

# Forming Stainless Steel Heads



Steve Hammoor: VP of Sales & Marketing – Brighton Tru-Edge Heads

# Burning



# Welding



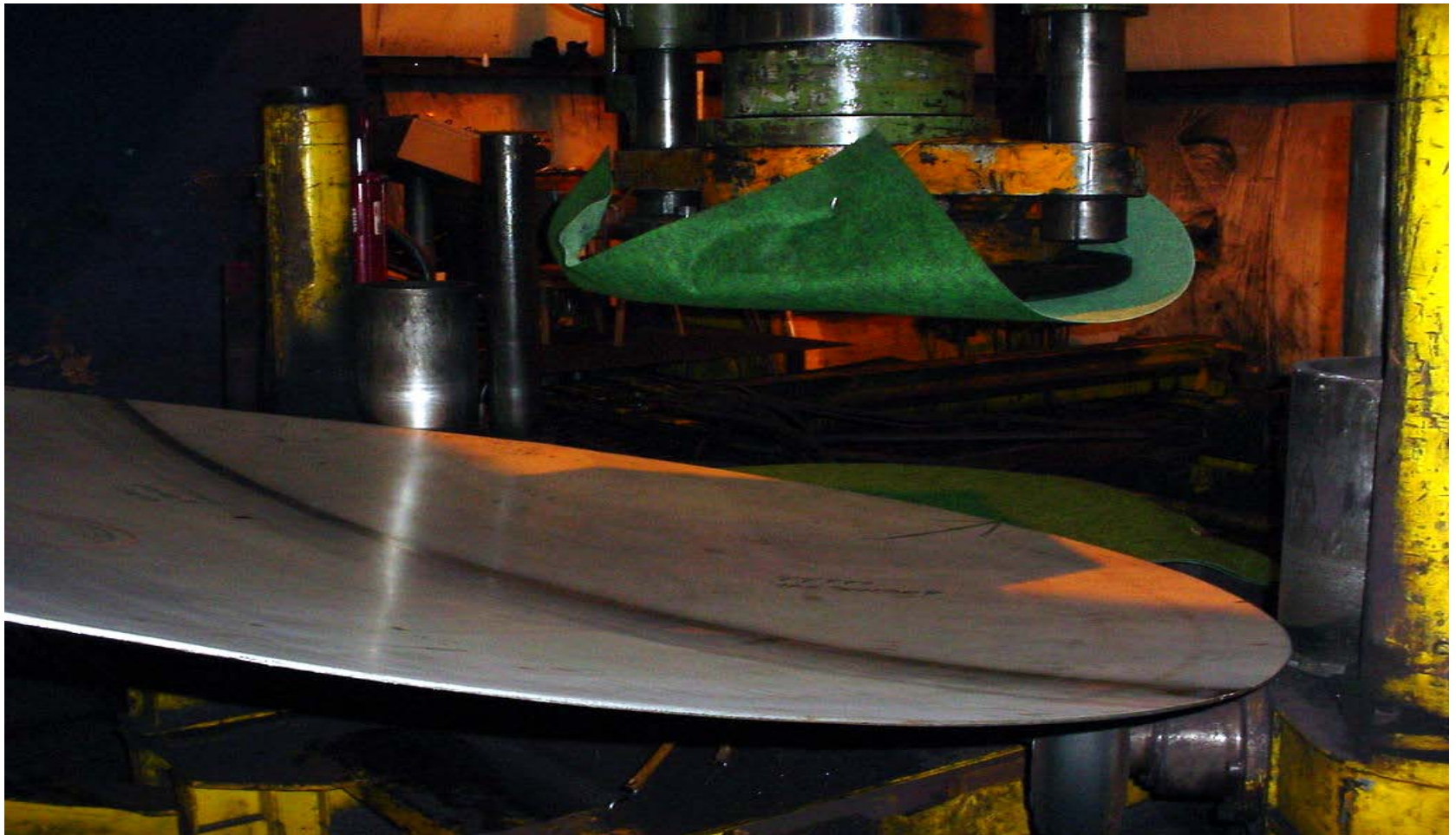
# Welding



# Real Time X-Ray



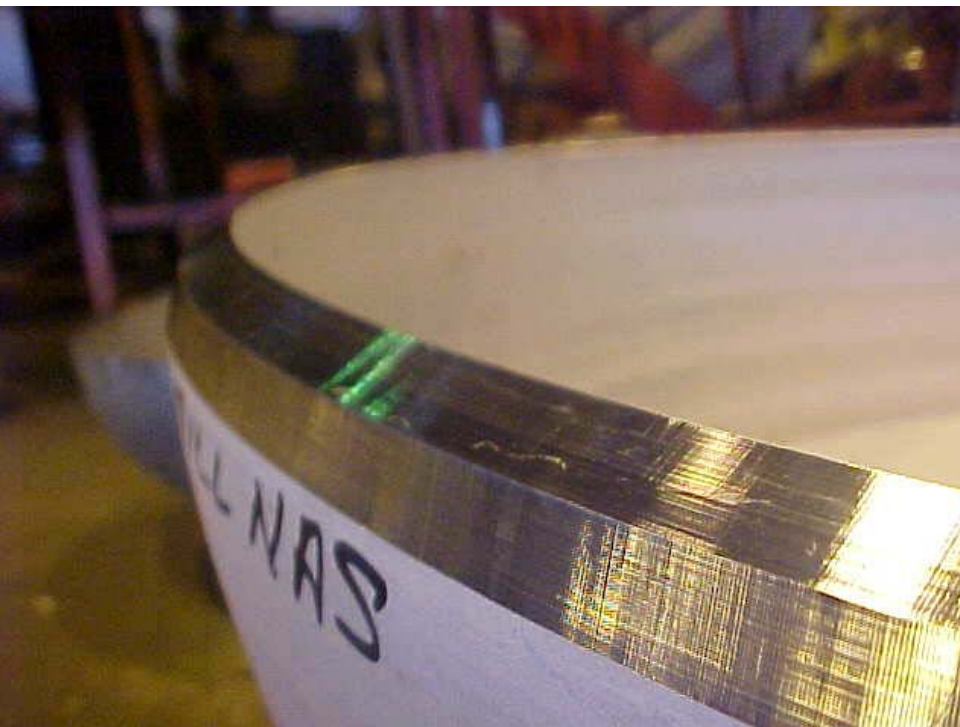
# Pressing



# Flanging



# “Tru-Edge” Machined Bevel



# Why Do We Polish Heads?



- ▣ Appearance
  - Cosmetic
- ▣ Performance
  - Surface Slip
  - Surface Release Properties
- ▣ Product
  - Easy Clean
  - Sanitary
- ▣ Plant
  - Corrosion
    - ▣ Pitting Corrosion
    - ▣ Crevice Corrosion
- ▣ Snag Free



# Different Types of Stainless Steel Finishes



- No.0-Hot rolled, annealed, thicker plates
- No.1-Hot rolled, annealed and passivated
- No.2D- Cold rolled, annealed, pickled and passivated
- No.2B-Same as above with additional pass-through highly polished rollers
- No.2BA- Bright annealed (BA or 2R) same as above then Bright annealed under Oxygen- free atmospheric conditions
- No.3- Coarse abrasive finish applied mechanically
- No.4- Brushed finish
- No.5- Satin finish
- No.6 -Matte finish
- No.7 -Reflective finish
- No.8- Mirror finish
- No.9- Bead blast finish
- No.10- Heat colored finish- wide range of electro-polished and heat colored surfaces

# Polishing



# Polishing



# Ferros Blatter Polisher



# 480" DIA x 10 Ga FOR ANHEUSER BUSCH



# Why Do We Solution Anneal Heads?



- During head forming, the austenitic material is plastically deformed, or cold worked
- Due to cold working, the material's hardness and tensile strength are increased, while its ductility and toughness are reduced.
- The strengthening occurs because of dislocation movements and dislocation generation within the crystal structure.
- Solution annealing allows for recrystallization of the work hardened grains and restores the austenitic material to its original condition.
- This increases the material's toughness and ductility making it suitable for pressure vessel fabrication

# Heat Treating



# Heat Treating



# Why Do We Pickle Heads?



- The corrosion resistance of stainless steel is a result of the natural formation of a passive chrome rich oxide film.
- During fabrication and forming operations, the passive layer, or film, may become damaged or compromised.
- Pickling is a chemical treatment which removes free iron contaminants and chrome depleted oxides and assists in restoring the chromium rich passive layer.
- Because pickling is an acid treatment only, it will not remove grease or oil. Therefore, an alkaline cleaner is used prior to pickling to remove any dirt, oil, grease, or other contaminants from the steel surface caused by the fabrication and forming process.

