

# Flange bolt and spanner size chart

flange bolt and spanner size chart is an essential reference for professionals and DIY enthusiasts working with pipe fittings, machinery assembly, or any application involving flanges. Accurate sizing ensures proper fitting, prevents leaks, and maintains the safety and integrity of the assembly. Whether you're selecting the right bolt for a flange connection or choosing a spanner that fits perfectly, understanding the size chart is vital. This comprehensive guide will explore the key aspects of flange bolts and spanners, including standard sizes, measurement methods, and practical tips for selecting the correct tools and fasteners.

**Understanding Flange Bolts and Their Role**  
What Are Flange Bolts? Flange bolts are specialized fasteners designed to secure flanged components together, often in piping systems, pressure vessels, and machinery. They typically feature a hexagonal head and a threaded shaft, allowing for easy tightening with a spanner or wrench. Flange bolts help create a tight seal between two flanges, preventing leaks and ensuring structural stability.

**Types of Flange Bolts**  
There are various types of flange bolts, including:  
Standard Flange Bolts: Used in general applications, available in metric and imperial sizes.  
High-Strength Flange Bolts: Designed for high-pressure environments.  
Raised Face Flange Bolts: For flanges with a raised face for sealing.  
Ring-Type Flange Bolts: For flanges with a ring gasket.

**Understanding Spanners and Their Sizes**  
What Is a Spanner? A spanner, also known as a wrench, is a hand tool used to tighten or loosen fasteners like bolts and nuts. They come in various designs, such as open-end, box-end, combination, adjustable, and socket wrenches.

**Spanner Size Measurement**  
Spanner sizes are generally measured based on the width across the flats (the distance between two parallel sides of the wrench's opening) or the nut/bolt size they fit. Accurate measurement ensures the spanner will grip the fastener securely without slipping or damaging the hardware.

**Standard Size Charts for Flange Bolts and Spanners**

**Metric Flange Bolt Sizes**  
Metric flange bolts are classified by diameter (mm), thread pitch, and length. Here's a simplified chart:

| Diameter (mm) | Thread Pitch | Common Lengths (mm) | Notes                   |
|---------------|--------------|---------------------|-------------------------|
| M6            | 1.0 mm       | 12, 20, 25, 30      | Small applications      |
| M8            | 1.25 mm      | 16, 20, 25, 30      | Medium strength         |
| M10           | 1.5 mm       | 20, 25, 30, 40      | Heavy-duty applications |
| M12           | 1.75 mm      | 20, 25, 30, 50      | Industrial use          |

**Imperial Flange Bolt Sizes**  
Imperial sizes are measured in inches, with standard diameters such as:

| Diameter (inches) | Thread Type | Common Lengths (inches) | Notes       |
|-------------------|-------------|-------------------------|-------------|
| 1/4"              | UNC or UNF  | 1/2, 3/4, 1             | Light-duty  |
| 3/8"              | UNC or UNF  | 1/2, 3/4, 1             | General use |
| 1/2"              | UNC or UNF  | 1-1/2, 2                | Industrial  |
| 5/8"              | UNC or UNF  |                         | Heavy-duty  |

**Spanner Sizes and Corresponding Fastener Sizes**  
Spanner sizes are typically aligned with bolt or nut sizes:  
For M6 bolts, a spanner with a width across flats of 10-13 mm is suitable.  
For M8 bolts, a spanner of 13-17 mm is recommended.  
For M10 bolts, use a spanner measuring 17-19 mm.  
For larger sizes like M12, a spanner of 19-22 mm is appropriate.  
In imperial sizes:  
1/4" bolts require a spanner of approximately 7-8 mm.  
3/8" bolts fit a spanner of around 10-12 mm.  
1/2" bolts need a spanner of about 13-15 mm.

**Measuring and Selecting the Right Size**  
How to Measure Flange

**Bolts**To determine the correct flange bolt size:**Measure the Diameter:** Use a caliper to measure the outer diameter of the bolt threads.**Check Thread Pitch:** Use a thread gauge to determine the thread pitch.**Determine Length:** Measure from the underside of the head to the end of the threaded shaft.**Identify Material and Grade:** For high-stress applications, select bolts with appropriate strength grades.**How to Choose the Correct Spanner Size**Select a spanner that matches the size of the nut or bolt head:**Use a sizing chart or measure the flats across the nut or bolt head with a caliper.**If in doubt, opt for a spanner slightly larger to ensure a secure grip.**Adjustable spanners** are versatile for multiple sizes, but fixed sizes provide better grip for specific fasteners.**Practical Tips for Working with Flange Bolts and Spanners****Ensuring Proper Fit**Always use the correctly sized spanner to avoid stripping the bolt or nut.**Check for wear or damage before use;** replace if necessary.**Clean the fastener and spanner contacts** to prevent slipping.**Torque Specifications**Follow manufacturer guidelines for torque to ensure the flange is properly sealed.**Over-tightening** can damage the flange or bolt; **under-tightening** may lead to leaks.**Material Compatibility**Match bolt material (stainless steel, carbon steel, alloy) with application environment.**Use corrosion-resistant bolts** in moist or chemical environments.**Summary and Key Takeaways**The flange bolt and spanner size chart provides essential measurements for selecting the right fasteners and tools.**Metric and imperial sizes** serve different regions; always verify the system used in your application.**Accurate measurement of bolt diameter, thread pitch, and length** ensures proper fit and function.**Choosing the correct spanner size** based on bolt or nut dimensions enhances safety and efficiency.**Proper handling, torque application, and material selection** extend the lifespan of flange connections.**Conclusion**Having a comprehensive understanding of flange bolt and spanner sizes is crucial for any technical work involving flanged connections. By consulting size charts, using precise measuring tools, and selecting appropriately rated fasteners and tools, you can ensure secure, leak-proof, and durable assemblies. Keep this guide handy as a reference to streamline your projects, avoid common pitfalls, and achieve professional results every time.

**Flange Bolt and Spanner Size Chart: A Comprehensive Guide for Engineers and DIY Enthusiasts**In the world of mechanical assembly, piping systems, and industrial construction, understanding the precise specifications of fasteners and tools is essential for safety, efficiency, and durability. Among the crucial components are flange bolts and the corresponding spanners or wrenches needed to tighten or loosen them. This article delves into the intricacies of flange bolt and spanner size charts, providing a detailed overview that caters to engineers, technicians, and DIY enthusiasts alike.**What Is a Flange Bolt?**Before exploring size charts, it's important to comprehend what flange bolts are and their applications. A flange bolt combines a bolt with a flange—a flat, disc-shaped protrusion at the head—that acts as a washer, distributing the load over a broader surface area. This design reduces stress on the material and ensures a secure, airtight connection, especially in piping, pressure vessels, and machinery assemblies.**Key Features of Flange Bolts:****Design:** Typically hexagonal heads with an integrated flange.**Materials:** Commonly made of stainless steel, carbon steel, alloy steels, or specialty materials for corrosion resistance.**Sizes:** Varying diameters and

lengths to suit specific applications.Thread Types: Usually metric (M) or imperial (UNC/UNF) threads.The Importance of a Flange Bolt and Spanner Size ChartA size chart acts as a universal reference, simplifying the process of selecting the appropriate bolt and matching it with the right spanner or wrench. Proper pairing ensures effective torque application, prevents damage to fasteners, and maintains the integrity of the assembled components.Why is a size chart essential?Prevents mismatched tools and fasteners.Ensures safety by avoiding over-tightening or under-tightening.Saves time during assembly or maintenance.Facilitates inventory management and procurement.

Understanding Flange Bolt Size Specifications

Diameter and Pitch

Flange bolts are categorized primarily by their diameter and thread pitch:

Diameter: Usually expressed in millimeters (metric) or inches (imperial). Common metric sizes include M6, M8, M10, M12, M16, etc.

Thread Pitch: The distance between threads, e.g., 1.25mm for M6, or 0.75 inches for 1/4-inch bolts.

Length

Bolt length varies depending on application, typically measured from the bottom of the head to the end of the threaded portion. Longer bolts are used for thicker materials or multiple flange layers.

Head Size and Shape

Most flange bolts feature a hexagonal head, with sizes corresponding to the bolt's diameter:

| Bolt Diameter | Head Width Across Flats | Typical Spanner/Wrench Size |
|---------------|-------------------------|-----------------------------|
| M6            | 10mm                    | 10mm                        |
| M8            | 13mm                    | 13mm                        |
| M10           | 17mm                    | 17mm                        |
| M12           | 19mm                    | 19mm                        |
| M16           | 24mm                    | 24mm                        |

[Note: The actual spanner size may vary depending on the manufacturer and specific bolt design.]

The Spanner (Wrench) Size Chart for Flange Bolts

Choosing the correct spanner size is critical for applying proper torque and avoiding damage. The size of the spanner or wrench is generally matched to the bolt head size, but some variations exist.

Standard Hex Bolt and Spanner Size Correlation

| Bolt Diameter | Typical Spanner Size | Notes                                                            |
|---------------|----------------------|------------------------------------------------------------------|
| M6            | 10mm to 12mm         | Use a 10mm spanner for standard fit; larger for ease of turning. |
| M8            | 13mm to 14mm         | 13mm spanner is common; 14mm for tighter fit.                    |
| M10           | 17mm to 19mm         | 17mm spanner for standard; 19mm for high torque applications.    |
| M12           | 19mm to 22mm         | 19mm spanner for light work; 22mm for heavy-duty tasks.          |
| M16           | 24mm to 27mm         | 24mm spanner for standard; 27mm for high-stress environments.    |

[Metric vs. Imperial Tools]

Metric spanners are measured in millimeters and correspond directly to bolt sizes. Imperial spanners are measured in inches or fractions thereof; they are less common globally but prevalent in the United States and UK.

