.0	1904.0	159.0
228	...	...	...	...	...	...	...	6716.0	13433.0	2121.0	177.0
240	...	...	...	...	...	...	...	7834.0	15667.0	2350.0	196.0

Approximate volumes shown for Standard and ASME Flanged and Dished are for heads with dimensions listed as our standard for those types. For Dished Only they are based on Dish Radius equal to Diameter.

On all heads the volume is exclusive of Straight Flange portion.

Diameters are outside for Flanged and Dished heads; inside for Elliptical, Hemispherical, and Shells.

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
3.	9.4248	7.0686	11.	34.558	95.033	19.	59.690	283.53	27.	84.823	572.56
1/8	9.8175	7.6699	1/8	34.950	97.205	1/8	60.083	287.27	1/8	85.216	577.87
1/4	10.210	8.2958	1/4	35.343	99.402	1/4	60.476	291.04	1/4	85.608	583.21
3/8	10.603	8.9462	3/8	35.736	101.62	3/8	60.868	294.83	3/8	86.001	588.57
1/2	10.996	9.6211	1/2	36.128	103.87	1/2	61.261	298.65	1/2	86.394	593.96
5/8	11.388	10.321	5/8	36.521	106.14	5/8	61.654	302.49	5/8	86.786	599.37
3/4	11.781	11.045	3/4	36.914	108.43	3/4	62.046	306.35	3/4	87.179	604.81
7/8	12.174	11.793	7/8	37.306	110.75	7/8	62.439	310.24	7/8	87.572	610.27
4.	12.566	12.566	12.	37.699	113.10	20.	62.832	314.16	28.	87.965	615.75
1/8	12.959	13.364	1/8	38.092	115.47	1/8	63.225	318.10	1/8	88.357	621.26
1/4	13.352	14.186	1/4	38.485	117.86	1/4	63.617	322.06	1/4	88.750	626.80
3/8	13.744	15.033	3/8	38.877	120.28	3/8	64.010	326.05	3/8	89.143	632.36
1/2	14.137	15.904	1/2	39.270	122.72	1/2	64.403	330.06	1/2	89.535	637.94
5/8	14.530	16.800	5/8	39.663	125.19	5/8	64.795	334.10	5/8	89.928	643.55
3/4	14.923	17.728	3/4	40.055	127.68	3/4	65.188	338.16	3/4	90.321	649.18
7/8	15.315	18.665	7/8	40.448	130.19	7/8	65.581	342.25	7/8	90.713	654.84
5.	15.708	19.635	13.	40.841	132.73	21.	65.973	346.36	29.	91.106	660.52
1/8	16.101	20.629	1/8	41.233	135.30	1/8	66.366	350.50	1/8	91.499	666.23
1/4	16.493	21.648	1/4	41.626	137.89	1/4	66.759	354.66	1/4	91.892	671.96
3/8	16.886	22.691	3/8	42.019	140.50	3/8	67.152	358.84	3/8	92.284	677.71
1/2	17.279	23.758	1/2	42.412	143.14	1/2	67.544	363.05	1/2	92.677	683.49
5/8	17.671	24.850	5/8	42.804	145.80	5/8	67.937	367.28	5/8	93.070	689.30
3/4	18.064	25.967	3/4	43.197	148.49	3/4	68.330	371.54	3/4	93.462	695.13
7/8	18.457	27.109	7/8	43.590	151.20	7/8	68.722	375.83	7/8	93.855	700.98
6.	18.850	28.274	14.	43.982	153.94	22.	69.115	380.13	30.	94.248	706.86
1/8	19.242	29.465	1/8	44.375	156.70	1/8	69.508	384.46	1/8	94.640	712.76
1/4	19.635	30.680	1/4	44.768	159.48	1/4	69.900	388.82	1/4	95.033	718.69
3/8	20.028	31.919	3/8	45.160	162.30	3/8	70.293	393.20	3/8	95.426	724.64
1/2	20.420	33.183	1/2	45.553	165.13	1/2	70.686	397.61	1/2	95.819	730.62
5/8	20.813	34.472	5/8	45.946	167.99	5/8	71.079	402.04	5/8	96.211	736.62
3/4	21.206	35.785	3/4	46.338	170.87	3/4	71.471	406.49	3/4	96.604	742.64
7/8	21.598	37.122	7/8	46.731	173.78	7/8	71.864	410.97	7/8	96.997	748.69
7.	21.991	38.485	15.	47.124	176.71	23.	72.257	415.48	31.	97.389	754.77
1/8	22.384	39.871	1/8	47.517	179.67	1/8	72.649	420.00	1/8	97.782	760.87
1/4	22.776	41.282	1/4	47.909	182.65	1/4	73.042	424.56	1/4	98.175	766.99
3/8	23.169	42.718	3/8	48.302	185.66	3/8	73.435	429.13	3/8	98.567	773.14
1/2	23.562	44.179	1/2	48.695	188.69	1/2	73.827	433.74	1/2	98.960	779.31
5/8	23.955	45.664	5/8	49.087	191.75	5/8	74.220	438.36	5/8	99.353	785.51
3/4	24.347	47.173	3/4	49.480	194.83	3/4	74.613	443.01	3/4	99.746	791.73
7/8	24.740	48.707	7/8	49.873	197.93	7/8	75.006	447.69	7/8	100.138	797.98
8.	25.133	50.265	16.	50.265	201.06	24.	75.398	452.39	32.	100.531	804.25
1/8	25.525	51.849	1/8	50.658	204.22	1/8	75.791	457.11	1/8	100.924	810.54
1/4	25.918	53.456	1/4	51.051	207.39	1/4	76.184	461.86	1/4	101.316	816.86
3/8	26.311	55.088	3/8	51.444	210.60	3/8	76.576	466.64	3/8	101.709	823.21
1/2	26.704	56.745	1/2	51.836	213.82	1/2	76.969	471.44	1/2	102.102	829.58
5/8	27.096	58.426	5/8	52.229	217.08	5/8	77.362	476.26	5/8	102.494	835.97
3/4	27.489	60.132	3/4	52.622	220.35	3/4	77.754	481.11	3/4	102.887	842.39
7/8	27.882	61.862	7/8	53.014	223.65	7/8	78.147	485.98	7/8	103.280	848.83
9.	28.274	63.617	17.	53.407	226.98	25.	78.540	490.87	33.	103.673	855.30
1/8	28.667	65.397	1/8	53.800	230.33	1/8	78.933	495.79	1/8	104.065	861.79
1/4	29.060	67.201	1/4	54.192	233.71	1/4	79.325	500.74	1/4	104.458	868.31
3/8	29.452	69.029	3/8	54.585	237.10	3/8	79.718	505.71	3/8	104.851	874.85
1/2	29.845	70.882	1/2	54.978	240.53	1/2	80.111	510.71	1/2	105.243	881.41
5/8	30.238	72.760	5/8	55.371	243.98	5/8	80.503	515.72	5/8	105.636	888.00
3/4	30.631	74.662	3/4	55.763	247.45	3/4	80.896	520.77	3/4	106.029	894.62
7/8	31.023	76.589	7/8	56.156	250.95	7/8	81.289	525.84	7/8	106.421	901.26
10.	31.416	78.540	18.	56.549	254.47	26.	81.681	530.93	34.	106.814	907.92
1/8	31.809	80.516	1/8	56.941	258.02	1/8	82.074	536.05	1/8	107.207	914.61
1/4	32.201	82.516	1/4	57.334	261.59	1/4	82.467	541.19	1/4	107.600	921.32
3/8	32.594	84.541	3/8	57.727	265.18	3/8	82.860	546.35	3/8	107.992	928.06
1/2	32.987	86.590	1/2	58.119	268.80	1/2	83.252	551.55	1/2	108.385	934.82
5/8	33.379	88.664	5/8	58.512	272.45	5/8	83.645	556.76	5/8	108.778	941.61
3/4	33.772	90.763	3/4	58.905	276.12	3/4	84.038	562.00	3/4	109.170	948.42
7/8	34.165	92.886	7/8	59.298	279.81	7/8	84.430	567.27	7/8	109.563	955.25