# Pickling – 25' Heated Nitric Acid Tank



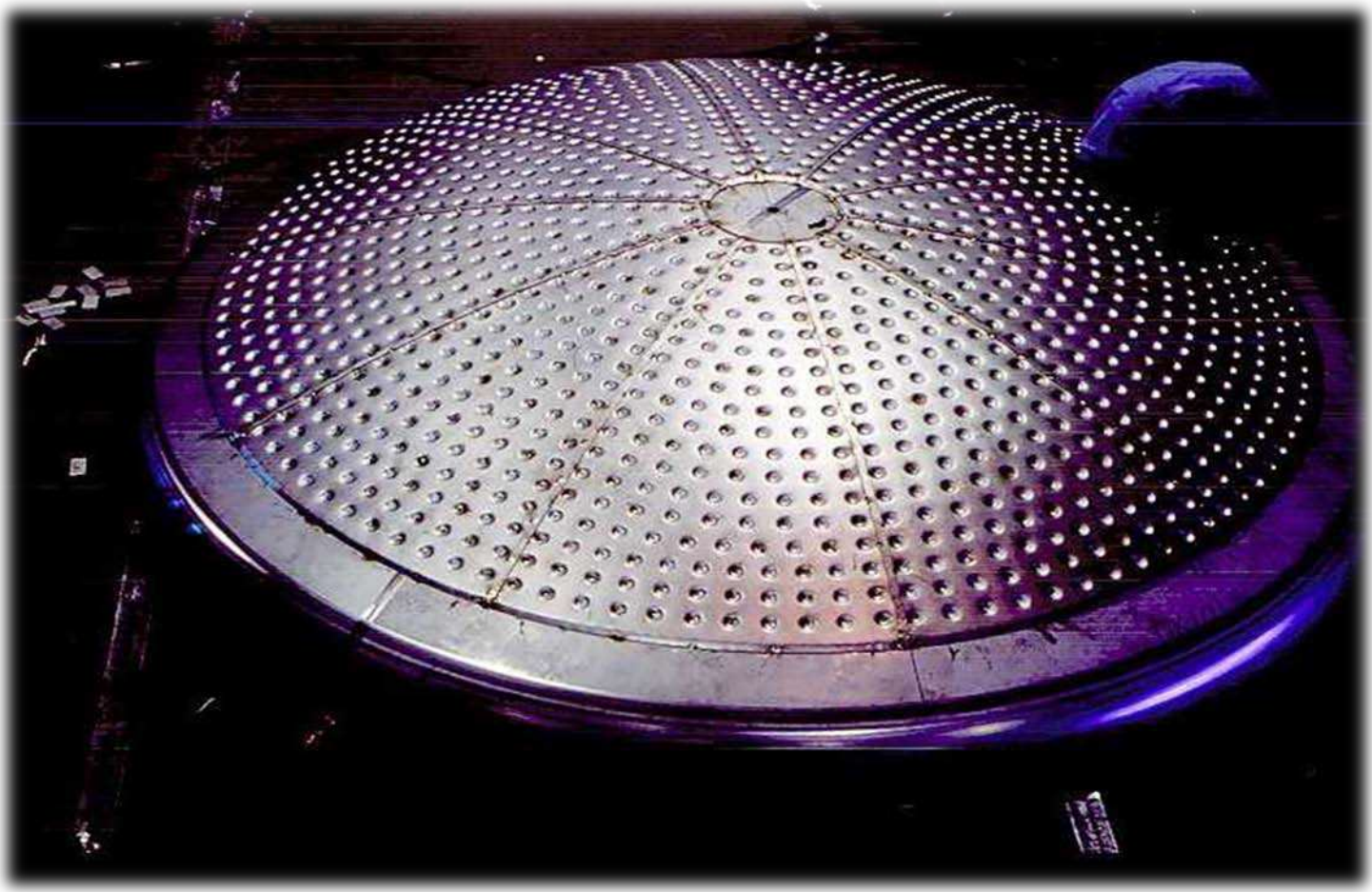
# Heat Transfer – Half Pipe



# Heat Transfer – Half Pipe



# Heat Transfer – Dimple Jacket



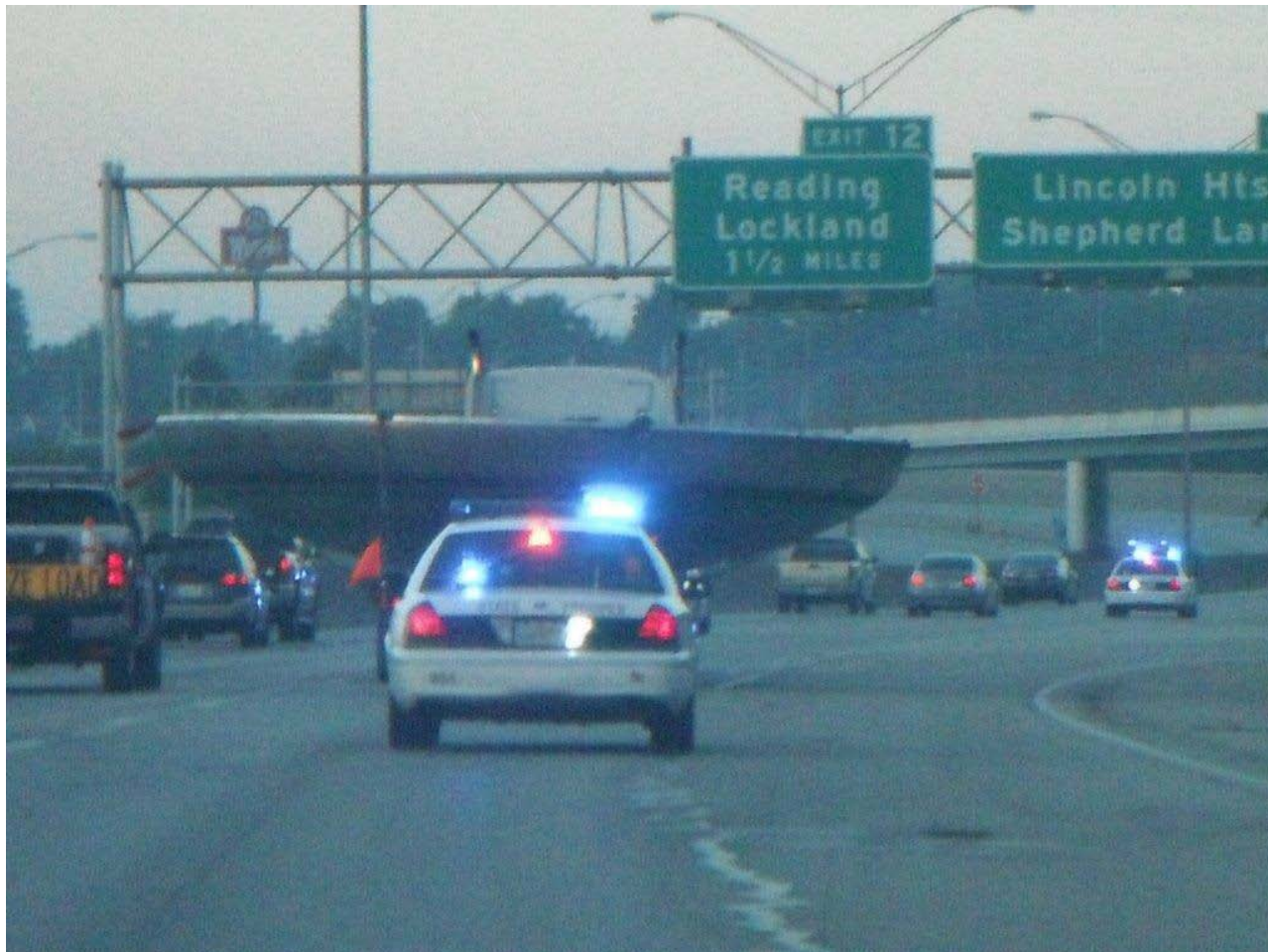
# Shipping



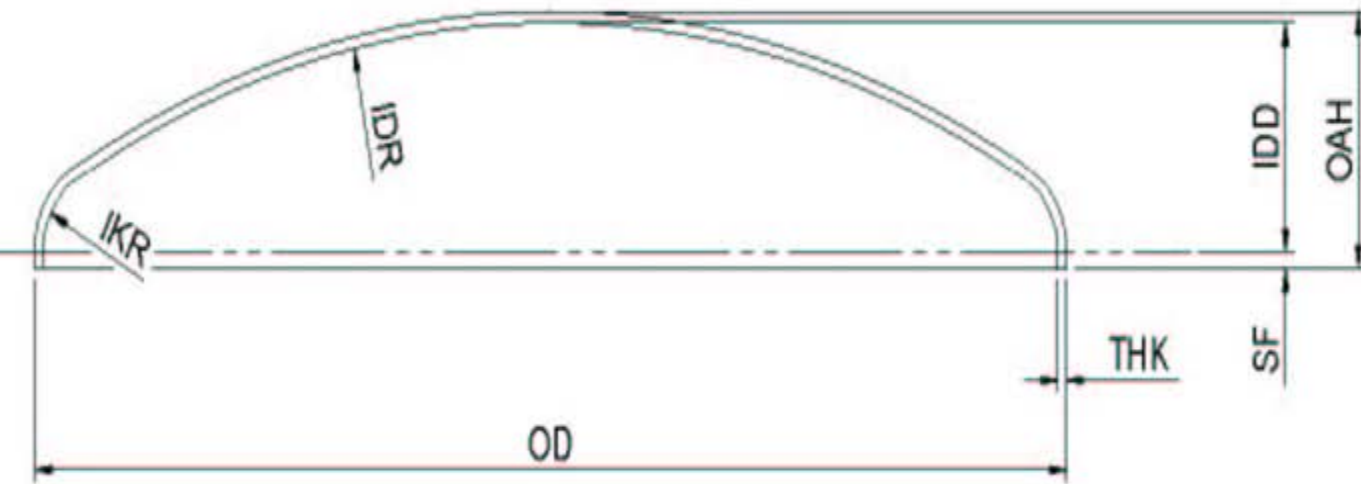
# Shipping



# Shipping



## ASME FLANGED AND DISHED



IKR - Inside Knuckle Radius  
IDR - Inside Dish Radius  
THK - Thickness  
OD - Outside Diameter  
SF - Straight Flange  