Adjustable Spanners

For varying bolt sizes, adjustable spanners can be used, but they may not provide the same grip and torque precision as fixed-size wrenches.

Factors Influencing Size Selection

Material and Thread Type

Stronger materials or high-torque applications may require larger spanner sizes to prevent slippage or tool damage.

Bolt Head Design

Some flange bolts have hex heads, while others feature square or specialized shapes. Always verify the head shape before selecting a spanner.

Application Environment

Corrosive or high-temperature environments may necessitate specific bolt and spanner combinations to ensure safety and longevity.

Practical Tips for Selecting the Correct Flange Bolt and Spanner Size

Always Consult Manufacturer Specifications: They provide precise size charts tailored to their products.

Measure Accurately: Use a caliper or measuring tape for bolt diameter and head size.

Use the Correct Tool: Match the spanner size

closely to the bolt head to avoid rounding off corners. Consider Torque Requirements: Larger spanners allow for higher torque application, essential for securing flanged joints. Maintain Tools and Fasteners: Keep spanners and bolts in good condition for optimal performance. Industry Standards and Certifications Various organizations provide standardized dimensions and testing protocols: ISO (International Organization for Standardization): Defines metric bolt and spanner sizes. ANSI/ASME (American National Standards Institute / American Society of Mechanical Engineers): Sets imperial size standards. DIN (Deutsches Institut für Normung): German standards for bolt sizes and tools. Adhering to these standards ensures compatibility and safety across different applications. Conclusion A well-structured flange bolt and spanner size chart is an invaluable resource for anyone involved in mechanical assembly, piping, or construction projects. By understanding the relationships between bolt diameters, thread types, and spanner sizes, professionals can ensure proper fit, safety, and efficiency. Whether you're selecting fasteners for a new installation or performing maintenance on existing systems, referencing a comprehensive size chart helps prevent errors, reduces downtime, and guarantees the longevity of your assemblies. In essence, mastery of flange bolt and spanner sizing is a fundamental skill that enhances precision and safety in engineering tasks. Keep a detailed chart at hand, verify specifications diligently, and always use the appropriate tools for the job? your systems will thank you with reliable performance and extended lifespan.

## QuestionAnswer

What is a flange bolt and how is it different from a regular bolt?

A flange bolt has a built-in washer-like flange beneath the head that distributes load and provides a secure fit, making it ideal for flange connections. Unlike regular bolts, flange bolts simplify assembly by eliminating the need for separate washers.

How do I determine the correct spanner size for flange bolts?

The spanner size should match the bolt head size. To find the right spanner, measure the bolt head diameter or refer to the flange bolt size chart, which lists the appropriate spanner sizes for various bolt diameters.

Where can I find a reliable flange bolt and spanner size chart?

Reliable size charts can be found in manufacturer catalogs, engineering handbooks, or reputable hardware supplier websites. Many online resources also provide downloadable flange bolt and spanner size charts for quick reference.

What are common flange bolt sizes used in industrial applications?

Common flange bolt sizes range from M6 to M30 in metric sizes and 1/4 inch to 1-1/2 inch in imperial sizes, depending on the application. The specific size depends on the flange diameter and load requirements.

How do I read a flange bolt size chart?

A flange bolt size chart typically lists the bolt diameter, length, thread pitch, and corresponding spanner size. It helps you select the correct bolt and spanner based on application needs and measurements.

Why is it important to use the correct spanner size for flange bolts?

Using the correct spanner size ensures proper torque application, prevents damage to the bolt or spanner, and ensures a secure connection. An incorrect size can lead to slipping or stripping of the bolt head.

Can I use a socket wrench instead of a spanner for flange bolts?

Yes, a socket wrench can be used if the socket matches the bolt head size. It's important to select the correct socket size from the flange bolt size chart to avoid damaging the bolt.

Are flange bolt size charts standardized across manufacturers?

While many standards exist, size charts can vary slightly between manufacturers. It's best to consult the specific manufacturer's chart or specifications to ensure compatibility and proper sizing.

How do I convert between metric and imperial flange bolt sizes?

Conversion involves using standard conversion factors: 1 inch equals 25.4 mm. For example, an M6 bolt (6 mm diameter) is approximately 1/4 inch. Refer to size charts that provide both metric and imperial equivalents for accuracy.

What safety considerations should I keep in mind when selecting flange bolts and spanners?

Always select the correct size and grade of flange bolts and matching spanners to ensure proper torque and secure fastening. Use appropriate personal protective equipment and follow manufacturer guidelines to prevent accidents.

Related keywords: flange bolt sizes, spanner size chart, bolt diameter, flange bolt dimensions, spanner wrench sizes, bolt thread chart, flange fastener sizes, spanner tool dimensions, bolt size guide, flange hardware chart

## Ansi flange bolt torque

ANSI flange bolt torque is a critical parameter in ensuring the safety, integrity, and performance of flange connections in various piping and mechanical systems. Proper torque application is essential to prevent leaks, mechanical failures, and potential safety hazards, especially in industries such as oil and gas, chemical processing, power generation, and water treatment. Understanding the principles behind ANSI flange bolt torque, including the correct procedures, torque specifications, and factors influencing torque values, is vital for engineers, technicians, and maintenance personnel involved in flange assembly and maintenance.

**Understanding ANSI Flange Standards and Their Importance**

**What Are ANSI Flanges?** ANSI (American National Standards Institute) provides standardized specifications for flanges used across multiple industries. These standards ensure compatibility, safety, and performance consistency. ANSI flanges include various types such as slip-on, weld neck, blind, threaded, and lap joint, each specific to different application needs.

**Why Are ANSI Flange Standards Important?** Adhering to ANSI standards guarantees that flanges and their bolt assemblies meet established criteria for dimensions, pressure ratings, and material specifications. This uniformity facilitates safe assembly and maintenance, reduces the risk of flange leaks, and ensures that bolt torque values are appropriate for the flange type and application.

**The Significance of Correct Bolt Torque in ANSI Flanges**

**What Happens When Bolt Torque Is Improper?** Incorrect bolt torque can have serious consequences, including:

- Leaks due to insufficient sealing force
- Damage to flange components from over-tightening
- Unequal load distribution leading to gasket failure
- Reduced system reliability and safety

**The Role of Proper Bolt Torque** Proper torque ensures the correct clamping force to compress the gasket uniformly, providing a reliable seal without damaging the flange or bolts. It also helps in achieving optimal load distribution across all bolts, which is crucial for flange integrity under operating conditions.

**Factors Influencing ANSI Flange Bolt Torque**

**Material of Bolts and Flanges** Different materials have varying strength properties. For example, stainless steel bolts require different torque values compared to carbon steel bolts due to differences in tensile strength and ductility.

**Size and Grade of Bolts** Bolt size (diameter and length) and grade (e.g., Grade 5, Grade 8) significantly affect the torque needed. Larger or higher-grade bolts typically require higher torque to achieve the same clamping force.

**Type of Gasket and Flange** The gasket material and flange design influence the torque required for an effective seal. Soft gaskets may require less torque, while metal gaskets need higher torque levels.

**Lubrication Conditions** Lubricated threads and flange surfaces reduce friction, which affects the torque required to achieve the desired bolt tension. Proper lubrication can help attain more accurate torque values.

**Operating Conditions** Temperature, pressure, and fluid type can impact bolt tension and

sealing requirements. High-temperature or high-pressure environments may necessitate adjustments in torque application.

### ANSI Flange Bolt Torque Specifications

#### Standard Torque Values

ANSI provides torque guidelines based on bolt size, grade, and application. While specific values may vary depending on standards like ASME B16.5 or B16.47, general torque ranges are available for common bolt sizes.

| Bolt Size        | Approximate Torque Range (ft-lb) |
|------------------|----------------------------------|
| 1/2-inch bolts   | 20-30                            |
| 3/4-inch bolts   | 35-50                            |
| 1-inch bolts     | 75-95                            |
| 1-1/2-inch bolts | 150-200                          |

Note: Always refer to the manufacturer's specifications and relevant standards for precise torque values.

#### Using Torque Tables and Charts

Torque tables are valuable tools that correlate bolt diameter, material, and gasket type to recommended torque values. They help ensure consistency and safety during flange assembly.

### Best Practices for Applying ANSI Flange Bolt Torque

#### Preparation and Inspection

Before tightening: Ensure flange surfaces are clean and free of debris or defects. Check bolt and gasket compatibility. Lubricate threads if recommended.

#### Torque Application Techniques

Proper techniques include: Using calibrated torque wrenches for accuracy. Applying torque in multiple passes (e.g., a torque sequence). Using a star or cross pattern to tighten bolts evenly.

#### Torque Sequencing and Pattern

Follow a specific sequence, such as: Start with all bolts finger-tight. Gradually tighten bolts in a crisscross pattern to half of the final torque. Complete the tightening in the same pattern to reach the final torque.

#### Final Inspection

After torque application: Recheck torque values to account for settling or relaxation. Inspect flange surface for uneven contact or deformation.

### Tools and Equipment for Achieving Proper ANSI Flange Bolt Torque

#### Torque Wrenches

Precision torque wrenches are essential for applying accurate torque. Types include: Click-type torque wrenches. Beam torque wrenches. Digital torque wrenches.