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
35.	109.956	962.11	43.	135.088	1452.2	51.	160.221	2042.8	59.	185.354	2734.0
$\frac{1}{8}$	110.348	969.00	$\frac{1}{8}$	135.481	1460.7	$\frac{1}{8}$	160.614	2052.8	$\frac{1}{8}$	185.747	2745.6
$\frac{1}{4}$	110.741	975.91	$\frac{1}{4}$	135.874	1469.1	$\frac{1}{4}$	161.007	2062.9	$\frac{1}{4}$	186.139	2757.2
$\frac{3}{8}$	111.134	982.84	$\frac{3}{8}$	136.267	1477.6	$\frac{3}{8}$	161.399	2073.0	$\frac{3}{8}$	186.532	2768.8
$\frac{1}{2}$	111.527	989.80	$\frac{1}{2}$	136.659	1486.2	$\frac{1}{2}$	161.792	2083.1	$\frac{1}{2}$	186.925	2780.5
$\frac{5}{8}$	111.919	996.78	$\frac{5}{8}$	137.052	1494.7	$\frac{5}{8}$	162.185	2093.2	$\frac{5}{8}$	187.317	2792.2
$\frac{3}{4}$	112.312	1003.8	$\frac{3}{4}$	137.445	1503.3	$\frac{3}{4}$	162.577	2103.3	$\frac{3}{4}$	187.710	2803.9
$\frac{7}{8}$	112.705	1010.8	$\frac{7}{8}$	137.837	1511.9	$\frac{7}{8}$	162.970	2113.5	$\frac{7}{8}$	188.103	2815.7
36.	113.097	1017.9	44.	138.230	1520.5	52.	163.363	2123.7	60.	188.496	2827.4
$\frac{1}{8}$	113.490	1025.0	$\frac{1}{8}$	138.623	1529.2	$\frac{1}{8}$	163.756	2133.9	$\frac{1}{8}$	188.888	2839.2
$\frac{1}{4}$	113.883	1032.1	$\frac{1}{4}$	139.015	1537.9	$\frac{1}{4}$	164.148	2144.2	$\frac{1}{4}$	189.281	2851.0
$\frac{3}{8}$	114.275	1039.2	$\frac{3}{8}$	139.408	1546.6	$\frac{3}{8}$	164.541	2154.5	$\frac{3}{8}$	189.674	2862.9
$\frac{1}{2}$	114.668	1046.3	$\frac{1}{2}$	139.801	1555.3	$\frac{1}{2}$	164.934	2164.8	$\frac{1}{2}$	190.066	2874.8
$\frac{5}{8}$	115.061	1053.5	$\frac{5}{8}$	140.194	1564.0	$\frac{5}{8}$	165.326	2175.1	$\frac{5}{8}$	190.459	2886.6
$\frac{3}{4}$	115.454	1060.7	$\frac{3}{4}$	140.586	1572.8	$\frac{3}{4}$	165.719	2185.4	$\frac{3}{4}$	190.852	2898.6
$\frac{7}{8}$	115.846	1068.0	$\frac{7}{8}$	140.979	1581.6	$\frac{7}{8}$	166.112	2195.8	$\frac{7}{8}$	191.244	2910.5
37.	116.239	1075.2	45.	141.372	1590.4	53.	166.504	2206.2	61.	191.637	2922.5
$\frac{1}{8}$	116.632	1082.5	$\frac{1}{8}$	141.764	1599.3	$\frac{1}{8}$	166.897	2216.6	$\frac{1}{8}$	192.030	2934.5
$\frac{1}{4}$	117.024	1089.8	$\frac{1}{4}$	142.157	1608.2	$\frac{1}{4}$	167.290	2227.0	$\frac{1}{4}$	192.423	2946.5
$\frac{3}{8}$	117.417	1097.1	$\frac{3}{8}$	142.550	1617.0	$\frac{3}{8}$	167.683	2237.5	$\frac{3}{8}$	192.815	2958.5
$\frac{1}{2}$	117.810	1104.5	$\frac{1}{2}$	142.942	1626.0	$\frac{1}{2}$	168.075	2248.0	$\frac{1}{2}$	193.208	2970.6
$\frac{5}{8}$	118.202	1111.8	$\frac{5}{8}$	143.335	1634.9	$\frac{5}{8}$	168.468	2258.5	$\frac{5}{8}$	193.601	2982.7
$\frac{3}{4}$	118.596	1119.2	$\frac{3}{4}$	143.728	1643.9	$\frac{3}{4}$	168.861	2269.1	$\frac{3}{4}$	193.993	2994.8
$\frac{7}{8}$	118.988	1126.7	$\frac{7}{8}$	144.121	1652.9	$\frac{7}{8}$	169.253	2279.6	$\frac{7}{8}$	194.386	3006.9
38.	119.381	1134.1	46.	144.513	1661.9	54.	169.646	2290.2	62.	194.779	3019.1
$\frac{1}{8}$	119.773	1141.5	$\frac{1}{8}$	144.906	1670.9	$\frac{1}{8}$	170.039	2300.8	$\frac{1}{8}$	195.171	3031.3
$\frac{1}{4}$	120.166	1149.1	$\frac{1}{4}$	145.299	1680.0	$\frac{1}{4}$	170.431	2311.5	$\frac{1}{4}$	195.564	3043.5
$\frac{3}{8}$	120.559	1156.6	$\frac{3}{8}$	145.691	1689.1	$\frac{3}{8}$	170.824	2322.1	$\frac{3}{8}$	195.957	3055.7
$\frac{1}{2}$	120.951	1164.2	$\frac{1}{2}$	146.084	1698.2	$\frac{1}{2}$	171.217	2332.8	$\frac{1}{2}$	196.350	3068.0
$\frac{5}{8}$	121.344	1171.7	$\frac{5}{8}$	146.477	1707.4	$\frac{5}{8}$	171.609	2343.5	$\frac{5}{8}$	196.742	3080.3
$\frac{3}{4}$	121.737	1179.3	$\frac{3}{4}$	146.869	1716.5	$\frac{3}{4}$	172.002	2354.3	$\frac{3}{4}$	197.135	3092.6
$\frac{7}{8}$	122.129	1186.9	$\frac{7}{8}$	147.262	1725.7	$\frac{7}{8}$	172.395	2365.0	$\frac{7}{8}$	197.528	3104.9
39.	122.522	1194.6	47.	147.655	1734.9	55.	172.788	2375.8	63.	197.920	3117.2
$\frac{1}{8}$	122.915	1202.3	$\frac{1}{8}$	148.048	1744.2	$\frac{1}{8}$	173.180	2386.6	$\frac{1}{8}$	198.313	3129.6
$\frac{1}{4}$	123.308	1210.6	$\frac{1}{4}$	148.440	1753.5	$\frac{1}{4}$	173.573	2397.5	$\frac{1}{4}$	198.706	3142.0
$\frac{3}{8}$	123.700	1217.7	$\frac{3}{8}$	148.833	1762.7	$\frac{3}{8}$	173.966	2408.3	$\frac{3}{8}$	199.098	3154.5
$\frac{1}{2}$	124.093	1225.4	$\frac{1}{2}$	149.226	1772.1	$\frac{1}{2}$	174.358	2419.2	$\frac{1}{2}$	199.491	3166.9
$\frac{5}{8}$	124.486	1233.2	$\frac{5}{8}$	149.618	1781.4	$\frac{5}{8}$	174.751	2430.1	$\frac{5}{8}$	199.884	3179.4
$\frac{3}{4}$	124.878	1241.0	$\frac{3}{4}$	150.011	1790.8	$\frac{3}{4}$	175.144	2441.1	$\frac{3}{4}$	200.277	3191.9
$\frac{7}{8}$	125.271	1248.8	$\frac{7}{8}$	150.404	1800.1	$\frac{7}{8}$	175.536	2452.0	$\frac{7}{8}$	200.669	3204.4
40.	125.664	1256.6	48.	150.796	1809.6	56.	175.929	2463.0	64.	201.062	3217.0
$\frac{1}{8}$	126.056	1264.5	$\frac{1}{8}$	151.189	1819.0	$\frac{1}{8}$	176.322	2474.0	$\frac{1}{8}$	201.455	3229.6
$\frac{1}{4}$	126.449	1272.4	$\frac{1}{4}$	151.582	1828.5	$\frac{1}{4}$	176.715	2485.0	$\frac{1}{4}$	201.847	3242.2
$\frac{3}{8}$	126.842	1280.3	$\frac{3}{8}$	151.975	1837.9	$\frac{3}{8}$	177.107	2496.1	$\frac{3}{8}$	202.240	3254.8
$\frac{1}{2}$	127.235	1288.2	$\frac{1}{2}$	152.367	1847.5	$\frac{1}{2}$	177.500	2507.2	$\frac{1}{2}$	202.633	3267.5
$\frac{5}{8}$	127.627	1296.2	$\frac{5}{8}$	152.760	1857.0	$\frac{5}{8}$	177.893	2518.3	$\frac{5}{8}$	203.025	3280.1
$\frac{3}{4}$	128.020	1304.2	$\frac{3}{4}$	153.153	1866.5	$\frac{3}{4}$	178.285	2529.4	$\frac{3}{4}$	203.418	3292.8
$\frac{7}{8}$	128.413	1312.2	$\frac{7}{8}$	153.545	1876.1	$\frac{7}{8}$	178.678	2540.6	$\frac{7}{8}$	203.811	3305.6
41.	128.805	1320.3	49.	153.938	1885.7	57.	179.071	2551.8	65.	204.204	3318.3
$\frac{1}{8}$	129.198	1328.3	$\frac{1}{8}$	154.331	1895.4	$\frac{1}{8}$	179.463	2563.0	$\frac{1}{8}$	204.596	3331.1
$\frac{1}{4}$	129.591	1336.4	$\frac{1}{4}$	154.723	1905.0	$\frac{1}{4}$	179.856	2574.2	$\frac{1}{4}$	204.989	3343.9
$\frac{3}{8}$	129.983	1344.5	$\frac{3}{8}$	155.116	1914.7	$\frac{3}{8}$	180.249	2585.4	$\frac{3}{8}$	205.382	3356.7
$\frac{1}{2}$	130.376	1352.7	$\frac{1}{2}$	155.509	1924.4	$\frac{1}{2}$	180.642	2596.7	$\frac{1}{2}$	205.774	3369.6
$\frac{5}{8}$	130.769	1360.8	$\frac{5}{8}$	155.902	1934.2	$\frac{5}{8}$	181.034	2608.0	$\frac{5}{8}$	206.167	3382.4
$\frac{3}{4}$	131.161	1369.0	$\frac{3}{4}$	156.294	1943.9	$\frac{3}{4}$	181.427	2619.4	$\frac{3}{4}$	206.560	3395.3
$\frac{7}{8}$	131.554	1377.2	$\frac{7}{8}$	156.687	1953.7	$\frac{7}{8}$	181.820	2630.7	$\frac{7}{8}$	206.952	3408.2
42.	131.947	1385.4	50.	157.080	1963.5	58.	182.212	2642.1	66.	207.345	3421.2
$\frac{1}{8}$	132.340	1393.7	$\frac{1}{8}$	157.472	1973.3	$\frac{1}{8}$	182.605	2653.5	$\frac{1}{8}$	207.738	3434.2
$\frac{1}{4}$	132.732	1402.0	$\frac{1}{4}$	157.865	1983.2	$\frac{1}{4}$	182.998	2664.9	$\frac{1}{4}$	208.131	3447.2
$\frac{3}{8}$	133.125	1410.3	$\frac{3}{8}$	158.258	1993.1	$\frac{3}{8}$	183.390	2676.4	$\frac{3}{8}$	208.523	3460.2
$\frac{1}{2}$	133.518	1418.6	$\frac{1}{2}$	158.650	2003.0	$\frac{1}{2}$	183.783	2687.8	$\frac{1}{2}$	208.916	3473.2
$\frac{5}{8}$	133.910	1427.0	$\frac{5}{8}$	159.043	2012.9	$\frac{5}{8}$	184.176	2699.3	$\frac{5}{8}$	209.309	3486.3
$\frac{3}{4}$	134.303	1435.4	$\frac{3}{4}$	159.436	2022.8	$\frac{3}{4}$	184.569	2710.9	$\frac{3}{4}$	209.701	3499.4
$\frac{7}{8}$	134.696	1443.8	$\frac{7}{8}$	159.829	2032.8	$\frac{7}{8}$	184.961	2722.4	$\frac{7}{8}$	210.094	3512.5