IDD - Inside Depth of Dish  
OAH - Overall Height

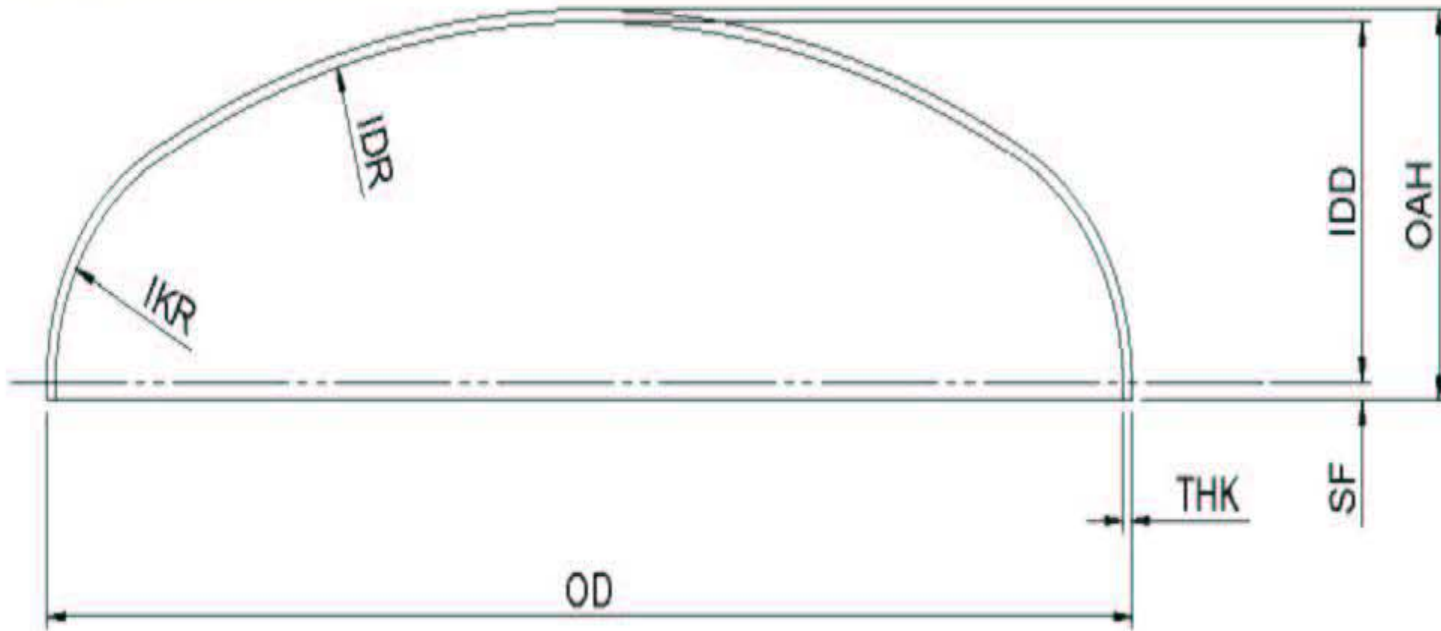
IKR MUST BE A MINIMUM 6% OF DIAMETER (OR 3 x THICKNESS IF GREATER)

DISH RADIUS MUST BE EQUAL TO OR LESS THAN DIAMETER

# ASME Flanged & Dished Head



## ELLIPTICAL HEAD



IKR - Inside Knuckle Radius  
IDR - Inside Dish Radius  
THK - Thickness  
OD - Outside Diameter  
SF - Straight Flange  
IDD - Inside Depth of Dish  
OAH - Overall Height