#### Lubricants and Thread Compounds

Using appropriate lubricants reduces friction and helps achieve target torque values. Always select lubricants compatible with the flange and gasket materials.

### Proper Training and Procedures

Ensure personnel are trained in torque application techniques and understand the importance of following established procedures to prevent over- or under-tightening.

### Common Challenges and Troubleshooting

| Challenge                 | Cause                                           | Solution                                                                         |
|---------------------------|-------------------------------------------------|----------------------------------------------------------------------------------|
| Uneven Flange Contact     | Warped or damaged flange surfaces               | Inspect and repair flange surfaces before assembly; use proper gasket materials. |
| Gasket Blowout or Leakage | Insufficient torque or uneven tightening        | Re-tighten bolts following proper sequence; verify torque values.                |
| Bolt Failure or Breakage  | Over-tightening or using incompatible materials | Use correct torque, materials, and inspect bolts regularly.                      |

### Conclusion

Achieving the correct ANSI flange bolt torque is fundamental to ensuring flange integrity, preventing leaks, and maintaining safety in industrial piping systems. By understanding the standards, factors influencing torque, and best practices for application, professionals can optimize flange assembly procedures. Always consult relevant ANSI and ASME standards, use proper tools, and follow systematic tightening sequences for the best results. Proper attention to bolt torque not only extends the lifespan of piping components but also safeguards personnel and the environment from potential failures and hazards.

ANSI Flange Bolt Torque: An In-Depth Guide to Proper Application and Best Practices

Ensuring the

correct torque application on ANSI flange bolts is critical in maintaining the integrity, safety, and longevity of piping systems, pressure vessels, and industrial equipment. Proper torque prevents leaks, reduces the risk of bolt failure, and ensures compliance with industry standards. This comprehensive review delves into the nuances of ANSI flange bolt torque, exploring standards, calculation methods, best practices, and common pitfalls to help engineers, technicians, and maintenance professionals optimize their flange assembly procedures.

### Understanding ANSI Flange Standards and Their Significance

ANSI (American National Standards Institute) establishes a set of guidelines and specifications that ensure consistency, safety, and performance across industrial components. For flanges, ANSI/ASME B16.5 and B16.47 are among the most widely adopted standards, defining dimensions, pressure ratings, materials, and testing requirements.

#### Key aspects of ANSI flange standards include:

- Design specifications:** Dimensions, bolt hole patterns, pressure ratings
- Material specifications:** Carbon steel, stainless steel, alloy steels, etc.
- Assembly guidelines:** Bolt torque values, gasket types, flange surface finishes
- Testing and inspection protocols:** Hydrostatic testing, visual inspections

Adhering to ANSI standards ensures that bolted flange assemblies are constructed reliably, with predictable performance under specified operating conditions.

### The Importance of Proper Flange Bolt Torque

Applying the correct torque to flange bolts is fundamental for several reasons:

- Sealing integrity:** Adequate torque compresses the gasket sufficiently to prevent leaks.
- Mechanical stability:** Ensures uniform load distribution across bolts, reducing stress concentrations.
- Component longevity:** Prevents over-tightening, which can deform flanges or damage bolts, and under-tightening, which leads to leaks and joint failure.
- Safety compliance:** Meets industry safety standards and avoids costly downtime or accidents.

Incorrect torque application can lead to gasket blowouts, flange warping, bolt breakage, or leakage, all of which compromise system performance and safety.

### Factors Influencing ANSI Flange Bolt Torque

Multiple variables impact the torque required for proper flange bolt tightening:

- Bolt Material and Grade**  
Different bolt materials and grades possess varying tensile strengths and elastic properties. For example:
  - Carbon steel bolts:** Commonly used; have predictable torque values.
  - Stainless steel bolts:** Generally more resistant to corrosion but may require different torque parameters.
  - High-grade alloy bolts:** Offer higher strength, necessitating adjustments in torque calculations.
- Flange Size and Pressure Class**  
Larger flanges or those rated for higher pressures typically require higher torque values to achieve proper gasket compression.
- Gasket Type and Material**  
Gasket properties influence the torque needed:
  - Soft gaskets:** Require less torque.
  - Reinforced or composite gaskets:** May need higher torque for proper sealing.
  - Rubber or elastomeric gaskets:** Often require specific torque specifications to avoid crushing.
- Surface Finish and Flatness**  
Smooth, machined flange surfaces facilitate uniform gasket compression at lower torque levels. Surface imperfections or unevenness can necessitate higher torque to compensate.
- Lubrication**  
Lubricating bolts reduces friction, allowing for more accurate torque application. The type and amount of lubricant can significantly influence torque values:
  - Untreated bolts:** Higher torque needed due to higher friction.
  - Lubricated bolts:** Lower torque values needed; this reduces the risk of over-tightening.
- Ambient Conditions**  
Temperature, humidity, and corrosion conditions may affect bolt material properties and, consequently, torque requirements.

### Calculating and Applying ANSI Flange Bolt Torque

Achieving the correct bolt tension involves understanding torque values, which

are often derived from bolt load calculations and friction factors.

1. Reference to Standard Torque Tables Industry standards and manufacturer specifications provide torque tables based on bolt diameter, grade, and lubrication level. For example:

| Bolt Diameter | Grade | Lubrication | Torque Range (ft-lb) | Torque Range (Nm) |
|---------------|-------|-------------|----------------------|-------------------|
| 1/2"          | 2-4   | Dry         | 15 - 25              | 20 - 34           |
| 1/2"          | 2-4   | Lubricated  | 10 - 20              | 14 - 27           |
| 1"            | 8-10  | Dry         | 150 - 200            | 203 - 271         |

Note: Always refer to specific industry or manufacturer tables for precise values.

2. The Torque-Force Relationship Torque (T) is related to bolt preload (F) via the equation:

$$T = K \times F \times d$$

Where:

- ( T ) = torque
- ( K ) = torque coefficient (friction factor, typically between 0.15 and 0.20)
- ( F ) = desired bolt preload (force)
- ( d ) = bolt diameter

Adjusting ( K ) based on lubrication and surface finish is essential for accurate calculations.

3. Achieving Proper Bolt Tension Use a calibrated torque wrench: Ensures application accuracy. Follow a tightening sequence: Usually a star or cross pattern to distribute load evenly. Apply torque in multiple stages: Gradually increase torque to reduce uneven gasket compression. Consider torque plus turn methods: For critical applications, a combination of torque application followed by a specified turn (e.g., 1/4 turn) ensures optimal gasket compression.

4. Alternative Methods for Bolt Tightening Direct tension measurement: Using a bolt load cell or tensioner. Ultrasonic measurement: To verify bolt elongation and preload directly. Hydraulic tensioners: For high-pressure, large-diameter flanges.

Best Practices for Flange Bolt Torque Application Effective flange assembly hinges on meticulous procedures:

1. Pre-assembly Checks Verify flange and gasket cleanliness. Ensure flange surfaces are flat and free of defects. Confirm bolt and nut integrity and proper matching of materials. Apply recommended lubrication if specified.
2. Tightening Sequence and Pattern Use a star or spiral pattern to tighten bolts incrementally. Begin with hand tightening, followed by torque wrench application. Tighten bolts in small, equal steps, gradually approaching the target torque. Repeat the sequence until all bolts reach the specified torque.
3. Use of Proper Tools Torque wrenches calibrated regularly. Appropriate socket sizes and extensions. Torque multipliers or tensioners for high loads.
4. Monitoring and Verification Check torque periodically after initial tightening. For critical joints, perform bolt tension verification with ultrasonic or tensioning tools. Document torque values and tightening procedures for quality assurance.
5. Post-assembly Inspection Conduct leak tests (hydrostatic or pneumatic). Inspect for signs of gasket failure or flange distortion. Re-torque bolts if necessary after initial operation (due to gasket relaxation or settling).

Common Challenges and Troubleshooting Despite best practices, issues may arise:

- Uneven gasket sealing: Caused by improper flange flatness or uneven bolt tightening.
- Bolt or flange deformation: Over-tightening or excessive torque application.
- Corrosion or galling: Use of incompatible materials or insufficient lubrication.
- Inconsistent torque readings: Calibration errors or tool inaccuracies.

Solutions include:

- Ensuring proper flange surface finish and flatness.
- Using lubricated bolts and nuts compatible with the flange material.
- Regularly calibrating torque tools.
- Following standardized tightening sequences.

Industry Standards and Recommendations Adherence to authoritative standards ensures safety and performance:

- ASME B16.5 and B16.47: Provide detailed torque tables and assembly procedures.
- API (American Petroleum Institute): Offers guidelines for high-pressure and critical service applications.
- Manufacturer specifications: Always consult specific product

datasheets. Recommendations: Always torque bolts to the values specified for the specific flange rating and application. Use calibrated torque tools. Document procedures and results for traceability. Regularly review and update procedures based on new standards or technological advances. Conclusion ANSI flange bolt torque is a fundamental aspect of industrial piping and equipment assembly that directly impacts safety, efficiency, and system longevity. Proper understanding of the standards, factors influencing torque, and best practices for application can drastically reduce the risk of leaks, joint failure, and costly downtime. By integrating precise calculations, meticulous procedures, and adherence to industry guidelines, professionals can ensure their flange assemblies perform reliably under demanding operational conditions. Investing in proper training, quality tools, and thorough documentation will not only improve assembly quality but also foster a culture of safety and excellence in industrial operations. Whether working on small-scale systems or massive high-pressure pipelines, mastering the nuances of ANSI flange bolt torque is an essential skill for engineers and technicians committed to operational integrity.