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
67.	210.487	3525.7	75.	235.619	4417.9	83.	260.752	5410.6	91.	285.885	6503.9
1/8	210.879	3538.8	1/8	236.012	4432.6	1/8	261.145	5426.9	1/8	286.278	6521.8
1/4	211.272	3552.0	1/4	236.405	4447.4	1/4	261.538	5443.3	1/4	286.670	6539.7
3/8	211.665	3565.2	3/8	236.798	4462.2	3/8	261.930	5459.6	3/8	287.063	6557.6
1/2	212.058	3578.5	1/2	237.190	4477.0	1/2	262.323	5476.0	1/2	287.456	6575.5
5/8	212.450	3591.7	5/8	237.583	4491.8	5/8	262.716	5492.4	5/8	287.848	6593.5
3/4	212.843	3605.0	3/4	237.976	4506.7	3/4	263.108	5508.8	3/4	288.241	6611.5
7/8	213.236	3618.3	7/8	238.368	4521.5	7/8	263.501	5525.3	7/8	288.634	6629.6
68.	213.628	3631.7	76.	238.761	4536.5	84.	263.894	5541.8	92.	289.027	6647.6
1/8	214.021	3645.0	1/8	239.154	4551.4	1/8	264.286	5558.3	1/8	289.419	6665.7
1/4	214.414	3658.4	1/4	239.546	4566.4	1/4	264.679	5574.8	1/4	289.812	6683.8
3/8	214.806	3671.8	3/8	239.939	4581.3	3/8	265.072	5591.4	3/8	290.205	6701.9
1/2	215.199	3685.3	1/2	240.332	4596.3	1/2	265.465	5607.9	1/2	290.597	6720.1
5/8	215.592	3698.7	5/8	240.725	4611.4	5/8	265.857	5624.5	5/8	290.990	6738.2
3/4	215.984	3712.2	3/4	241.117	4626.4	3/4	266.250	5641.2	3/4	291.383	6756.4
7/8	216.377	3725.7	7/8	241.510	4641.5	7/8	266.643	5657.8	7/8	291.775	6774.7
69.	216.770	3739.3	77.	241.903	4656.6	85.	267.035	5674.5	93.	292.168	6792.9
1/8	217.163	3752.8	1/8	242.295	4671.8	1/8	267.428	5691.2	1/8	292.561	6811.2
1/4	217.555	3766.4	1/4	242.688	4686.9	1/4	267.821	5707.9	1/4	292.954	6829.5
3/8	217.948	3780.0	3/8	243.081	4702.1	3/8	268.213	5724.7	3/8	293.346	6847.8
1/2	218.341	3793.7	1/2	243.473	4717.3	1/2	268.606	5741.5	1/2	293.739	6866.1
5/8	218.733	3807.3	5/8	243.866	4732.5	5/8	268.999	5758.3	5/8	294.132	6884.5
3/4	219.126	3821.0	3/4	244.259	4747.8	3/4	269.392	5775.1	3/4	294.524	6902.9
7/8	219.519	3834.7	7/8	244.652	4763.1	7/8	269.784	5791.9	7/8	294.917	6921.3
70.	219.911	3848.5	78.	245.044	4778.4	86.	270.177	5808.8	94.	295.310	6939.8
1/8	220.304	3862.2	1/8	245.437	4793.7	1/8	270.570	5825.7	1/8	295.702	6958.2
1/4	220.697	3876.0	1/4	245.830	4809.0	1/4	270.962	5842.6	1/4	296.095	6976.7
3/8	221.090	3889.8	3/8	246.222	4824.4	3/8	271.355	5859.6	3/8	296.488	6995.3
1/2	221.482	3903.6	1/2	246.615	4839.8	1/2	271.748	5876.5	1/2	296.881	7013.8
5/8	221.875	3917.5	5/8	247.008	4855.2	5/8	272.140	5893.5	5/8	297.273	7032.4
3/4	222.268	3931.4	3/4	247.400	4870.7	3/4	272.533	5910.6	3/4	297.666	7051.0
7/8	222.660	3945.3	7/8	247.793	4886.2	7/8	272.926	5927.6	7/8	298.059	7069.6
71.	223.053	3959.2	79.	248.186	4901.7	87.	273.319	5944.7	95.	298.451	7088.2
1/8	223.446	3973.1	1/8	248.579	4917.2	1/8	273.711	5961.8	1/8	298.844	7106.9
1/4	223.838	3987.1	1/4	248.971	4932.7	1/4	274.104	5978.9	1/4	299.237	7125.6
3/8	224.231	4001.1	3/8	249.364	4948.3	3/8	274.497	5996.0	3/8	299.629	7144.3
1/2	224.624	4015.2	1/2	249.757	4963.9	1/2	274.889	6013.2	1/2	300.022	7163.0
5/8	225.017	4029.2	5/8	250.149	4979.5	5/8	275.282	6030.4	5/8	300.415	7181.8
3/4	225.409	4043.3	3/4	250.542	4995.2	3/4	275.675	6047.6	3/4	300.807	7200.6
7/8	225.802	4057.4	7/8	250.935	5010.9	7/8	276.067	6064.9	7/8	301.200	7219.4
72.	226.195	4071.5	80.	251.327	5026.5	88.	276.460	6082.1	96.	301.593	7238.2
1/8	226.587	4085.7	1/8	251.720	5042.3	1/8	276.853	6099.4	1/8	301.986	7257.1
1/4	226.980	4099.8	1/4	252.113	5058.0	1/4	277.246	6116.7	1/4	302.378	7276.0
3/8	227.373	4114.0	3/8	252.506	5073.8	3/8	277.638	6134.1	3/8	302.771	7294.9
1/2	227.765	4128.2	1/2	252.898	5089.6	1/2	278.031	6151.4	1/2	303.164	7313.8
5/8	228.158	4142.5	5/8	253.291	5105.4	5/8	278.424	6168.8	5/8	303.556	7332.8
3/4	228.551	4156.8	3/4	253.684	5121.2	3/4	278.816	6186.2	3/4	303.949	7351.8
7/8	228.944	4171.1	7/8	254.076	5137.1	7/8	279.209	6203.7	7/8	304.342	7370.8
73.	229.336	4185.4	81.	254.469	5153.0	89.	279.602	6221.1	97.	304.734	7389.8
1/8	229.729	4199.7	1/8	254.862	5168.9	1/8	279.994	6238.6	1/8	305.127	7408.9
1/4	230.122	4214.1	1/4	255.254	5184.9	1/4	280.387	6256.1	1/4	305.520	7428.0
3/8	230.514	4228.5	3/8	255.647	5200.8	3/8	280.780	6273.7	3/8	305.913	7447.1
1/2	230.907	4242.9	1/2	256.040	5216.8	1/2	281.173	6291.2	1/2	306.305	7466.2
5/8	231.300	4257.4	5/8	256.433	5232.8	5/8	281.565	6308.8	5/8	306.698	7485.3
3/4	231.692	4271.8	3/4	256.825	5248.9	3/4	281.958	6326.4	3/4	307.091	7504.5
7/8	232.085	4286.3	7/8	257.218	5264.9	7/8	282.351	6344.1	7/8	307.483	7523.7
74.	232.478	4300.8	82.	257.611	5281.0	90.	282.743	6361.7	98.	307.876	7543.0
1/8	232.871	4315.4	1/8	258.003	5297.1	1/8	283.136	6379.4	1/8	308.269	7562.2
1/4	233.263	4329.9	1/4	258.396	5313.3	1/4	283.529	6397.1	1/4	308.661	7581.5
3/8	233.656	4344.5	3/8	258.789	5329.4	3/8	283.921	6414.9	3/8	309.054	7600.8
1/2	234.049	4359.2	1/2	259.181	5345.6	1/2	284.314	6432.6	1/2	309.447	7620.1
5/8	234.441	4373.8	5/8	259.574	5361.8	5/8	284.707	6450.4	5/8	309.840	7639.5
3/4	234.834	4388.5	3/4	259.967	5378.1	3/4	285.100	6468.2	3/4	310.232	7658.9
7/8	235.227	4403.1	7/8	260.359	5394.3	7/8	285.492	6486.0	7/8	310.625	7678.3