2:1 → IKR IS APPROX 15% OF DIA – IDR IS APPROX 80% OF DIA

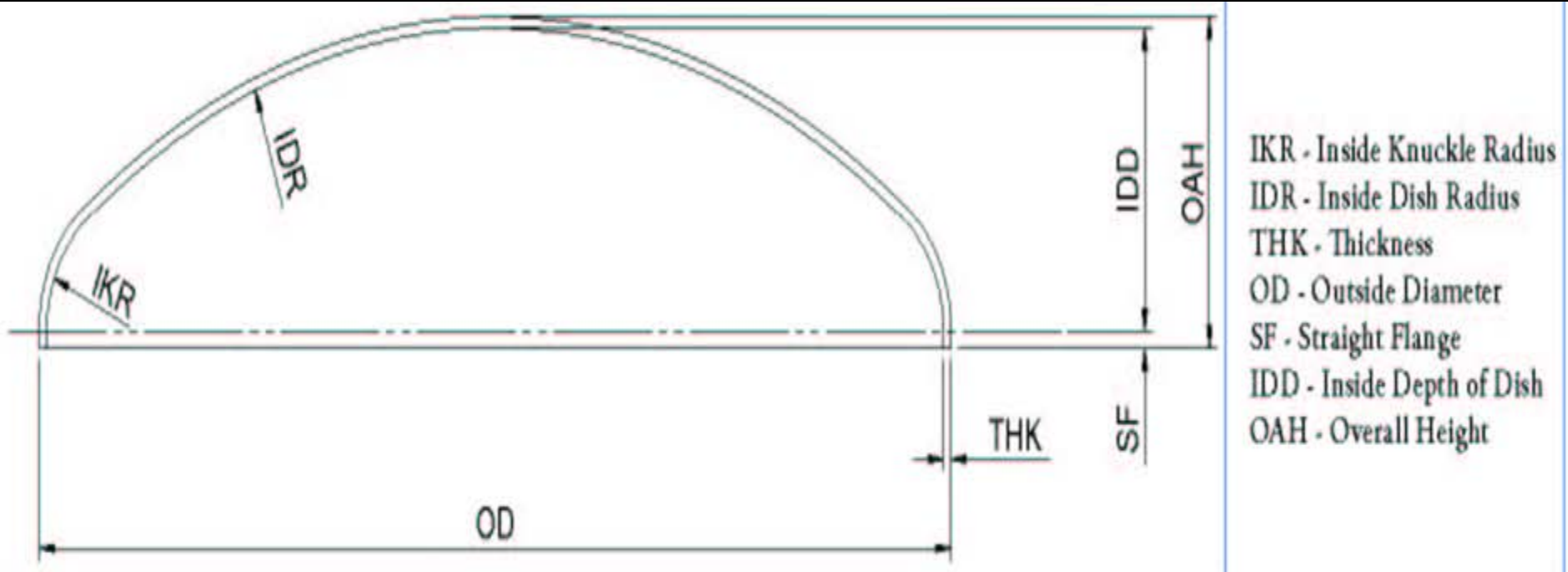
90/ 17 → IDR IS 90% OF DIA - IKR IS 17% OF DIA (Accepted by Code)