## QuestionAnswer

What is the recommended torque for ANSI flange bolts?

The recommended torque for ANSI flange bolts varies depending on the bolt size and material, but typically ranges from 30 to 150 ft-lb. Always refer to the specific torque chart for the bolt diameter and material to ensure proper tightening.

How does bolt torque impact flange sealing performance?

Proper bolt torque ensures adequate gasket compression, preventing leaks and maintaining flange integrity. Under-tightening can lead to leaks, while over-tightening may damage the flange or gasket.

What are the consequences of over-torquing ANSI flange bolts?

Over-torquing can cause flange deformation, gasket damage, or bolt failure, leading to leaks, equipment damage, and increased maintenance costs.

What tools are recommended for achieving accurate ANSI flange bolt torque?

Use calibrated torque wrenches designed for the specific torque range, along with proper lubrication and tightening sequences to ensure uniform bolt tension.

How does bolt material affect the torque requirements for ANSI flanges?

Different bolt materials have varying strength and elasticity, which influence torque values. For example, stainless steel bolts may require different torque settings compared to carbon steel bolts, so always consult manufacturer guidelines.

Are there specific torque procedures for flange bolt tightening in ANSI standards?

Yes, ANSI standards recommend uniform, incremental tightening in a crisscross pattern, often called torquing in multiple stages, to achieve even gasket compression and optimal sealing. Always follow the specific procedure outlined in the relevant ANSI code or manufacturer instructions.

Related keywords: ansi flange bolt torque, bolt torque specifications, flange bolt tightening, ANSI flange standards, bolt torque chart, flange assembly torque, bolt tightening procedure, flange gasket torque, bolt preload torque, ANSI flange dimensions

## Pipe flange stud bolt spanner size

Pipe flange stud bolt spanner size is a critical parameter in the installation, maintenance, and assembly of piping systems. Proper understanding and selection of the correct spanner size ensure secure fastening, prevent leaks, and extend the lifespan of pipe flanges and their associated components. Whether you are an engineer, technician, or maintenance professional, knowing how to determine the appropriate spanner size for stud bolts is essential for efficient and safe operations.

**Understanding Pipe Flange and Stud Bolt Basics**

**What Are Pipe Flanges?** Pipe flanges are mechanical fittings used to connect pipes, valves, pumps, and other equipment within a piping system. They provide a reliable and removable joint, allowing for easy assembly, disassembly, inspection, and maintenance.

**What Are Stud Bolts and Their Role?** Stud bolts are threaded rods used to secure flanges together. They are inserted through aligned holes in flanges and tightened with nuts to create a leak-proof seal. Proper torque and fitting are vital to ensure the integrity of the connection.

**Importance of Correct Spanner Size** The spanner (or wrench) size used for tightening or loosening stud bolts directly impacts the efficiency and safety of assembly. An incorrect spanner size can lead to stripping threads, uneven tightening, or incomplete sealing.

**Determining the Correct Spanner Size for Stud Bolts**

**Key Factors to Consider**

Before selecting a spanner size, consider the following:

- Diameter of the stud bolt (nominal size)**
- Thread pitch and type**
- Head type of the bolt (hex, square, etc.)**
- Material and corrosion resistance**
- Application specifications and standards (e.g., ASME, ASTM)**

**Standard Sizes and Measurements**

Spanners are typically sized according to the dimensions of the bolt head or nut they are intended to fit. Common standards include:

- Hexagon bolt heads:** measured across flats (AF)
- Socket or wrench sizes:** in millimeters or inches correlating with AF measurements

For example, a bolt with a 19 mm across flats head requires a spanner of

approximately 19 mm. Measuring the Spanner Size To determine the appropriate spanner size: Measure the distance across the flats of the bolt head or nut using a caliper or a ruler. Match this measurement to a standard spanner or wrench size. Check the compatibility with your tools and ensure the spanner grips the bolt securely without slipping.

**Common Types of Spanners for Pipe Flange Stud Bolts**

- Open-End Wrenches** Designed to fit over the hexagonal head of the bolt or nut. Suitable for quick tightening or loosening. Available in fixed sizes corresponding to bolt dimensions.
- Box-End Wrenches** Enclose the entire head, providing a more secure grip. Ideal for applying higher torque without slipping. Usually come in fixed sizes matching bolt head measurements.
- Combination Wrenches** Feature an open-end on one side and a box-end on the other. Provide versatility for different tasks.
- Socket Wrenches** Use a ratchet mechanism for efficient tightening. Compatible with various socket sizes matching bolt dimensions. Highly recommended for repetitive work or high-torque applications.
- Specialized Flange Spanners** Designed specifically for flange applications. May feature adjustable or specialized jaw designs for different flange types.

**Standard Dimensions and Industry Guidelines**

**ANSI/ASME Standards** The American National Standards Institute (ANSI) and the American Society of Mechanical Engineers (ASME) set guidelines for bolt and nut sizes in piping systems. These standards specify:

- Nominal bolt sizes (e.g., 1/2", 3/4", 1")
- Thread pitch and diameter
- Recommended spanner sizes for each bolt type

**Metric Standards** Internationally, metric sizes are expressed in millimeters, such as M8, M10, M12, etc. Corresponding spanner sizes are typically equal to the bolt's width across flats.

| Common Flange Sizes and Corresponding Spanner Sizes |                       |
|-----------------------------------------------------|-----------------------|
| Nominal Size                                        | Typical Spanner Size  |
| 1/2"                                                | 13 mm or 1/2" spanner |
| 3/4"                                                | 19 mm or 3/4" spanner |
| 1"                                                  | 22 mm or 1" spanner   |
| M8                                                  | 13 mm spanner         |
| M10                                                 | 17 mm spanner         |

[Note: Always verify the actual bolt head dimensions, as manufacturing tolerances may vary.]

**Tools and Best Practices for Working with Stud Bolts and Flanges**

- Choosing the Right Spanner** Match the spanner size precisely to the bolt head. Use adjustable spanners cautiously; fixed sizes are preferred for accuracy. For high-torque applications, use socket or box-end wrenches.
- Ensuring Proper Tightening** Follow torque specifications provided by standards or manufacturer guidelines. Use calibrated torque wrenches to achieve the correct tightening force. Tighten in stages if multiple bolts are involved to ensure even pressure.
- Maintenance and Inspection** Regularly inspect bolt heads and nuts for wear or damage. Replace worn or damaged spanners to prevent slipping or stripping. Keep tools clean and free of debris to ensure a secure fit.

**Conclusion** Understanding the pipe flange stud bolt spanner size is fundamental for anyone involved in piping system assembly and maintenance. Correct sizing ensures effective torque application, seals, and safety. Always measure bolt dimensions accurately, adhere to industry standards, and select the appropriate tool type to achieve optimal results. Proper tool selection and usage not only facilitate efficient work but also prolong the lifespan of piping components and prevent costly failures. By following these guidelines and standard practices, professionals can confidently select the right spanner size for any pipe flange stud bolt, ensuring secure connections and reliable system operation.

Pipe Flange Stud Bolt Spanner Size: An In-Depth Investigation

In the realm of industrial piping systems, ensuring the integrity and safety of connections is paramount. Among the critical components that facilitate secure pipe jointing are flange assemblies, which rely heavily on proper torqueing of stud bolts. Central to the efficiency and safety of this process is the pipe flange stud bolt spanner size—a seemingly simple specification that carries significant weight in installation, maintenance, and operational safety. This comprehensive investigation aims to explore the nuances of spanner sizes for pipe flange stud bolts, addressing their importance, standardization, selection criteria, and practical implications.

**Understanding Pipe Flange Stud Bolt Spanner Size**

Before delving into specifics, it is essential to define what the spanner size entails in the context of pipe flange stud bolts. Spanner size refers to the dimensions of the tool—typically a spanner, wrench, or socket—used to tighten or loosen the stud bolts securing pipe flanges. It directly correlates to the bolt's head or nut size, dictating the compatibility and effectiveness of the tool during assembly and maintenance. In practical terms, the spanner size is often expressed as the width across flats (WAF) measurement, which indicates the distance between two parallel sides of the bolt head or nut. This dimension must precisely match the spanner or socket used to prevent damage and ensure proper torque application.

**Significance of Correct Spanner Size in Flange Assembly**

Choosing the correct spanner size is more than a matter of convenience; it is a critical factor affecting:

- Assembly Integrity:** Proper fit ensures even distribution of torque, reducing risks of uneven tightening.
- Safety:** Incorrect spanner size may slip or strip, risking injury or failure.
- Equipment Longevity:** Proper torque application extends the lifespan of bolts and flanges.
- Operational Efficiency:** Accurate tool fit minimizes time and effort during maintenance.

Failure to use the correct spanner size can lead to several issues, including bolt stripping, uneven gasket compression, flange leakage, or even catastrophic joint failure.

**Standardization of Spanner Sizes for Pipe Flange Stud Bolts**

Standardization is essential for ensuring compatibility across different manufacturers and industries. The most commonly referenced standards include:

- ASME B16.5 and B16.47:** These American standards specify dimensions for flanges, including bolt sizes.
- ANSI/ASME B1.1 and B18.2.2:** Define thread sizes and nut dimensions.
- ISO 7005 and EN 1515:** European standards for flange dimensions and bolt sizes.