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
99.	311.018	7697.7	107.	336.15	8992	115.	361.28	10387	123.	386.42	11882
$\frac{1}{8}$	311.410	7717.1	$\frac{1}{8}$	336.54	9014	$\frac{1}{8}$	361.68	10410	$\frac{1}{8}$	386.81	11907
$\frac{1}{4}$	311.803	7736.6	$\frac{1}{4}$	336.94	9035	$\frac{1}{4}$	362.07	10432	$\frac{1}{4}$	387.20	11931
$\frac{3}{8}$	312.196	7755.1	$\frac{3}{8}$	337.33	9056	$\frac{3}{8}$	362.46	10455	$\frac{3}{8}$	387.60	11956
$\frac{1}{2}$	312.588	7773.6	$\frac{1}{2}$	337.72	9077	$\frac{1}{2}$	362.86	10477	$\frac{1}{2}$	387.99	11980
$\frac{5}{8}$	312.981	7792.2	$\frac{5}{8}$	338.12	9098	$\frac{5}{8}$	363.25	10500	$\frac{5}{8}$	388.38	12004
$\frac{3}{4}$	313.374	7810.8	$\frac{3}{4}$	338.51	9119	$\frac{3}{4}$	363.64	10522	$\frac{3}{4}$	388.77	12028
$\frac{7}{8}$	313.767	7829.4	$\frac{7}{8}$	338.90	9140	$\frac{7}{8}$	364.03	10545	$\frac{7}{8}$	389.17	12052
100.	314.16	7854	108.	339.29	9161	116.	364.43	10568	124.	389.56	12076
$\frac{1}{8}$	314.55	7873	$\frac{1}{8}$	339.69	9183	$\frac{1}{8}$	364.82	10590	$\frac{1}{8}$	389.95	12101
$\frac{1}{4}$	314.95	7893	$\frac{1}{4}$	340.08	9204	$\frac{1}{4}$	365.21	10613	$\frac{1}{4}$	390.34	12125
$\frac{3}{8}$	315.34	7913	$\frac{3}{8}$	340.47	9225	$\frac{3}{8}$	365.60	10636	$\frac{3}{8}$	390.74	12150
$\frac{1}{2}$	315.73	7933	$\frac{1}{2}$	340.86	9246	$\frac{1}{2}$	366.00	10659	$\frac{1}{2}$	391.13	12174
$\frac{5}{8}$	316.12	7952	$\frac{5}{8}$	341.26	9268	$\frac{5}{8}$	366.39	10682	$\frac{5}{8}$	391.52	12199
$\frac{3}{4}$	316.52	7972	$\frac{3}{4}$	341.65	9289	$\frac{3}{4}$	366.78	10705	$\frac{3}{4}$	391.92	12223
$\frac{7}{8}$	316.91	7992	$\frac{7}{8}$	342.04	9310	$\frac{7}{8}$	367.18	10728	$\frac{7}{8}$	392.31	12248
101.	317.30	8012	109.	342.43	9331	117.	367.57	10751	125.	392.70	12272
$\frac{1}{8}$	317.69	8032	$\frac{1}{8}$	342.83	9353	$\frac{1}{8}$	367.96	10774	$\frac{1}{8}$	393.09	12297
$\frac{1}{4}$	318.09	8052	$\frac{1}{4}$	343.22	9374	$\frac{1}{4}$	368.35	10798	$\frac{1}{4}$	393.49	12321
$\frac{3}{8}$	318.48	8071	$\frac{3}{8}$	343.61	9396	$\frac{3}{8}$	368.75	10821	$\frac{3}{8}$	393.88	12346
$\frac{1}{2}$	318.87	8091	$\frac{1}{2}$	344.01	9417	$\frac{1}{2}$	369.14	10844	$\frac{1}{2}$	394.27	12370
$\frac{5}{8}$	319.27	8111	$\frac{5}{8}$	344.40	9439	$\frac{5}{8}$	369.53	10867	$\frac{5}{8}$	394.66	12395
$\frac{3}{4}$	319.66	8131	$\frac{3}{4}$	344.79	9460	$\frac{3}{4}$	369.92	10890	$\frac{3}{4}$	395.06	12419
$\frac{7}{8}$	320.05	8151	$\frac{7}{8}$	345.18	9481	$\frac{7}{8}$	370.32	10913	$\frac{7}{8}$	395.45	12444
102.	320.44	8171	110.	345.58	9503	118.	370.71	10936	126.	395.84	12469
$\frac{1}{8}$	320.84	8191	$\frac{1}{8}$	345.97	9525	$\frac{1}{8}$	371.11	10960	$\frac{1}{8}$	396.23	12494
$\frac{1}{4}$	321.23	8211	$\frac{1}{4}$	346.36	9546	$\frac{1}{4}$	371.49	10983	$\frac{1}{4}$	396.63	12518
$\frac{3}{8}$	321.62	8231	$\frac{3}{8}$	346.75	9568	$\frac{3}{8}$	371.89	11007	$\frac{3}{8}$	397.02	12543
$\frac{1}{2}$	322.01	8252	$\frac{1}{2}$	347.15	9589	$\frac{1}{2}$	372.28	11030	$\frac{1}{2}$	397.41	12568
$\frac{5}{8}$	322.41	8272	$\frac{5}{8}$	347.54	9611	$\frac{5}{8}$	372.67	11053	$\frac{5}{8}$	397.81	12593
$\frac{3}{4}$	322.80	8292	$\frac{3}{4}$	347.93	9633	$\frac{3}{4}$	373.07	11076	$\frac{3}{4}$	398.20	12618
$\frac{7}{8}$	323.19	8312	$\frac{7}{8}$	348.33	9655	$\frac{7}{8}$	373.46	11099	$\frac{7}{8}$	398.59	12643
103.	323.59	8332	111.	348.72	9677	119.	373.85	11122	127.	398.98	12668
$\frac{1}{8}$	323.98	8352	$\frac{1}{8}$	349.11	9698	$\frac{1}{8}$	374.24	11146	$\frac{1}{8}$	399.38	12693
$\frac{1}{4}$	324.37	8372	$\frac{1}{4}$	349.50	9720	$\frac{1}{4}$	374.64	11169	$\frac{1}{4}$	399.77	12718
$\frac{3}{8}$	324.76	8393	$\frac{3}{8}$	349.90	9742	$\frac{3}{8}$	375.03	11193	$\frac{3}{8}$	400.16	12743
$\frac{1}{2}$	325.16	8413	$\frac{1}{2}$	350.29	9764	$\frac{1}{2}$	375.42	11216	$\frac{1}{2}$	400.55	12768
$\frac{5}{8}$	325.55	8434	$\frac{5}{8}$	350.68	9786	$\frac{5}{8}$	375.81	11240	$\frac{5}{8}$	400.95	12793
$\frac{3}{4}$	325.94	8454	$\frac{3}{4}$	351.07	9808	$\frac{3}{4}$	376.21	11263	$\frac{3}{4}$	401.34	12818
$\frac{7}{8}$	326.33	8474	$\frac{7}{8}$	351.47	9830	$\frac{7}{8}$	376.60	11287	$\frac{7}{8}$	401.73	12843
104.	326.73	8495	112.	351.86	9852	120.	376.99	11310	128.	402.13	12868
$\frac{1}{8}$	327.12	8515	$\frac{1}{8}$	352.25	9874	$\frac{1}{8}$	377.39	11334	$\frac{1}{8}$	402.52	12893
$\frac{1}{4}$	327.51	8536	$\frac{1}{4}$	352.65	9897	$\frac{1}{4}$	377.78	11357	$\frac{1}{4}$	402.91	12919
$\frac{3}{8}$	327.91	8556	$\frac{3}{8}$	353.04	9919	$\frac{3}{8}$	378.17	11381	$\frac{3}{8}$	403.30	12944
$\frac{1}{2}$	328.30	8577	$\frac{1}{2}$	353.43	9941	$\frac{1}{2}$	378.56	11404	$\frac{1}{2}$	403.70	12970
$\frac{5}{8}$	328.69	8597	$\frac{5}{8}$	353.82	9963	$\frac{5}{8}$	378.96	11428	$\frac{5}{8}$	404.09	12995
$\frac{3}{4}$	329.08	8618	$\frac{3}{4}$	354.22	9985	$\frac{3}{4}$	379.35	11451	$\frac{3}{4}$	404.48	13020
$\frac{7}{8}$	329.48	8638	$\frac{7}{8}$	354.61	10007	$\frac{7}{8}$	379.74	11475	$\frac{7}{8}$	404.87	13045
105.	329.87	8659	113.	355.00	10029	121.	380.13	11499	129.	405.27	13070
$\frac{1}{8}$	330.26	8679	$\frac{1}{8}$	355.39	10052	$\frac{1}{8}$	380.53	11522	$\frac{1}{8}$	405.66	13096
$\frac{1}{4}$	330.65	8700	$\frac{1}{4}$	355.79	10074	$\frac{1}{4}$	380.92	11546	$\frac{1}{4}$	406.05	13121
$\frac{3}{8}$	331.05	8721	$\frac{3}{8}$	356.18	10097	$\frac{3}{8}$	381.31	11570	$\frac{3}{8}$	406.44	13147
$\frac{1}{2}$	331.44	8741	$\frac{1}{2}$	356.57	10119	$\frac{1}{2}$	381.70	11594	$\frac{1}{2}$	406.84	13172
$\frac{5}{8}$	331.83	8762	$\frac{5}{8}$	356.96	10141	$\frac{5}{8}$	382.10	11618	$\frac{5}{8}$	407.23	13198
$\frac{3}{4}$	332.22	8783	$\frac{3}{4}$	357.36	10163	$\frac{3}{4}$	382.49	11642	$\frac{3}{4}$	407.62	13223
$\frac{7}{8}$	332.62	8804	$\frac{7}{8}$	357.75	10185	$\frac{7}{8}$	382.88	11666	$\frac{7}{8}$	408.02	13248
106.	333.01	8825	114.	358.14	10207	122.	383.28	11690	130.	408.41	13273
$\frac{1}{8}$	333.40	8845	$\frac{1}{8}$	358.54	10230	$\frac{1}{8}$	383.67	11714	$\frac{1}{8}$	408.80	13299
$\frac{1}{4}$	333.80	8866	$\frac{1}{4}$	358.93	10252	$\frac{1}{4}$	384.06	11738	$\frac{1}{4}$	409.19	13324
$\frac{3}{8}$	334.19	8887	$\frac{3}{8}$	359.32	10275	$\frac{3}{8}$	384.45	11762	$\frac{3}{8}$	409.59	13350
$\frac{1}{2}$	334.58	8908	$\frac{1}{2}$	359.71	10297	$\frac{1}{2}$	384.85	11786	$\frac{1}{2}$	409.98	13375
$\frac{5}{8}$	334.97	8929	$\frac{5}{8}$	360.11	10320	$\frac{5}{8}$	385.24	11810	$\frac{5}{8}$	410.37	13401
$\frac{3}{4}$	335.37	8950	$\frac{3}{4}$	360.50	10342	$\frac{3}{4}$	385.63	11834	$\frac{3}{4}$	410.76	13426
$\frac{7}{8}$	335.76	8971	$\frac{7}{8}$	360.89	10365	$\frac{7}{8}$	386.02	11858	$\frac{7}{8}$	411.16	13452