IDD → ID / 4

# Elliptical Head



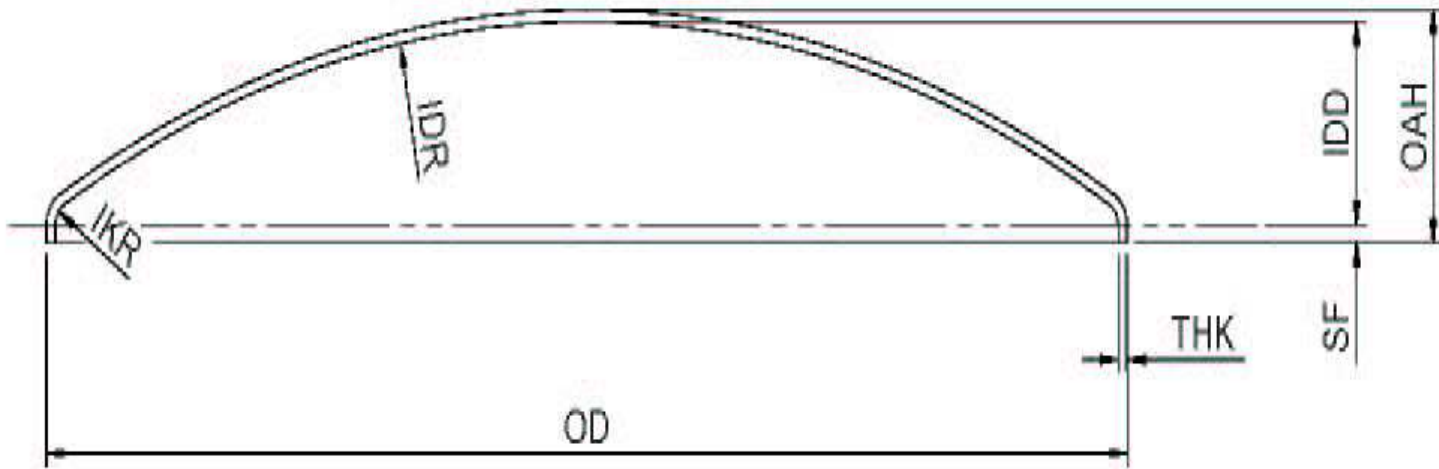
## ASME 80-10



IDR = 80% OF DIAMETER

IKR = 10% OF DIAMETER

## STANDARD FLANGED AND DISHED

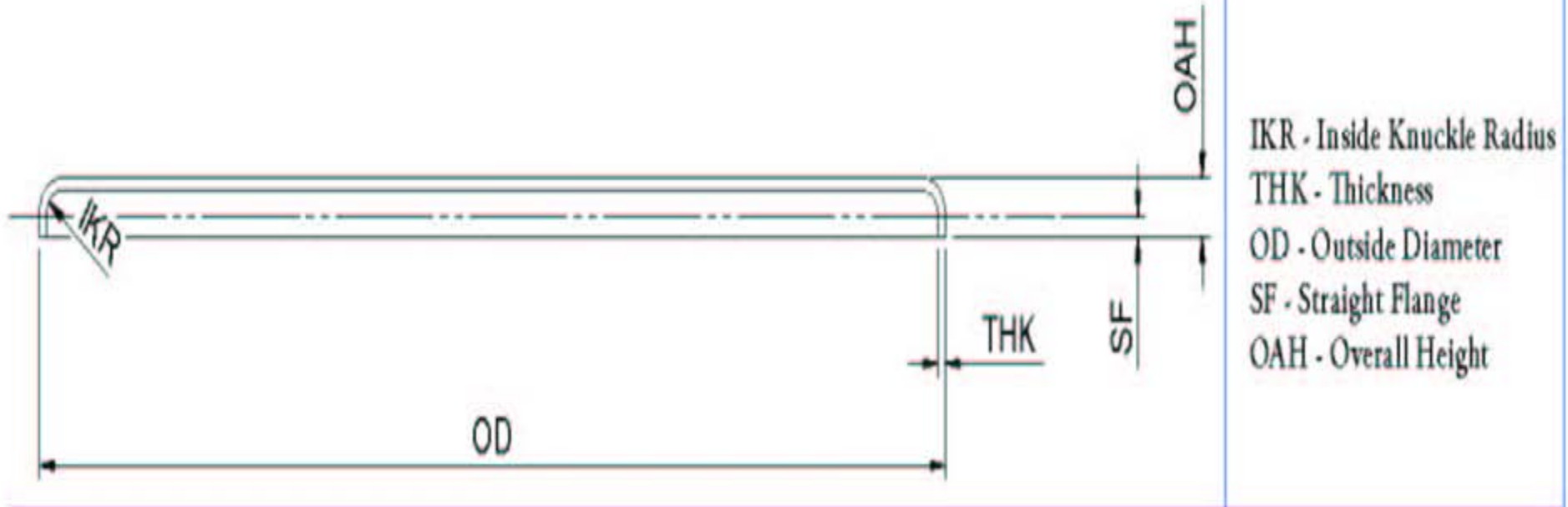


IKR - Inside Knuckle Radius  
IDR - Inside Dish Radius  
THK - Thickness  
OD - Outside Diameter  
SF - Straight Flange  
IDD - Inside Depth of Dish  
OAH - Overall Height

IKR = MIN OF 3 x THICKNESS

IDR - NORMALLY 100% OF DIAMETER

## FLANGED ONLY HEAD



IS RECOGNIZED AS A CODE HEAD

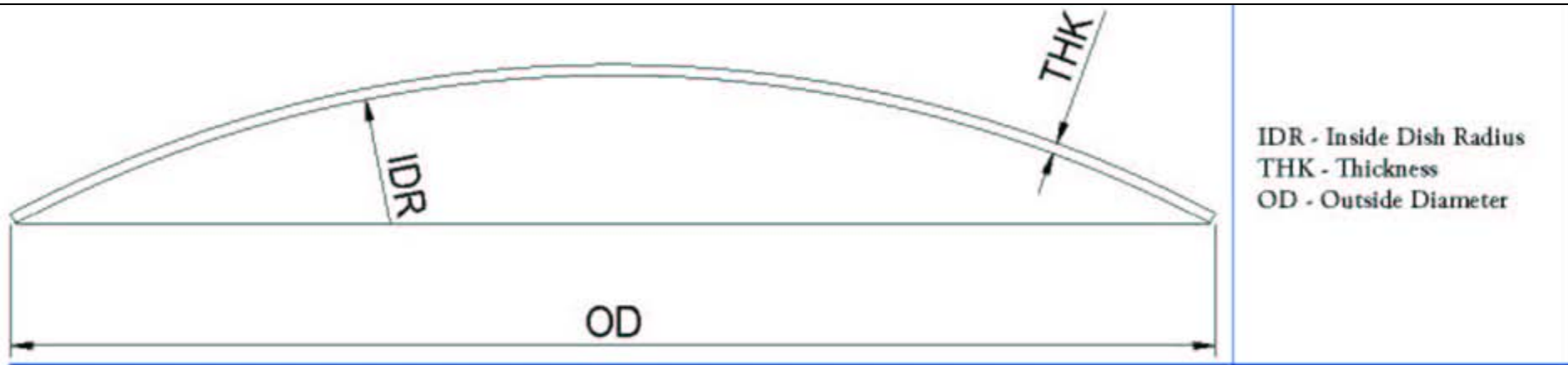
IKR CAN BE 3 x THICKNESS INSTEAD OF MIN 6% OF DIAMETER

$$OAH = THICKNESS + IKR + STRAIGHT FLANGE$$

# Flanged Only Head



## DISHED ONLY



### SPECIFICATIONS

Inside Dish Radius - Typically 100% of Diameter

Typical Thin Out Allowance -  $\frac{1}{2}$ " and Under - Add .03125" to the minimum