In these standards, bolt and nut sizes are specified in metric (millimeters) or imperial (inches), with corresponding spanner sizes.

**Typical Spanner Sizes for Common Flange Classes**

| Flange Class | Nominal Diameter      | Typical Stud Bolt Size | Spanner Size (WAF) | Common Tool Type                  |
|--------------|-----------------------|------------------------|--------------------|-----------------------------------|
| 150 (PN10)   | 2"   ½" - 2"          | 13mm - 24mm            | Socket/Wrench      | 1" - 4"   2" - 8"   3" and larger |
|              | 300 (PN40)            | 24mm - 46mm            | Socket/Wrench      |                                   |
| 600 (PN100)  | 1" - 4"   46mm - 70mm | Heavy-duty Wrench      | 900 and above      | Large Spanner/Socket              |
|              | 70mm and above        |                        |                    |                                   |

**Note:** These sizes are approximate; actual specifications depend on the manufacturer and flange standard.

**Determining the Correct Spanner Size: Factors and Practices**

Selecting the appropriate spanner size hinges on multiple factors:

- Bolt or Nut Diameter:** The primary determinant is the bolt or nut size, standardized across industry norms. For example, a ¾" bolt typically requires a spanner size of approximately 19mm or ¾"

wrench. Thread Type and Pitch Different thread types (e.g., UNC, UNF, BSP, NPT) influence the nut's dimensions, which in turn affect spanner size. Precision in matching thread standards prevents cross-threading and damage. Material and Manufacturer Specifications Some materials (e.g., stainless steel, alloy steel) and manufacturers may have slightly different dimensions due to manufacturing tolerances. Always consult manufacturer documentation for exact sizes. Application and Load Conditions High-pressure and high-temperature applications may require specialized tools and precise torque application, emphasizing the importance of the correct spanner size. Availability of Tools Ensure that the available spanner or socket sizes match the bolt dimensions. For large bolts, specialized heavy-duty tools may be necessary. Practical Steps for Selection: Measure the Nut or Bolt Head: Use a caliper or precision ruler to determine the WAF. Consult Standards: Cross-reference measurements with relevant standards. Use the Correct Tool Type: Choose between open-end wrenches, box-end, socket sets, or specialized flange spanners. Verify Fit Before Use: Always test the tool fit on the bolt or nut before applying torque. Common Tools and Their Compatibility with Spanner Sizes Understanding the relationship between spanner sizes and tools enhances operational efficiency: Open-End Wrenches: Suitable for quick adjustments; limited reach. Box-End Wrenches: Provide better grip and torque. Socket Sets: Offer versatility, especially for confined spaces. Adjustable Wrenches: Useful but may not provide the precision needed for high-torque applications. Specialized Flange Spanners: Designed for large bolts and high-pressure environments; often custom-made. Choosing the right tool ensures safety, precision, and longevity of the connection. Implications of Incorrect Spanner Size Selection Mistakes in selecting the spanner size can lead to: Bolt Stripping: Caused by using a spanner that's too small or too large. Cross-Threading: Damaging threads, leading to leaks or joint failure. Increased Assembly Time: Due to slipping or tool mismatch. Component Damage: Damaged nuts or bolts may need replacement, increasing costs. Safety Hazards: Slips and tool failure can cause injuries. Therefore, meticulous measurement and adherence to standards are vital. Case Study: Industry Practices in Spanner Size Selection A survey of industry practices reveals common approaches: Standardized Tool Kits: Many facilities maintain a set of tools matching standard flange sizes. Regular Calibration: Tools are inspected periodically to ensure sizing accuracy. Manufacturer Guidelines: Following manufacturer specifications for bolt and nut sizes. Training and Protocols: Technicians are trained to measure and select appropriate tools meticulously. This systematic approach minimizes errors and maximizes safety. Emerging Trends and Innovations Advancements in technology and standards influence spanner size considerations: Digital Measurement Tools: Laser and digital calipers improve measurement accuracy. Universal Spanner Designs: Adjustable and modular tools accommodate multiple sizes. Material Innovations: Use of corrosion-resistant materials enhances tool longevity. Automation and Robotics: Automated tightening systems utilize pre-set torque parameters aligned with bolt sizes. These innovations aim to streamline flange assembly processes, improve safety, and reduce errors. Conclusion: The Critical Role of Accurate Spanner Sizing in Pipe Flange Applications The pipe flange stud bolt spanner size is a fundamental parameter that underpins the integrity, safety, and efficiency of piping systems. Proper selection based on standardized dimensions, precise measurement, and adherence to best practices is essential for successful flange assembly and maintenance. As industries evolve with technological innovations and stricter

standards, the importance of accurate, compatible spanner sizing becomes even more pronounced. Whether in oil and gas, chemical processing, power generation, or water treatment, meticulous attention to this seemingly small detail can prevent costly failures, ensure safety, and extend equipment lifespan. In conclusion, understanding and applying correct spanner sizes is not merely a matter of convenience but a critical aspect of industrial safety and operational excellence. Continuous training, standard adherence, and embracing technological advancements are vital for professionals involved in flange assembly and maintenance.

References: ASME B16.5: Pipe Flanges and Flanged Fittings  
ASME B16.47: Large Diameter Steel Flanges  
ISO 7005: Steel Flanges  
EN 1515: Steel Flanges for Pipes  
ASTM Standards for Bolt and Nut Dimensions  
Industry best practices from leading piping manufacturers

## QuestionAnswer

What is the standard size range for pipe flange stud bolts?

Pipe flange stud bolts typically range from M6 to M30 in diameter, with lengths varying based on flange and pipe specifications, following standards like ANSI, ASME, or DIN.

How do I determine the correct spanner size for installing pipe flange stud bolts?

The spanner size should match the bolt head or nut size. Measure the bolt or nut across flats using a caliper, then select a spanner or wrench that fits snugly to prevent slipping or damage.

Are there specific spanner sizes recommended for common pipe flange stud bolts?

Yes, common sizes like M12, M16, and M20 bolts typically require spanners or wrenches of corresponding sizes like 17mm, 19mm, and 22mm respectively, but always verify with precise measurements.

Can I use an adjustable spanner for pipe flange stud bolts?

Yes, adjustable spanners can be used, especially for different sizes, but for better grip and torque, fixed-size spanners or wrenches matching the bolt size are recommended.

What factors influence the choice of spanner size for pipe flange stud bolts?

Factors include bolt diameter, nut size, flange type, and the required torque. Accurate measurement of the bolt or nut flats is essential for selecting the proper spanner size.

Is there a standard chart that correlates bolt stud sizes with spanner sizes?

Yes, many industry standards and tool charts provide correlations between bolt sizes and appropriate spanner or wrench sizes for efficient installation and removal.

How does the material of the bolt or flange affect spanner size selection?

Material does not typically affect spanner size, but softer materials may require careful handling to avoid damage, and using the correct size wrench ensures proper torque without stripping.

What are common mistakes to avoid when selecting a spanner size for pipe flange stud bolts?

Common mistakes include using an improperly sized spanner that damages the nut or bolt, forcing the tool, or using a tool that is too loose, leading to slippage or injury.

Where can I find reliable tools and spanners for pipe flange stud bolts?

Reliable tools can be purchased from industrial supply stores, hardware stores, or reputable online retailers that offer tools designed for pipe fitting and flange maintenance.

Related keywords: pipe flange, stud bolt, spanner size, flange bolt, pipe fitting, bolt wrench, flange hardware, bolt size chart, spanner tool, pipe connection

## Taylor forge flange dimensions

taylor forge flange dimensions are essential specifications that play a critical role in various industrial applications, including piping systems, pressure vessels, and mechanical assemblies. Understanding these dimensions is vital for engineers, procurement specialists, and maintenance teams to ensure compatibility, safety, and efficiency. This comprehensive guide provides an in-depth overview of Taylor Forge flange dimensions, covering standard types, measurement parameters, industry standards, and practical considerations.

**Introduction to Taylor Forge Flanges**Taylor Forge is a renowned manufacturer specializing in high-quality forged flanges used across diverse sectors such as oil and gas, power generation, chemical processing, and aerospace. The company's flanges are known for their durability, precision, and adherence to international standards. Before selecting a flange, understanding its dimensions is crucial for proper installation and performance.

**Understanding Flange Dimensions**Flange dimensions typically include several key measurements that define the size, compatibility, and performance of a flange. These include:

- 1.

**Diameter (OD and ID)**  
**Outer Diameter (OD):** The overall diameter of the flange, usually measured across the outer edge.  
**Inner Diameter (ID):** The diameter of the bore or opening through which the pipe or fitting passes.

**2. Thickness**  
 The thickness of the flange face, which impacts pressure handling and gasket seating.

**3. Bolt Hole Dimensions**  
**Number of Bolt Holes:** Varies depending on flange size and type.  
**Bolt Hole Diameter:** The size of each bolt hole.  
**Bolt Circle Diameter (BCD):** The diameter of the circle passing through the bolt holes' centers.