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
131.	411.55	13478	139.	436.68	15175	147.	461.82	16972	155.	486.95	18869
1/8	411.94	13504	1/8	437.08	15203	1/8	462.21	17000	1/8	487.34	18900
1/4	412.34	13529	1/4	437.47	15230	1/4	462.60	17029	1/4	487.73	18930
3/8	412.73	13555	3/8	437.86	15258	3/8	462.99	17058	3/8	488.13	18961
1/2	413.12	13581	1/2	438.25	15285	1/2	463.39	17087	1/2	488.52	18991
5/8	413.51	13607	5/8	438.65	15313	5/8	463.78	17116	5/8	488.91	19022
3/4	413.91	13633	3/4	439.04	15340	3/4	464.17	17145	3/4	489.30	19052
7/8	414.30	13659	7/8	439.43	15367	7/8	464.56	17174	7/8	489.70	19083
132.	414.69	13685	140.	439.82	15394	148.	464.96	17203	156.	490.09	19113
1/8	415.08	13711	1/8	440.22	15422	1/8	465.35	17232	1/8	490.48	19144
1/4	415.48	13737	1/4	440.61	15449	1/4	465.74	17262	1/4	490.88	19174
3/8	415.87	13763	3/8	441.00	15477	3/8	466.14	17291	3/8	491.27	19205
1/2	416.26	13789	1/2	441.40	15504	1/2	466.53	17321	1/2	491.66	19235
5/8	416.66	13815	5/8	441.79	15532	5/8	466.92	17350	5/8	492.05	19266
3/4	417.05	13841	3/4	442.18	15559	3/4	467.31	17379	3/4	492.45	19297
7/8	417.44	13867	7/8	442.57	15587	7/8	467.71	17408	7/8	492.84	19328
133.	417.83	13893	141.	442.97	15615	149.	468.10	17437	157.	493.23	19359
1/8	418.23	13919	1/8	443.36	15642	1/8	468.49	17466	1/8	493.62	19390
1/4	418.62	13946	1/4	443.75	15670	1/4	468.88	17496	1/4	494.02	19421
3/8	419.01	13972	3/8	444.14	15697	3/8	469.28	17525	3/8	494.41	19452
1/2	419.40	13999	1/2	444.54	15725	1/2	469.67	17555	1/2	494.80	19483
5/8	419.80	14025	5/8	444.93	15753	5/8	470.06	17584	5/8	495.20	19514
3/4	420.19	14051	3/4	445.32	15781	3/4	470.46	17614	3/4	495.59	19545
7/8	420.58	14077	7/8	445.72	15809	7/8	470.85	17643	7/8	495.98	19576
134.	420.97	14103	142.	446.11	15837	150.	471.24	17672	158.	496.37	19607
1/8	421.37	14130	1/8	446.50	15865	1/8	471.63	17702	1/8	496.77	19638
1/4	421.76	14156	1/4	446.89	15893	1/4	472.03	17731	1/4	497.16	19669
3/8	422.15	14183	3/8	447.29	15921	3/8	472.42	17761	3/8	497.55	19701
1/2	422.55	14209	1/2	447.68	15949	1/2	472.81	17790	1/2	497.94	19732
5/8	422.94	14236	5/8	448.07	15977	5/8	473.20	17820	5/8	498.34	19763
3/4	423.33	14262	3/4	448.46	16005	3/4	473.60	17849	3/4	498.73	19794
7/8	423.72	14288	7/8	448.86	16033	7/8	473.99	17879	7/8	499.12	19825
135.	424.12	14314	143.	449.25	16061	151.	474.38	17908	159.	499.51	19856
1/8	424.51	14341	1/8	449.64	16089	1/8	474.77	17938	1/8	499.91	19887
1/4	424.90	14367	1/4	450.03	16117	1/4	475.17	17967	1/4	500.30	19919
3/8	425.29	14394	3/8	450.43	16145	3/8	475.56	17997	3/8	500.69	19950
1/2	425.69	14420	1/2	450.82	16173	1/2	475.95	18026	1/2	501.09	19982
5/8	426.08	14447	5/8	451.21	16201	5/8	476.35	18056	5/8	501.48	20013
3/4	426.47	14473	3/4	451.61	16229	3/4	476.74	18086	3/4	501.87	20044
7/8	426.87	14500	7/8	452.00	16258	7/8	477.13	18116	7/8	502.26	20075
136.	427.26	14527	144.	452.39	16286	152.	477.52	18146	160.	502.66	20106
1/8	427.65	14553	1/8	452.78	16314	1/8	477.92	18175	1/8	503.05	20138
1/4	428.04	14580	1/4	453.18	16342	1/4	478.31	18205	1/4	503.44	20169
3/8	428.44	14607	3/8	453.57	16371	3/8	478.70	18235	3/8	503.83	20201
1/2	428.83	14633	1/2	453.96	16399	1/2	479.09	18265	1/2	504.23	20232
5/8	429.22	14660	5/8	454.35	16428	5/8	479.49	18295	5/8	504.62	20264
3/4	429.61	14687	3/4	454.75	16456	3/4	479.88	18325	3/4	505.01	20295
7/8	430.01	14714	7/8	455.14	16485	7/8	480.27	18355	7/8	505.41	20327
137.	430.40	14741	145.	455.53	16513	153.	480.67	18385	161.	505.80	20358
1/8	430.79	14768	1/8	455.93	16542	1/8	481.06	18415	1/8	506.19	20390
1/4	431.19	14795	1/4	456.32	16570	1/4	481.45	18446	1/4	506.58	20421
3/8	431.58	14822	3/8	456.71	16599	3/8	481.84	18476	3/8	506.98	20453
1/2	431.97	14849	1/2	457.10	16627	1/2	482.24	18507	1/2	507.37	20484
5/8	432.36	14876	5/8	457.50	16656	5/8	482.63	18537	5/8	507.76	20516
3/4	432.76	14903	3/4	457.89	16684	3/4	483.02	18567	3/4	508.15	20548
7/8	433.15	14930	7/8	458.28	16713	7/8	483.41	18597	7/8	508.55	20580
138.	433.54	14957	146.	458.67	16742	154.	483.81	18627	162.	508.94	20612
1/8	433.93	14984	1/8	459.07	16770	1/8	484.20	18658	1/8	509.33	20644
1/4	434.33	15012	1/4	459.46	16799	1/4	484.59	18688	1/4	509.73	20675
3/8	434.72	15039	3/8	459.85	16827	3/8	484.99	18719	3/8	510.12	20707
1/2	435.11	15067	1/2	460.24	16856	1/2	485.38	18749	1/2	510.51	20739
5/8	435.50	15094	5/8	460.64	16885	5/8	485.77	18779	5/8	510.90	20771
3/4	435.90	15121	3/4	461.03	16914	3/4	486.16	18809	3/4	511.30	20803
7/8	436.29	15148	7/8	461.42	16943	7/8	486.56	18839	7/8	511.69	20835



# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
163.	512.08	20867	171.	537.21	22966	179.	562.35	25165	187.	587.48	27465
1/8	512.47	20899	1/8	537.61	22999	1/8	562.74	25200	1/8	587.87	27501
1/4	512.87	20931	1/4	538.00	23033	1/4	563.13	25236	1/4	588.27	27538
3/8	513.26	20964	3/8	538.39	23066	3/8	563.53	25271	3/8	588.66	27574
1/2	513.65	20996	1/2	538.78	23100	1/2	563.92	25307	1/2	589.05	27611
5/8	514.04	21028	5/8	539.18	23133	5/8	564.31	25342	5/8	589.44	27648
3/4	514.44	21060	3/4	539.57	23167	3/4	564.70	25377	3/4	589.84	27685
7/8	514.83	21092	7/8	539.96	23201	7/8	565.10	25412	7/8	590.23	27722
164.	515.22	21124	172.	540.36	23235	180.	565.49	25447	188.	590.62	27759
1/8	515.62	21157	1/8	540.75	23268	1/8	565.88	25482	1/8	591.01	27796
1/4	516.01	21189	1/4	541.14	23302	1/4	566.27	25518	1/4	591.41	27833
3/8	516.40	21222	3/8	541.53	23336	3/8	566.67	25553	3/8	591.80	27870
1/2	516.79	21254	1/2	541.93	23370	1/2	567.06	25589	1/2	592.19	27907
5/8	517.19	21287	5/8	542.32	23404	5/8	567.45	25624	5/8	592.58	27944
3/4	517.58	21319	3/4	542.71	23438	3/4	567.84	25660	3/4	592.98	27981
7/8	517.97	21351	7/8	543.10	23472	7/8	568.24	25695	7/8	593.37	28018
165.	518.36	21383	173.	543.50	23506	181.	568.63	25730	189.	593.76	28055
1/8	518.76	21416	1/8	543.89	23540	1/8	569.02	25765	1/8	594.16	28092
1/4	519.15	21448	1/4	544.28	23575	1/4	569.42	25801	1/4	594.55	28130
3/8	519.54	21481	3/8	544.68	23609	3/8	569.81	25836	3/8	594.94	28167
1/2	519.94	21513	1/2	545.07	23643	1/2	570.20	25872	1/2	595.33	28205
5/8	520.33	21546	5/8	545.46	23677	5/8	570.59	25908	5/8	595.73	28242
3/4	520.72	21578	3/4	545.85	23711	3/4	570.99	25944	3/4	596.12	28279
7/8	521.11	21610	7/8	546.25	23745	7/8	571.38	25980	7/8	596.51	28316
166.	521.51	21642	174.	546.64	23779	182.	571.77	26016	190.	596.90	28353
1/8	521.90	21675	1/8	547.03	23813	1/8	572.16	26051	1/8	597.29	28390
1/4	522.29	21707	1/4	547.42	23848	1/4	572.56	26087	1/4	597.68	28428
3/8	522.68	21740	3/8	547.82	23882	3/8	572.95	26122	3/8	598.08	28465
1/2	523.08	21772	1/2	548.21	23917	1/2	573.34	26158	1/2	598.47	28503
5/8	523.47	21805	5/8	548.60	23951	5/8	573.74	26194	5/8	598.86	28540
3/4	523.86	21838	3/4	549.00	23985	3/4	574.13	26230	3/4	599.25	28578
7/8	524.26	21871	7/8	549.39	24019	7/8	574.52	26266	7/8	599.64	28615
167.	524.65	21904	175.	549.78	24053	183.	574.91	26302	191.	600.04	28652
1/8	525.04	21937	1/8	550.17	24087	1/8	575.31	26338	1/8	600.44	28689
1/4	525.43	21969	1/4	550.57	24122	1/4	575.70	26374	1/4	600.83	28727
3/8	525.83	22002	3/8	550.96	24156	3/8	576.09	26410	3/8	601.22	28764
1/2	526.22	22035	1/2	551.35	24191	1/2	576.48	26446	1/2	601.62	28802
5/8	526.61	22068	5/8	551.74	24225	5/8	576.88	26482	5/8	602.01	28839
3/4	527.00	22101	3/4	552.14	24260	3/4	577.27	26518	3/4	602.40	28877
7/8	527.40	22134	7/8	552.53	24294	7/8	577.66	26554	7/8	602.79	28915
168.	527.79	22167	176.	552.92	24329	184.	578.05	26590	192.	603.19	28953
1/8	528.18	22200	1/8	553.31	24363	1/8	578.45	26626	1/8	603.58	28990
1/4	528.57	22233	1/4	553.71	24398	1/4	578.84	26663	1/4	603.97	29028
3/8	528.97	22266	3/8	554.10	24432	3/8	579.23	26699	3/8	604.36	29065
1/2	529.36	22299	1/2	554.49	24467	1/2	579.63	26736	1/2	604.76	29103
5/8	529.75	22332	5/8	554.89	24501	5/8	580.02	26772	5/8	605.15	29141
3/4	530.15	22366	3/4	555.28	24536	3/4	580.41	26808	3/4	605.54	29179
7/8	530.54	22399	7/8	555.67	24571	7/8	580.80	26844	7/8	605.94	29217
169.	530.93	22432	177.	556.06	24606	185.	581.20	26880	193.	606.33	29255
1/8	531.32	22465	1/8	556.46	24640	1/8	581.59	26916	1/8	606.72	29293
1/4	531.72	22499	1/4	556.85	24675	1/4	581.98	26953	1/4	607.11	29331
3/8	532.11	22532	3/8	557.24	24710	3/8	582.37	26989	3/8	607.51	29369
1/2	532.50	22566	1/2	557.63	24745	1/2	582.77	27026	1/2	607.90	29407
5/8	532.89	22599	5/8	558.03	24780	5/8	583.16	27062	5/8	608.29	29445
3/4	533.29	22632	3/4	558.42	24815	3/4	583.55	27099	3/4	608.68	29483
7/8	533.68	22665	7/8	558.81	24850	7/8	583.95	27135	7/8	609.08	29521
170.	534.07	22698	178.	559.21	24885	186.	584.34	27172	194.	609.47	29559
1/8	534.47	22731	1/8	559.60	24920	1/8	584.73	27208	1/8	609.86	29597
1/4	534.86	22765	1/4	559.99	24955	1/4	585.12	27245	1/4	610.26	29636
3/8	535.25	22798	3/8	560.38	24990	3/8	585.52	27281	3/8	610.65	29674
1/2	535.64	22832	1/2	560.78	25025	1/2	585.91	27318	1/2	611.05	29713
5/8	536.04	22865	5/8	561.17	25060	5/8	586.30	27354	5/8	611.43	29751
3/4	536.43	22899	3/4	561.56	25095	3/4	586.69	27391	3/4	611.83	29789
7/8	536.82	22932	7/8	561.95	25130	7/8	587.09	27428	7/8	612.23	29827

# CIRCUMFERENCES AND AREAS OF CIRCLES

(Areas are approximate, but sufficiently accurate for estimating)

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area*	Dia.	Circum.	Area
195.	612.61	29865	206	647.17	33329	256	804.25	51472	306	961.33	73542
1/8	613.00	29903	207	650.31	33654	257	807.39	51875	307	964.47	74023
1/4	613.40	29942	208	653.45	33980	258	810.53	52279	308	967.61	74506
3/8	613.79	29980	209	656.59	34307	259	813.67	52685	309	970.75	74991
1/2	614.18	30019	210	659.73	34636	260	816.81	53093	310	973.89	75477
5/8	614.57	30057									
3/4	614.97	30096	211	662.88	34967	261	819.96	53502	311	977.04	75965
7/8	615.36	30134	212	666.02	35299	262	823.10	53913	312	980.18	76454
			213	669.16	35633	263	826.24	54325	313	983.32	76945
196.	615.75	30172	214	672.30	35968	264	829.38	54739	314	986.46	77437
1/8	616.15	30210	215	675.44	36305	265	832.52	55155	315	989.60	77931
1/4	616.54	30249									
3/8	616.93	30287	216	678.58	36644	266	835.66	55572	316	992.74	78427
1/2	617.32	30326	217	681.73	36984	267	838.81	55990	317	995.88	78924
5/8	617.72	30364	218	684.87	37325	268	841.95	56410	318	999.03	79423
3/4	618.11	30403	219	688.01	37669	269	845.09	56832	319	1002.2	79923
7/8	618.50	30442	220	691.15	38013	270	848.23	57256	320	1005.3	80425
197.	618.89	30481	221	694.29	38360	271	851.37	57680	321	1008.5	80928
1/8	619.29	30519	222	697.43	38708	272	854.51	58107	322	1011.6	81433
1/4	619.68	30558	223	700.58	39057	273	857.66	58535	323	1014.7	81940
3/8	620.08	30596	224	703.72	39408	274	860.80	58965	324	1017.9	82448
1/2	620.47	30635	225	706.86	39761	275	863.94	59396	325	1021.0	82958
5/8	620.86	30674									
3/4	621.25	30713	226	710.00	40115	276	867.08	59829	326	1024.2	83469
7/8	621.64	30752	227	713.14	40471	277	870.22	60263	327	1027.3	83982
			228	716.28	40828	278	873.36	60699	328	1030.4	84496
198.	622.04	30791	229	719.42	41187	279	876.50	61136	329	1033.6	85012
1/8	622.44	30830	230	722.57	41548	280	879.65	61575	330	1036.7	85530
1/4	622.83	30869									
3/8	623.22	30908	231	725.71	41910	281	882.79	62016	331	1039.9	86049
1/2	623.62	30947	232	728.85	42273	282	885.93	62458	332	1043.0	86570
5/8	624.01	30986	233	731.99	42639	283	889.07	62902	333	1046.2	87092
3/4	624.40	31025	234	735.13	43005	284	892.21	63347	334	1049.3	87616
7/8	624.79	31064	235	738.27	43374	285	895.35	63794	335	1052.4	88141
199.	625.18	31103	236	741.42	43744	286	898.50	64242	336	1055.6	88668
1/8	625.58	31142	237	744.56	44115	287	901.64	64693	337	1058.7	89197
1/4	625.97	31181	238	747.70	44488	288	904.78	65144	338	1061.9	89727
3/8	626.36	31220	239	750.84	44863	289	907.92	65597	339	1065.0	90259
1/2	626.76	31260	240	753.98	45239	290	911.06	66052	340	1068.1	90792
5/8	627.15	31299									
3/4	627.54	31338	241	757.12	45617	291	914.20	66508	341	1071.3	91327
7/8	627.94	31377	242	760.27	45996	292	917.35	66966	342	1074.4	91863
			243	763.41	46377	293	920.49	67426	343	1077.6	92401
200.	628.32	31416	244	766.55	46760	294	923.63	67887	344	1080.7	92941
1/8	628.72	31455	245	769.69	47144	295	926.77	68349	345	1083.8	93482
1/4	629.11	31495									
3/8	629.51	31534	246	772.83	47529	296	929.91	68814	346	1087.0	94025
1/2	629.90	31574	247	775.97	47916	297	933.05	69279	347	1090.1	94569
5/8	630.29	31613	248	779.12	48305	298	936.19	69747	348	1093.3	95115
3/4	630.58	31653	249	782.26	48696	299	939.34	70215	349	1096.4	95662
7/8	631.08	31692	250	785.40	49087	300	942.48	70686	350	1099.6	96211
201	631.46	31731	251	788.54	49481	301	945.62	71158	351	1102.7	96762
202	634.60	32047	252	791.68	49876	302	948.76	71632	352	1105.8	97314
203	637.74	32366	253	794.82	50273	303	951.90	72107	353	1109.0	97868
204	640.88	32685	254	797.96	50671	304	955.04	72583	354	1112.1	98423
205	644.03	33006	255	801.81	51071	305	958.19	73062	355	1115.3	98980