- Over  $\frac{1}{2}$ " - Add .0625" to the minimum

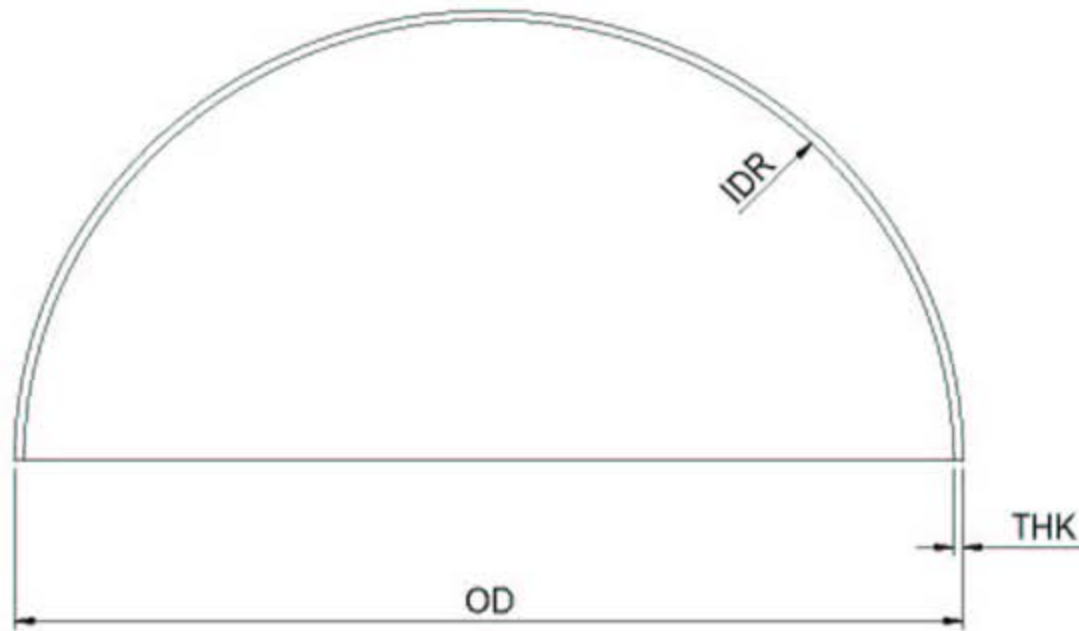
PREFER TO MAKE WITH "UNTRIMMED" EDGE

CAN PUT A "RADIAL" OR "VERTICAL" EDGE ON HEAD

# Dished Only Head



## ASME HEMI SPHERICAL HEAD



IDR - Inside Dish Radius  
THK - Thickness  
OD - Outside Diameter