**4. Raised Face and Gasket Surface**  
 The height and design of the gasket surface influence sealing capabilities.

**Common Types of Taylor Forge Flanges and Their Dimensions**  
 Taylor Forge manufactures several types of flanges, each with specific dimensional standards:

- 1. Weld Neck Flanges**  
 Designed for high-pressure applications, featuring a long tapered hub that provides reinforcement. Typical dimensions include a large bore, high face height, and precise bolt hole spacing.
- 2. Slip-On Flanges**  
 Easier to install, with dimensions characterized by a larger bore that slips over the pipe. Usually have a thinner profile compared to weld neck flanges.
- 3. Blind Flanges**  
 Used to seal the end of a pipeline or system; dimensions include bolt hole patterns but lack a bore.
- 4. Threaded Flanges**  
 Designed with internal threads to connect directly to threaded pipes; dimensions include thread size and bolt hole pattern.

**Standard Dimension References for Taylor Forge Flanges**  
 To ensure compatibility and proper fit, flange dimensions adhere to industry standards such as ANSI/ASME B16.5 and B16.47. Below are key parameters based on these standards:

- 1. Nominal Pipe Size (NPS)**  
 Ranges from ½ inch to 24 inches or more. Determines the basic size of the flange and pipe connection.
- 2. Pressure Class Ratings**  
 Common classes include 150, 300, 600, 900, 1500, and 2500, indicating the maximum pressure the flange can withstand. Dimensions such as bolt circle diameter and bolt hole size increase with pressure class.
- 3. Standard Dimension Tables**  
 Here's an overview of typical dimensions for a 2-inch, Class 150 weld neck flange:  
 Outer Diameter (OD): 6.3 inches (160 mm)  
 Bolt Circle Diameter (BCD): 4.5 inches (114 mm)  
 Bolt Hole Diameter: 0.5 inches (13 mm)  
 Number of Bolt Holes: 4  
 Flange Thickness: 0.31 inches (8 mm)  
 Note: Actual dimensions vary depending on the flange type, size, and pressure rating.

**Measuring Taylor Forge Flange Dimensions**  
 Accurate measurement is crucial for ensuring compatibility. Here are steps and tools typically used:

**Tools Needed**  
 Caliper or steel ruler  
 Measuring tape  
 Bolt hole gauge  
 Thread gauge (for threaded flanges)

**Measurement Procedures**  
**Outer Diameter:** Measure across the flange's widest points.  
**Bore Diameter:** Measure the internal opening where the pipe passes.  
**Bolt Circle Diameter:** Measure the distance between the centers of bolt holes across the flange.  
**Bolt Hole Diameter:** Measure the diameter of a single bolt hole.  
**Flange Thickness:** Measure the face-to-back thickness of the flange.

**Industry Standards and Compliance**  
 Adhering to established standards guarantees the quality and interchangeability of flanges.

- 1. ANSI/ASME B16.5**  
 Covers pipe flanges and flanged fittings up to 24 inches in diameter. Defines dimensional requirements, pressure classes, materials, and testing.
- 2. ANSI/ASME B16.47**  
 Addresses large diameter steel pipe flanges (greater than 24 inches).
- 3. ASTM Standards**  
 Specify material properties, testing procedures, and corrosion resistance.

**Practical Considerations When Selecting Taylor Forge Flanges**  
 Choosing the right flange involves more than just dimensions; consider the following factors:

- 1. Material Compatibility**  
 Taylor Forge offers flanges in various materials such as carbon steel, stainless steel, alloy steel, and exotic metals. Ensure material compatibility with the piping system and operating environment.
- 2. Application Pressure and**

Temperature Higher pressure and temperature applications require flanges with appropriate pressure class ratings and material strength. 3. Connection Type Decide between welded, threaded, slip-on, or blind flanges based on installation requirements. 4. Industry Standards Compliance Verify that the flange dimensions and materials meet the relevant standards for your application. Conclusion Understanding Taylor Forge flange dimensions is fundamental to ensuring the integrity and efficiency of piping and mechanical systems. From standard measurements like outer diameter, bolt circle, and thickness to adherence to industry standards, precise knowledge of flange dimensions facilitates proper selection, installation, and maintenance. Whether you're working with weld neck, slip-on, blind, or threaded flanges, always refer to manufacturer specifications and industry standards to guarantee compatibility and safety. Accurate measurement, material consideration, and compliance are key to leveraging the full benefits of Taylor Forge flanges in your projects.

Taylor Forge Flange Dimensions: An Expert Guide to Specifications and Applications When it comes to industrial piping systems, the integrity and reliability of connections are paramount. Flanges serve as critical components that enable secure, leak-proof joints between pipes, valves, pumps, and other equipment. Among the multitude of flange manufacturers, Taylor Forge stands out for its commitment to precision, durability, and industry standards. Understanding Taylor Forge flange dimensions is essential for engineers, procurement specialists, and maintenance teams aiming to ensure compatibility, safety, and optimal performance in their piping assemblies. In this comprehensive guide, we will delve into the specifics of Taylor Forge flange dimensions, exploring the various types of flanges they produce, standard dimensions, inspection criteria, and best practices for selection and installation. Whether you are designing a new piping system or replacing existing components, this article aims to equip you with the knowledge necessary to make informed decisions.

Overview of Taylor Forge Flanges Taylor Forge is renowned for manufacturing high-quality forged components, including a broad range of flanges designed for demanding industrial applications. Their flanges adhere to international standards such as ASME (American Society of Mechanical Engineers), ASTM (American Society for Testing and Materials), and MSS (Manufacturers Standardization Society), ensuring compatibility across various systems.

Key features of Taylor Forge flanges include:

- Material Variety: Carbon steel, stainless steel, alloy steel, and special materials to suit corrosive or high-temperature environments.
- Precision Manufacturing: Forged to tight tolerances for dimensional accuracy.
- Surface Finish: Smooth, clean surfaces for effective sealing.
- Robust Design: Capable of withstanding high pressure and temperature conditions.

Understanding the dimensions of these flanges involves knowing the standard specifications they follow and the parameters that define their size and fit.

Standard Flange Types and Their Dimensions Taylor Forge manufactures a comprehensive range of flange types, each with specific dimensional standards. The most common types include:

- Weld Neck Flanges
- Slip-On Flanges
- Blind Flanges
- Lap Joint Flanges
- Socket Weld Flanges
- Threaded Flanges

Each type conforms to specific dimensional standards, primarily ASME B16.5 for sizes up to 2, and ASME B16.47 for

larger sizes. These standards specify key parameters:Nominal Pipe Size (NPS)Pressure Class (e.g., 150, 300, 600, 900, 1500, 2500)Outside Diameter (OD)Inner Diameter (ID) or Bore DiameterThickness (T)Number of Bolt HolesBolt Hole DiameterHub or Neck Dimensions (for certain flange types)Let's examine these parameters in detail.Critical Flange Dimensions Explained1. Nominal Pipe Size (NPS) and DiameterThe NPS designation indicates the approximate internal diameter of the pipe the flange fits. For example, a 4-inch flange is designed for 4-inch pipes, but the actual outside diameter varies depending on the flange type and pressure class.Outer Diameter (OD): The distance across the flange from one outer edge to the opposite edge. It increases with pipe size and pressure class.Bore Diameter: The internal diameter that allows the pipe to pass through, matching the pipe's outer diameter plus any fitting clearance.2. Thickness (T)The flange thickness is crucial for ensuring strength and pressure containment. It varies based on the pressure class and flange type. Thicker flanges are used in higher pressure applications. Typical thickness ranges include:Class 150: Approximately 14-20 mm (0.55-0.79 inches)Class 300: Approximately 20-30 mm (0.79-1.18 inches)Class 600 and above: Thicker, often exceeding 30 mm3. Bolt Circle Diameter and Number of Bolt HolesThe bolt circle diameter (BCD) is the diameter of the circle on which the bolt holes are located. It ensures proper bolt placement and uniform load distribution.Number of Bolt Holes: Typically ranges from 4 to 12, depending on flange size and pressure class.Bolt Hole Diameter: Usually 1.5-2 times the bolt diameter, designed to accommodate standard bolt sizes.4. Flange Face DimensionsThe face of the flange (e.g., flat, raised face, ring-type joint) impacts sealing and installation. The dimensions of these faces are standardized and critical for gasket selection and sealing performance.Dimension Tables and Standard SizesTo facilitate quick reference, manufacturers provide detailed dimension tables aligning with standards like ASME B16.5 and B16.47. Here's an overview of typical dimensions for a few common flange sizes at different pressure classes:

| Nominal Size | Pressure Class | OD (mm) | Bore (mm) | Thickness (mm) | Number of Bolts | Bolt Diameter (mm) | Bolt Circle Diameter (mm) |
|--------------|----------------|---------|-----------|----------------|-----------------|--------------------|---------------------------|
| 2"           | 150            | 73      | 33        | 12             | 4               | 12                 | 51                        |
| 2"           | 300            | 85      | 38        | 14             | 4               | 14                 | 58                        |
| 4"           | 150            | 120     | 114       | 16             | 8               | 18                 | 160                       |
| 4"           | 300            | 140     | 114       | 20             | 8               | 20                 | 180                       |
| 6"           | 150            | 150     | 168       | 20             | 8               | 22                 | 210                       |

[Note: Actual dimensions vary per specific flange type and standard; always refer to official datasheets for precise measurements.Inspection and Quality Assurance of Taylor Forge FlangesDimensional accuracy is vital to ensure flange integrity and system safety. Taylor Forge employs rigorous inspection protocols, including:Dimensional Verification: Using coordinate measuring machines (CMM) to verify OD, bore, bolt hole placement, and thickness.Material Testing: Ensuring material composition and mechanical properties meet specifications.Surface Finish Inspection: Ensuring smooth sealing surfaces to prevent leaks.Non-Destructive Testing: Ultrasonic or radiographic testing for internal defects.Manufacturers also provide certification documents such as Mill Test Reports (MTRs) that confirm adherence to standards and specified dimensions.Best Practices for Selecting and Using Taylor Forge FlangesProper selection of flange dimensions is

critical for system performance. Here are essential considerations:

- Match Standard Dimensions:** Always verify that flange dimensions conform to the applicable ASME or MSS standards.
- Consider Operating Conditions:** Higher temperature and pressure applications may require thicker, high-pressure class flanges.
- Compatibility with Gaskets and Bolts:** Ensure bolt sizes and hole patterns match gasket specifications and bolt strengths.
- Installation Precision:** Use correct torque procedures to prevent warping or gasket damage.
- Maintenance and Replacement:** Maintain records of flange dimensions and standards for future procurement or repairs.