**CIRCULAR  
PLATES**



# THEORETICAL WEIGHTS

## OF CIRCULAR STEEL PLATES IN POUNDS

Diameter	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"
10"	4	6	7	8	10	11	13	14	15	17	18	19	21	22
11"	5	7	8	10	12	13	15	17	19	20	22	24	25	27
12"	6	8	10	12	14	16	18	20	22	24	26	28	30	32
13"	7	9	12	14	16	19	21	24	26	28	31	33	35	38
14"	8	11	14	16	19	22	25	27	30	33	35	38	41	44
15"	9	13	16	19	22	25	28	31	34	38	41	44	47	50
16"	11	14	18	21	25	28	32	36	39	43	46	50	53	57
17"	12	16	20	24	28	32	36	40	44	48	52	56	60	64
18"	14	18	23	27	32	36	41	45	50	54	59	63	68	72
19"	15	20	25	30	35	40	45	50	55	60	65	70	75	80
20"	17	22	28	33	39	45	50	56	61	67	72	78	83	89
21"	18	25	31	37	43	49	55	61	68	74	80	86	92	98
22"	20	27	34	40	47	54	61	67	74	81	88	94	101	108
23"	22	29	37	44	52	59	66	74	81	88	96	103	110	118
24"	24	32	40	48	56	64	72	80	88	96	104	112	120	128
25"	26	35	43	52	61	70	78	87	96	104	113	122	130	139
26"	28	38	47	56	66	75	85	94	103	113	122	132	141	150
27"	30	41	51	61	71	81	91	101	112	122	132	142	152	162
28"	33	44	55	65	76	87	98	109	120	131	142	153	164	174
29"	35	47	58	70	82	94	105	117	129	140	152	164	176	187
30"	38	50	63	75	88	100	113	125	138	150	163	175	188	200
31"	40	53	67	80	94	107	120	134	147	160	174	187	201	214
32"	43	57	71	85	100	114	128	142	157	171	185	199	214	228
33"	45	61	76	91	106	121	136	151	167	182	197	212	227	242
34"	48	64	80	97	113	129	145	161	177	193	209	225	241	257
35"	51	68	85	102	119	136	153	170	188	204	222	239	256	273
36"	54	72	90	108	126	144	162	180	198	216	234	252	271	288
37"	57	76	95	114	133	152	171	190	210	228	248	267	286	305
38"	60	80	100	121	141	161	181	201	221	241	261	281	301	321
39"	63	85	106	127	148	169	190	212	233	254	275	296	318	339
40"	67	89	111	134	156	178	200	223	245	267	289	312	334	356
41"	70	94	117	140	164	187	210	234	257	281	304	327	351	374
42"	74	98	123	147	172	196	221	245	270	294	319	344	368	393
43"	77	103	129	154	180	206	231	257	283	309	335	360	386	411
44"	81	108	135	162	188	215	242	269	296	323	350	377	404	431
45"	84	113	141	169	197	225	254	282	310	338	366	394	423	451
46"	88	118	147	177	206	235	265	294	324	353	383	412	442	471
47"	92	123	154	184	215	246	277	307	338	369	400	430	461	492
48"	96	128	160	192	224	256	288	320	353	385	417	449	481	513
49"	100	134	167	200	234	267	301	334	368	401	434	467	501	534
50"	104	139	174	209	243	278	313	348	383	417	452	487	522	556
51"	109	145	181	217	253	289	326	362	398	434	470	506	543	579
52"	113	150	188	226	263	301	338	376	414	451	489	526	564	602
53"	117	156	195	234	273	313	352	391	430	469	508	547	586	625
54"	122	162	203	243	284	324	365	406	446	487	527	568	608	649
55"	126	168	210	252	295	337	379	421	463	505	547	589	631	673
56"	131	175	218	262	305	349	393	436	480	523	567	611	654	698
57"	136	181	226	271	316	361	407	452	497	542	587	633	678	723

CIRCULAR  
PLATES

# THEORETICAL WEIGHTS

## OF CIRCULAR STEEL PLATES IN POUNDS

Diameter	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"
58"	140	187	234	281	328	374	421	468	515	561	608	655	702	749
59"	145	194	242	290	339	387	436	484	533	581	629	678	726	775
60"	150	200	250	300	350	401	451	501	551	601	651	701	751	801
61"	155	207	259	311	362	414	466	518	569	621	673	724	777	828
62"	160	214	267	321	374	428	481	535	588	642	696	748	802	855
63"	166	221	276	331	386	442	497	552	607	662	718	773	828	883
64"	171	228	285	342	399	456	513	570	627	684	741	798	855	911
65"	176	235	294	353	411	470	529	588	646	705	764	823	882	940
66"	182	242	303	363	424	485	545	606	666	727	788	848	909	969
67"	187	250	312	375	437	499	562	624	687	749	812	874	937	999
68"	193	257	322	386	450	514	579	643	707	772	836	900	965	1029
69"	199	265	331	397	464	530	596	662	728	795	861	927	994	1059
70"	204	273	341	409	477	545	613	681	750	818	886	954	1022	1090
71"	210	280	351	421	491	561	631	701	771	841	911	982	1051	1121
72"	216	288	360	433	505	577	649	721	793	865	937	1009	1081	1153
73"	222	296	371	445	519	593	667	741	815	889	963	1037	1111	1185
74"	228	305	381	457	533	609	685	762	838	914	990	1066	1142	1218
75"	235	313	391	469	548	626	704	782	861	939	1017	1095	1173	1251
76"	241	321	402	482	562	643	723	803	884	964	1044	1125	1205	1285
77"	247	330	412	495	577	660	742	825	907	990	1072	1154	1237	1319
78"	254	338	423	508	592	677	762	846	931	1015	1100	1185	1269	1354
79"	260	347	434	521	608	694	781	868	955	1042	1128	1215	1302	1389
80"	267	356	445	534	623	712	801	890	979	1068	1157	1246	1335	1424
81"	274	365	456	547	639	730	821	912	1004	1095	1186	1278	1369	1460
82"	281	374	468	561	655	748	842	935	1029	1122	1216	1309	1403	1496
83"	287	383	479	575	671	766	862	958	1054	1150	1246	1341	1437	1533
84"	294	393	491	589	687	785	883	981	1079	1178	1276	1374	1472	1570
85"	301	402	502	603	703	804	904	1005	1105	1206	1306	1407	1507	1608
86"	309	411	514	617	720	823	926	1029	1132	1234	1337	1440	1543	1646
87"	316	421	526	632	737	842	947	1053	1158	1263	1369	1474	1579	1684
88"	323	431	539	646	754	862	969	1077	1185	1292	1400	1508	1616	1723
89"	330	441	551	661	771	881	991	1102	1212	1322	1432	1542	1652	1763
90"	338	451	563	676	789	901	1014	1127	1239	1352	1465	1577	1690	1802
91"	346	461	576	691	806	921	1037	1152	1267	1382	1497	1612	1728	1843
92"	353	471	589	706	824	942	1059	1177	1295	1413	1530	1648	1766	1883
93"	361	481	601	722	842	962	1083	1203	1323	1443	1564	1684	1804	1925
94"	369	492	614	737	860	983	1106	1229	1352	1475	1598	1720	1843	1966
95"	377	502	628	753	879	1004	1130	1255	1381	1506	1632	1757	1883	2008
96"	385	513	641	769	897	1025	1154	1282	1410	1538	1666	1794	1923	2051
97"	393	523	654	785	916	1047	1178	1309	1439	1570	1701	1832	1963	2094
98"	401	534	668	801	935	1069	1202	1336	1469	1603	1736	1870	2004	2137
99"	409	545	682	818	954	1090	1227	1363	1499	1636	1772	1908	2045	2181
100"	417	556	695	834	974	1113	1252	1391	1530	1669	1808	1947	2086	2225
101"	426	567	709	851	993	1135	1277	1419	1561	1702	1844	1986	2128	2270
102"	434	579	724	868	1013	1158	1302	1447	1592	1736	1881	2026	2170	2315
103"	443	590	738	885	1033	1180	1328	1476	1623	1771	1918	2066	2213	2361
104"	451	602	752	903	1053	1203	1354	1504	1655	1805	1956	2106	2256	2407
105"	460	613	767	920	1073	1227	1380	1533	1687	1840	1993	2147	2300	2453