$$IDR = \text{INSIDE DIAMETER} / 2$$

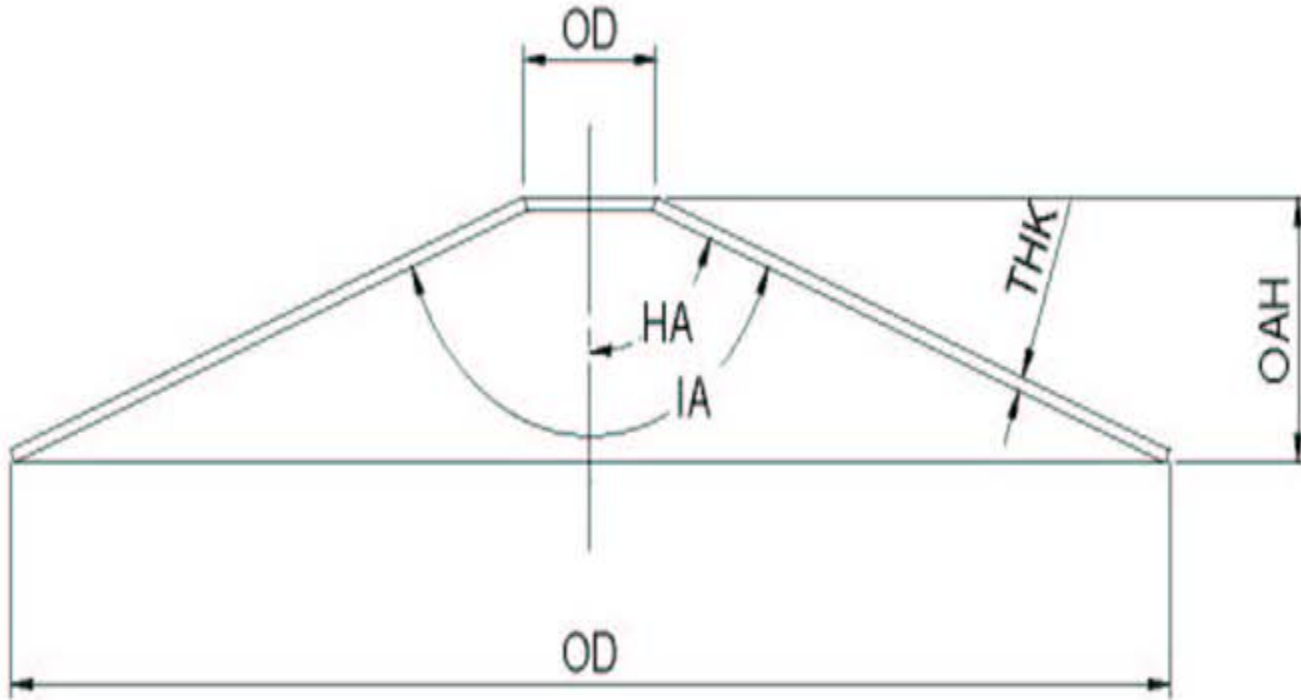
# ASME Hemispherical Head – 13'



# ASME Hemispherical Head – 360" Dia x 5/16" Thk



## CONICAL HEAD



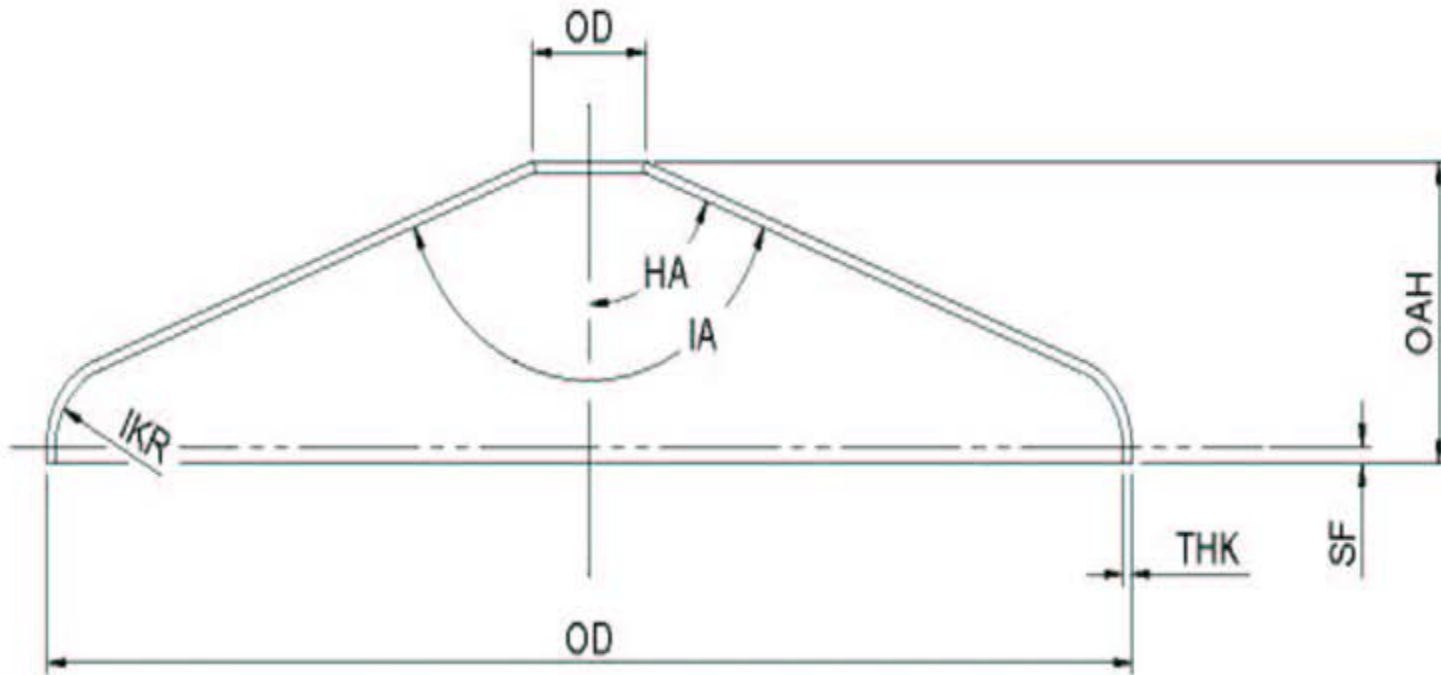
HA - Half Apex  
IA - Included Angle  
THK - Thickness  
OD - Outside Diameter  
OAH - Overall Height