**Conclusion**

Taylor Forge flange dimensions are meticulously designed to meet the demanding requirements of industrial piping systems. From the detailed specifications outlined in industry standards to the precise manufacturing processes employed, these flanges provide reliable, durable connections across various applications. Understanding the key parameters—such as outer diameter, bore size, bolt hole pattern, and pressure class—is essential for ensuring compatibility, safety, and optimal system performance. As industries evolve and demand higher standards of safety and efficiency, manufacturers like Taylor Forge continue to innovate and uphold stringent quality benchmarks. Whether selecting the right flange for a high-pressure pipeline or replacing worn components, a thorough knowledge of flange dimensions is an invaluable asset for engineers and technicians alike. Always consult official datasheets, standards, and certification documents to ensure accuracy and compliance in your projects. In summary, a comprehensive understanding of Taylor Forge flange dimensions involves familiarity with various flange types, standard measurement parameters, inspection protocols, and application-specific considerations. By mastering these aspects, professionals can ensure their piping systems operate safely, reliably, and efficiently for years to come.

## QuestionAnswer

What are the standard flange dimensions for Taylor Forge flanges?

Taylor Forge provides a variety of flange dimensions based on industry standards such as ANSI, ASME, and API, including bolt hole patterns, flange diameters, and thicknesses. Specific dimensions vary depending on the flange type and pressure class.

Where can I find the dimension charts for Taylor Forge flange products?

Dimension charts for Taylor Forge flanges are available in their official catalog and technical datasheets, which can be accessed on their website or requested directly from their customer service.

What is the typical diameter and bolt hole pattern for a Taylor Forge 150 flange?

A Taylor Forge 150 flange typically features a diameter and bolt hole pattern conforming to ASME B16.5 standards; for example, a 6-inch flange has a diameter of approximately 9.00 inches with bolt holes spaced accordingly. Always refer to the specific size chart for exact dimensions.

How do Taylor Forge flange dimensions differ between pipe sizes?

Flange dimensions, including outer diameter, bolt hole size, and bolt pattern, increase proportionally with pipe size. Larger pipe diameters have larger flanges with more bolt holes and increased diameters, following industry standards.

Are Taylor Forge flange dimensions compatible with ANSI standards?

Yes, Taylor Forge flanges are manufactured to comply with ANSI/ASME standards, ensuring compatibility with other ANSI standard fittings and components.

Can I customize Taylor Forge flange dimensions for specific projects?

Yes, Taylor Forge offers custom flange solutions where dimensions such as diameter, bolt pattern, and thickness can be tailored to meet specific project requirements, often requiring direct consultation with their engineering team.

What is the importance of flange dimensions in pipeline safety and integrity?

Proper flange dimensions ensure correct fit, sealing, and load distribution, which are critical for maintaining pipeline safety, preventing leaks, and ensuring structural integrity under operating pressures.

How do I measure the dimensions of an existing Taylor Forge flange?

To measure a flange, use a caliper or measuring tape to determine outer diameter, bolt hole diameter, bolt circle diameter, and thickness. Cross-reference these measurements with Taylor Forge's dimension charts for verification.

What are the common flange dimensions for high-pressure applications from Taylor Forge?

For high-pressure applications, Taylor Forge offers flanges with thicker walls, larger bolt sizes, and specific pressure class ratings such as 3000 or 6000, with dimensions designed to withstand increased stresses and conform to relevant standards.

Where can I get detailed technical specifications for Taylor Forge flange dimensions?

Detailed technical specifications are available in Taylor Forge’s official product catalogs and technical datasheets, which can be downloaded from their website or obtained through authorized distributors and representatives.

Related keywords: Taylor Forge flange dimensions, flange size chart, forged flange specifications, ANSI flange dimensions, industrial flange measurements, pipe flange standards, forged steel flange sizes, flange dimension table, pressure rating flange sizes, custom flange dimensions

Taylor forge flanges dimension

taylor forge flanges dimension: A Comprehensive Guide to Sizes and SpecificationsUnderstanding the dimensions of Taylor Forge flanges is essential for engineers, procurement specialists, and maintenance teams involved in piping and industrial applications. Accurate knowledge of flange dimensions ensures proper fitting, sealing, and overall system integrity. This guide provides an in-depth overview of Taylor Forge flange dimensions, including standard specifications, measurement parameters, and how to select the right flange for your project.Introduction to Taylor Forge FlangesTaylor Forge is a renowned manufacturer specializing in high-quality forged flanges used across various industries such as oil & gas, petrochemical, power generation, and shipbuilding. Their flanges are known for durability, precision, and adherence to international standards. The dimensions of these flanges are critical for compatibility with pipes, valves, and other equipment.Understanding Flange DimensionsFlange dimensions refer to the measurements that define the size, shape, and compatibility of the flange with mating components. Proper understanding ensures optimal sealing and mechanical strength.Key Parameters of Flange DimensionsThe main parameters influencing flange dimensions include:Outer Diameter (OD): The total diameter of the flange face.Inner Diameter (ID): The diameter of the bore or opening for the pipe.Thickness (T): The overall height of the flange from face to back.Number of Bolt Holes: The count of bolt holes around the flange perimeter.Bolt Hole Diameter (D): The diameter of each bolt hole.Pitch Circle Diameter (PCD): The diameter of the circle passing through the bolt hole centers.Each of these dimensions is standardized according to industry standards such as ASME B16.5, ASME B16.47, or MSS SP-44, ensuring interchangeability and compatibility.Standard Dimensions for Taylor Forge FlangesTaylor Forge manufactures flanges conforming primarily to the ASME B16.5 and B16.47 standards. These standards specify the dimensions for different classes and sizes.ASME B16.5 FlangesThis standard covers flanges from 1/2" to 24" nominal pipe size (NPS), with pressure classes ranging from 150 to 2500.Common Sizes and Dimensions| Nominal Size (NPS) | Outside Diameter (mm) | Number of Bolt Holes | Bolt Hole Diameter (mm) | Pitch Circle Diameter (mm) | Flange Thickness (mm) |

|              |     |   |     |     |    |
|--------------|-----|---|-----|-----|----|
| -----   1/2" | 90  | 4 | 9.5 | 65  | 12 |
| 1"           | 105 | 4 | 11  | 75  | 14 |
| 2"           | 140 | 8 | 17  | 105 | 16 |
| 4"           | 190 | 8 | 22  | 145 | 20 |

[Note: Exact dimensions may vary based on class and pressure rating.ASME B16.47 Large Diameter FlangesThese are used for sizes above 24" up to 144" and have different dimension standards.Typical Dimensions| Nominal Size (NPS) | Outside Diameter (mm) | Number of Bolt Holes | Bolt Hole Diameter (mm) | Pitch Circle Diameter (mm) | Flange Thickness (mm) |-----|-----|-----|-----|-----|-----|

|             |     |    |    |     |    |
|-------------|-----|----|----|-----|----|
| -----   30" | 610 | 12 | 30 | 460 | 38 |
| 48"         | 760 | 16 | 40 | 580 |    |

50 [Note: Always refer to the latest standards for precise dimensions.Measurement Guidelines for Taylor Forge FlangesAccurate measurement is crucial for ensuring flange compatibility and proper installation.Tools RequiredCaliper or measuring tapeMicrometerBolt gaugeProtractor (for angles if needed)Step-by-Step Measurement ProcedureOuter Diameter (OD): Measure across the flange face at its widest point.Inner Diameter (ID): Measure the bore diameter where the pipe fits.Thickness (T): Measure from the face of the flange to the back face.Bolt Hole Diameter (D): Measure the diameter of a single bolt hole.Pitch Circle Diameter (PCD): Measure the distance across the centers of two opposite bolt holes and calculate the circle diameter passing through all bolt holes.Number of Bolt Holes: Count the holes evenly spaced around the flange.Selection Criteria for Taylor Forge Flange DimensionsChoosing the correct flange dimensions depends on several factors:Application and Pressure RatingDifferent pressure classes require specific flange thicknesses and bolt sizes.Pipe Size and MaterialEnsure the flange size matches the pipe diameter and material compatibility.Standard ComplianceAdhere to relevant standards like ASME B16.5, B16.47, or MSS SP-44 for consistent dimensions.Operational EnvironmentConsider corrosion resistance, temperature, and mechanical stresses that may influence flange selection.Custom Flanges and Non-Standard DimensionsWhile standard dimensions cover most applications, some projects require custom-sized Taylor Forge flanges.Custom Manufacturing ProcessTaylor Forge offers custom forging and machining services to meet unique specifications:Unique bolt hole patternsSpecial dimensions for high-pressure applicationsMaterial-specific modificationsDesign Considerations for Custom FlangesEnsure compatibility with existing piping systemsMaintain compliance with applicable standardsVerify material strength and corrosion resistanceMaintenance and Inspection of FlangesRegular inspection of flange dimensions and condition helps prevent leaks and failures.Inspection TipsCheck for corrosion, wear, or deformationVerify bolt hole dimensions and pitch circle diameterEnsure gasket surfaces are clean and flatReplace flanges that do not meet dimensional tolerancesConclusionUnderstanding the dimensions of Taylor Forge flanges is fundamental for ensuring proper fit, sealing, and system reliability. Whether selecting standard sizes per industry standards or customizing for specific needs, precise measurements and adherence to specifications are critical. Always consult the latest standards and manufacturer's datasheets for accurate dimensions and compatibility. Proper selection, installation, and maintenance of flanges can

significantly extend the lifespan of piping systems and prevent costly failures. For further assistance, contact Taylor Forge or authorized distributors to obtain detailed dimension charts, technical support, and custom fabrication services tailored to your project requirements.