# THEORETICAL WEIGHTS

## OF CIRCULAR STEEL PLATES IN POUNDS

Diameter	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"
106"	469	625	781	938	1094	1250	1406	1563	1719	1875	2032	2188	2344	2500
107"	478	637	796	955	1115	1274	1433	1592	1752	1911	2070	2229	2388	2548
108"	487	649	811	973	1136	1298	1460	1622	1784	1947	2109	2271	2433	2596
109"	496	661	826	991	1157	1322	1487	1652	1818	1983	2148	2313	2479	2644
110"	505	673	841	1010	1178	1346	1515	1683	1851	2019	2188	2356	2524	2693
111"	514	685	857	1028	1200	1371	1542	1714	1885	2056	2228	2399	2570	2742
112"	...	698	872	1047	1221	1396	1570	1745	1919	2094	2268	2442	2617	2791
113"	...	710	888	1066	1243	1421	1598	1776	1953	2131	2309	2486	2664	2841
114"	...	723	904	1084	1265	1446	1627	1807	1988	2169	2350	2530	2711	2892
115"	...	736	920	1104	1288	1471	1655	1839	2023	2207	2391	2575	2759	2943
116"	...	749	936	1123	1310	1497	1684	1871	2059	2246	2433	2620	2807	2994
117"	...	762	952	1142	1333	1523	1713	1904	2094	2285	2475	2665	2856	3046
118"	...	775	968	1162	1356	1549	1743	1937	2130	2324	2518	2711	2905	3098
119"	...	788	985	1182	1379	1576	1773	1970	2166	2363	2560	2757	2954	3151
120"	...	801	1001	1202	1402	1602	1802	2003	2203	2403	2604	2804	3004	3204
121"	...	815	1018	1222	1425	1629	1833	2036	2240	2444	2647	2851	3054	3258
122"	...	828	1035	1242	1449	1656	1863	2070	2277	2484	2691	2898	3105	3312
123"	...	842	1052	1262	1473	1683	1894	2104	2315	2525	2735	2946	3156	3367
124"	...	855	1069	1283	1497	1711	1925	2138	2352	2566	2780	2994	3208	3421
125"	...	869	1087	1304	1521	1738	1956	2173	2390	2608	2825	3042	3260	3477
126"	...	883	1104	1325	1546	1766	1987	2208	2429	2650	2870	3091	3312	3533
127"	...	897	1122	1346	1570	1795	2019	2243	2467	2692	2916	3140	3365	3589
128"	...	911	1139	1367	1595	1823	2051	2279	2507	2734	2962	3190	3418	3646
129"	...	926	1157	1389	1620	1852	2083	2314	2546	2777	3009	3240	3472	3703
130"	...	940	1175	1410	1645	1880	2115	2350	2586	2821	3056	3291	3526	3761
131"	...	955	1193	1432	1671	1909	2148	2387	2625	2864	3103	3341	3580	3819
132"	...	969	1212	1454	1696	1939	2181	2423	2666	2908	3150	3393	3635	3877
133"	...	984	1230	1476	1722	1968	2214	2460	2706	2952	3198	3444	3690	3936
134"	...	999	1249	1498	1748	1998	2248	2497	2747	2997	3247	3496	3746	3996
135"	...	1014	1267	1521	1774	2028	2281	2535	2788	3042	3295	3549	3802	4056
136"	...	1029	1286	1543	1801	2058	2315	2572	2830	3087	3344	3601	3859	4116
137"	...	1044	1305	1566	1827	2088	2349	2610	2871	3132	3393	3655	3916	4177
138"	...	1059	1324	1589	1854	2119	2384	2648	2913	3178	3443	3708	3973	4238
139"	...	1075	1344	1612	1881	2150	2418	2687	2956	3225	3493	3762	4031	4299
140"	...	1090	1363	1636	1908	2181	2453	2726	2999	3271	3544	3816	4089	4362
141"	...	1106	1383	1659	1936	2212	2489	2765	3042	3318	3595	3871	4148	4424
142"	...	1122	1402	1683	1963	2244	2524	2804	3085	3365	3646	3926	4207	4487
143"	...	1138	1422	1706	1991	2275	2560	2844	3128	3413	3697	3982	4266	4550
144"	...	1154	1442	1730	2019	2307	2596	2884	3172	3461	3749	4038	4326	4614
145"	...	1170	1462	1754	2047	2339	2632	2924	3217	3509	3801	4094	4386	4679
146"	...	1186	1482	1779	2075	2372	2668	2965	3261	3558	3854	4150	4447	4743
147"	...	1202	1503	1803	2104	2404	2705	3005	3306	3606	3907	4208	4508	4809
148"	...	1219	1523	1828	2132	2437	2742	3046	3351	3656	3960	4265	4570	4874
149"	...	1235	1544	1853	2161	2470	2779	3088	3396	3705	4014	4323	4632	4940
150"	...	1252	1565	1878	2191	2503	2816	3129	3442	3755	4068	4381	4694	5007
151"	...	1268	1586	1903	2220	2537	2854	3171	3488	3805	4123	4440	4757	5074
152"	...	1285	1607	1928	2249	2571	2892	3213	3535	3856	4177	4499	4820	5141
153"	...	1302	1628	1953	2279	2605	2930	3256	3581	3907	4232	4558	4884	5209

# THEORETICAL WEIGHTS

## OF CIRCULAR STEEL PLATES IN POUNDS

Diameter	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	1 1/16"	3/4"	13/16"	7/8"	15/16"	1"
154"	...	1319	1649	1979	2309	2639	2969	3298	3628	3958	4288	4618	4948	5277
155"	...	1337	1671	2005	2339	2673	3007	3341	3676	4010	4344	4678	5012	5346
156"	...	1354	1692	2031	2369	2708	3046	3385	3723	4062	4400	4738	5077	5415
157"	...	1371	1714	2057	2400	2743	3085	3428	3771	4113	4457	4799	5142	5485
158"	...	1389	1736	2083	2430	2778	3125	3472	3819	4166	4514	4861	5208	5555
159"	...	1406	1758	2110	2461	2813	3164	3516	3868	4219	4571	4923	5274	5626
160"	...	1424	1780	2136	2492	2848	3204	3560	3916	4273	4629	4985	5341	5697
161"	...	1442	1803	2163	2524	2884	3245	3605	3966	4326	4687	5047	5408	5768
162"	...	1460	1825	2190	2555	2920	3285	3650	4015	4380	4745	5110	5475	5840
163"	...	1478	1848	2217	2587	2956	3326	3695	4065	4434	4804	5173	5543	5912
164"	...	1496	1870	2244	2618	2993	3367	3741	4115	4489	4863	5237	5611	5985
165"	...	1515	1893	2272	2651	3029	3408	3786	4165	4544	4922	5301	5680	6058
166"	...	1533	1916	2299	2683	3066	3449	3832	4216	4599	4982	5365	5749	6132
167"	...	1552	1939	2327	2715	3103	3491	3879	4267	4655	5042	5430	5818	6206
168"	...	1570	1963	2355	2748	3140	3533	3925	4318	4710	5103	5496	5888	6281
169"	...	1589	1986	2383	2781	3178	3575	3972	4370	4767	5164	5561	5958	6356
170"	...	1608	2010	2412	2814	3216	3617	4019	4421	4824	5225	5627	6029	6431
171"	...	1627	2033	2440	2847	3253	3660	4067	4473	4880	5286	5694	6100	6507
172"	...	1646	2057	2469	2880	3292	3703	4115	4526	4937	5349	5760	6172	6583
173"	...	1665	2081	2498	2914	3330	3746	4163	4579	4995	5411	5828	6244	6660
174"	...	1684	2105	2526	2948	3369	3790	4211	4632	5053	5474	5895	6316	6737
175"	...	1704	2130	2556	2982	3407	3833	4259	4685	5111	5537	5963	6389	6815
176"	...	1723	2154	2585	3016	3446	3877	4308	4739	5170	5601	6031	6462	6893
177"	...	1743	2179	2614	3050	3486	3921	4357	4793	5229	5664	6100	6536	6972
178"	...	1763	2203	2644	3085	3525	3966	4407	4847	5288	5729	6169	6610	7051
179"	...	1782	2228	2674	3119	3565	4011	4456	4902	5348	5793	6239	6684	7130
180"	...	1802	2253	2704	3154	3605	4056	4506	4957	5407	5858	6309	6759	7210
181"	...	1823	2278	2734	3189	3645	4101	4556	5012	5468	5923	6379	6835	7290
182"	...	1843	2303	2764	3225	3685	4146	4607	5068	5528	5989	6450	6910	7371
183"	...	1863	2329	2795	3260	3726	4192	4658	5123	5589	6055	6521	6986	7452
184"	...	1883	2354	2825	3296	3767	4238	4709	5180	5650	6121	6592	7063	7534
185"	...	1904	2380	2856	3332	3808	4284	4760	5236	5712	6188	6664	7140	7616
186"	...	1925	2406	2887	3368	3849	4330	4812	5293	5774	6255	6736	7217	7699
187"	...	1945	2432	2918	3404	3891	4377	4863	5350	5836	6323	6809	7295	7782
188"	...	1966	2458	2949	3441	3932	4424	4916	5407	5899	6390	6882	7373	7865
189"	...	1987	2484	2981	3478	3974	4471	4968	5465	5962	6458	6955	7452	7949
190"	...	2008	2510	3012	3515	4017	4519	5021	5522	6024	6527	7029	7531	8033
191"	...	2029	2537	3044	3552	4059	4566	5074	5581	6088	6596	7103	7611	8118
192"	...	2051	2564	3076	3589	4102	4614	5127	5640	6152	6665	7178	7691	8203
193"	...	2072	2590	3108	3626	4144	4663	5181	5699	6217	6735	7253	7771	8289
194"	...	2094	2617	3141	3664	4188	4711	5234	5758	6281	6805	7328	7852	8375
195"	...	2115	2644	3173	3702	4231	4760	5288	5817	6346	6875	7404	7933	8462
196"	...	2137	2671	3206	3740	4274	4809	5343	5877	6412	6946	7480	8014	8549
197"	...	2159	2699	3239	3778	4318	4858	5398	5937	6477	7017	7557	8096	8636
198"	...	2181	2726	3272	3817	4362	4907	5452	5998	6543	7088	7634	8179	8724
199"	...	2203	2754	3305	3855	4406	4957	5508	6059	6609	7160	7711	8262	8812
200"	...	2225	2782	3338	3894	4451	5007	5563	6120	6676	7232	7788	8345	8901