INCLUDED ANGLE NORMALLY IN THE 60 – 160 DEG RANGE

# Conical Head



## ASME TORI CONICAL HEAD



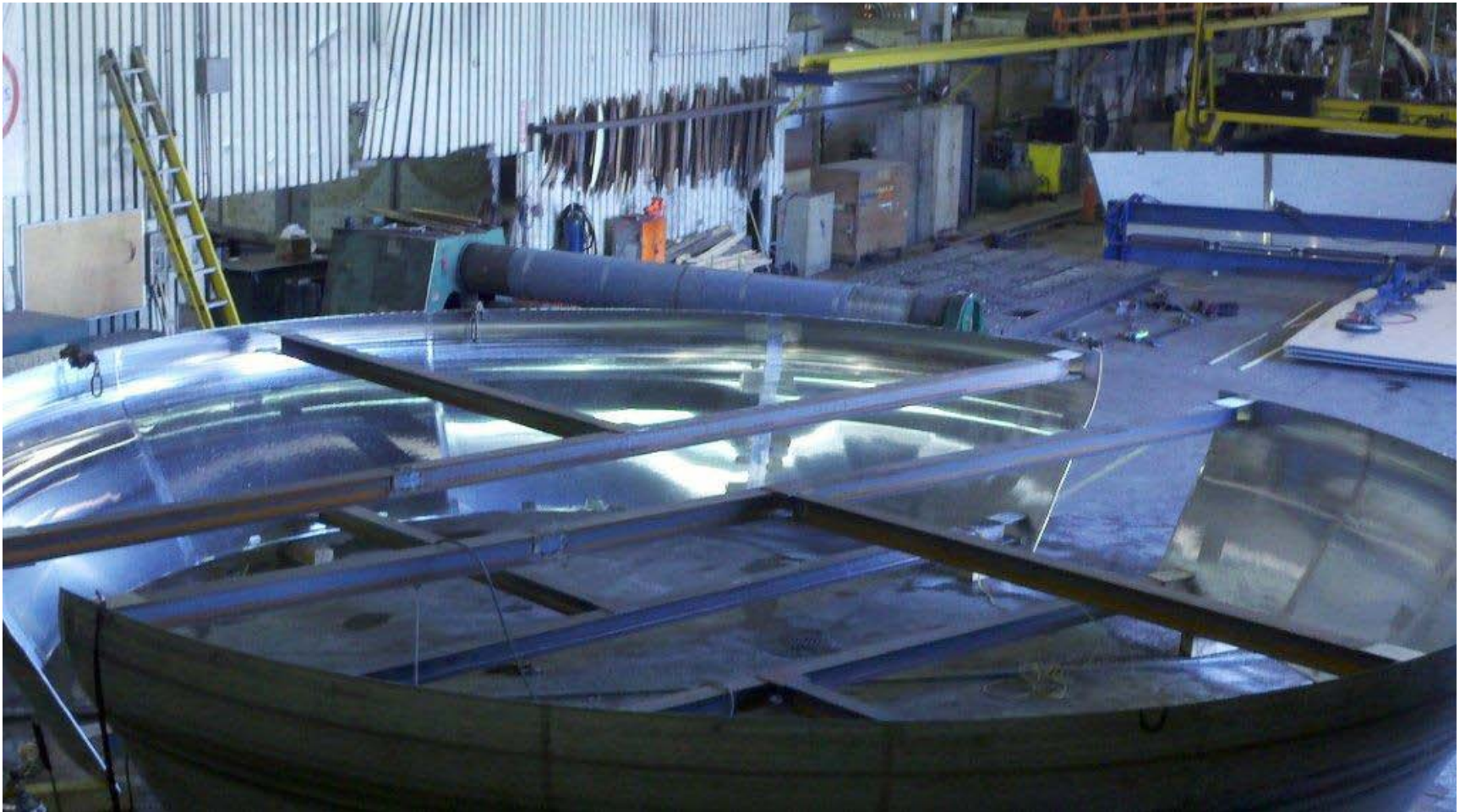
IKR - Inside Knuckle Radius  
HA - Half Apex  
IA - Included Angle  
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OAH - Overall Height

CONICAL HEAD WITH A KNUCKLE

# Flued Toriconical Head



# 354" x 0.375" Polished Toricone



# 20' x 0.75" Standard F & D Heads



# Forming Stainless Steel Heads



Thank You