**Taylor Forge Flanges Dimension: An In-Depth Guide to Their Specifications and Applications**

Introduction Taylor Forge flanges dimension is a critical consideration for engineers, procurement specialists, and maintenance teams working within the oil and gas, petrochemical, power generation, and industrial manufacturing sectors. These flanges are integral components used to connect pipes, valves, pumps, and other equipment, ensuring a secure, leak-proof seal in fluid and gas transfer systems. Understanding the precise dimensions of Taylor Forge flanges—their sizes, standards, and tolerances—is essential for ensuring compatibility, safety, and operational efficiency across a variety of industrial applications. In this article, we explore the detailed dimensions of Taylor Forge flanges, their manufacturing standards, types, and how these specifications influence their performance and application. Whether you are selecting flanges for a new project or inspecting existing installations, a thorough comprehension of flange dimensions is vital for success.

**What Are Taylor Forge Flanges?** Taylor Forge Flanges are specialized forged steel components manufactured by Taylor Forge, a renowned global provider of forged and machined components. Known for their high strength, durability, and precision, these flanges are designed to meet rigorous industry standards and demanding operational conditions. These flanges are typically used in high-pressure, high-temperature environments where safety and reliability are paramount. Their manufacturing process involves forging, which enhances the metallurgical properties of the steel, resulting in superior mechanical strength and resistance to fatigue and corrosion.

**Types of Taylor Forge Flanges and Their Dimensions** Taylor Forge manufactures an array of flange types, each tailored for specific applications. The most common types include: Weld Neck Flanges, Slip-On Flanges, Socket Weld Flanges, Blind Flanges, Lap Joint Flanges, Threaded Flanges. Each type follows specific dimensional standards, primarily governed by industry specifications such as ANSI/ASME B16.5, ASME B16.47, and ASME B16.48.

**Industry Standards Governing Flange Dimensions** Understanding the standards is fundamental to grasping flange dimensions. Taylor Forge flanges are manufactured in compliance with recognized international standards, which specify their dimensions, pressure ratings, and testing requirements:

- ANSI/ASME B16.5:** Covers flanges from Class 150 to 2500, primarily used in piping systems up to 24 inches.
- ASME B16.47:** Addresses large-diameter flanges (up to 144 inches), including Series A (weld neck, blind, threaded) and Series B.
- ASME B16.48:** Covers non-plate, large-diameter flanges and their dimensions.

These standards specify the outer diameter, bore diameter, number of bolt holes, bolt hole diameter, flange thickness, and other critical features.

**Detailed Flange Dimensions: Key Parameters** Understanding the precise dimensions of Taylor Forge flanges involves examining several key parameters:

- Outside Diameter (OD)** The outermost measurement of the flange, OD varies according to flange type and size. For example, a 12-inch weld neck flange typically has an OD of approximately 21 inches, following ANSI standards.
- Bore Diameter (ID or Hub Bore)** The bore diameter is the internal opening

that connects the flange to the pipe. It's designed to match the pipe's diameter and is critical for ensuring proper fit and flow capacity. For instance, a 6-inch flange will have a bore matching a 6-inch pipe, but exact dimensions depend on schedule and standard.

**Number of Bolt Holes** Bolt hole count is dictated by flange size and pressure class. Common configurations include: 8 bolt holes for smaller sizes (e.g., 2-4 inches) 12 or 16 bolt holes for larger sizes (e.g., 12 inches and above) The bolt pattern ensures even distribution of stress and secure sealing.

**Bolt Hole Diameter** Standard bolt hole diameters are specified in the relevant standards, typically ranging from 0.75 inches to 1.25 inches, depending on flange size and pressure class.

**Flange Thickness** The thickness of the flange directly impacts its pressure rating and mechanical strength. Thicker flanges are rated for higher pressures. For example, a Class 150 flange may have a thickness of approximately 0.75 inches, whereas a Class 600 flange could be 1.5 inches or more.

**Raised Face Height** Most Taylor Forge flanges feature a raised face (RF) for sealing purposes. The height of this face is standardized, usually around 1/16 to 1/4 inch, providing a reliable sealing surface.

**Raw Dimensions and Tolerances** Manufacturers like Taylor Forge adhere to strict tolerances to ensure interchangeability and compatibility. Typical tolerances include: Outer Diameter:  $\pm 1\%$  of specified size Bore Diameter:  $\pm 0.01$  inches Bolt Hole Diameter:  $\pm 0.02$  inches Flange Thickness:  $\pm 0.03$  inches These tolerances are crucial for ensuring proper assembly and sealing, especially in high-pressure systems.

**How Flange Dimensions Affect Application and Compatibility** Proper flange dimensions are vital for ensuring seamless integration within piping systems. Mismatched dimensions can lead to leaks, mechanical failure, or operational inefficiencies. Here's how dimensions influence various aspects: Pressure Ratings: Thicker flanges and larger bolt patterns are designed to withstand higher pressures. Temperature Compatibility: Material thickness and flange design influence performance in high-temperature environments. Ease of Assembly: Accurate bolt hole alignment and standard dimensions facilitate installation and maintenance. System Integrity: Properly dimensioned flanges prevent leaks and ensure system safety.

**Practical Considerations When Selecting Taylor Forge Flanges** When choosing Taylor Forge flanges, consider the following: Application Environment: High-pressure, high-temperature, corrosive media, or sanitary conditions. Standard Compliance: Ensure dimensions meet industry standards for the specific application. Material Compatibility: Flange material must be compatible with the piping material and process fluids. Size and Pressure Class: Match flange dimensions to the pipeline's size and operating pressure. Availability and Lead Time: Larger or custom dimensions may require longer manufacturing times.

**Conclusion** Understanding Taylor Forge flanges dimension is fundamental to ensuring the reliability and safety of piping systems in demanding industrial environments. These components' precise measurements—ranging from outer diameters to bolt hole patterns—are governed by strict standards that facilitate compatibility and performance. By comprehending these specifications and their implications, engineers and procurement professionals can make informed decisions, optimize system integrity, and maintain operational excellence. As industries continue to push the boundaries of pressure, temperature, and corrosive environments, the importance of correctly specified, dimensionally accurate flanges like those manufactured by Taylor Forge cannot be overstated. Whether you are designing new pipelines or maintaining existing systems, a thorough grasp of flange dimensions is essential for success.

**Disclaimer:** Always refer to the latest manufacturer

datasheets and industry standards when selecting or specifying flanges to ensure compliance with current specifications and safety regulations.

## QuestionAnswer

What are the standard dimensions for Taylor Forge flanges?

Taylor Forge flanges typically adhere to industry standards such as ANSI, ASME, and API, with common sizes ranging from 1/2 inch to 48 inches in diameter, and thicknesses varying based on pressure ratings and flange type.

How do I determine the correct flange dimension for my application?

To select the correct flange dimensions, consider factors like pipe size, pressure class, flange type, and applicable standards (e.g., ANSI B16.5). Refer to the flange dimension charts provided by Taylor Forge or relevant standards for precise measurements.

What are the typical bolt hole dimensions for Taylor Forge flanges?

Bolt hole dimensions depend on flange size and pressure class. For example, a 12-inch, 150 lb flange generally has bolt holes of 0.88 inches diameter, with bolt circle diameters specified in the standard dimension charts.

Are Taylor Forge flanges available in different pressure ratings?

Yes, Taylor Forge flanges are available in various pressure ratings such as Class 150, 300, 600, 900, 1500, and 2500, each with corresponding dimensions suitable for different operating conditions.

Where can I find detailed dimension charts for Taylor Forge flanges?

Detailed dimension charts are available in Taylor Forge's official catalog, technical datasheets, or industry standards like ANSI B16.5, which provide comprehensive measurements for all flange types and sizes.

How do flange dimensions affect compatibility with pipes and fittings?

Proper flange dimensions ensure compatibility with pipes and fittings by matching the pipe size, bolt hole pattern, and pressure class. Incorrect dimensions can lead to leaks or assembly issues, so

precise measurements are crucial.

What are the differences in dimensions between weld neck and slip-on Taylor Forge flanges?

Weld neck flanges typically have a neck that provides reinforcement and aligns with the pipe, with dimensions designed for butt welding, while slip-on flanges have larger bore diameters for slip-on installation, with differences in face thickness and bolt hole placement as specified in the standards.

Can I customize Taylor Forge flange dimensions for special applications?

Yes, Taylor Forge can manufacture custom flanges with specific dimensions to meet unique engineering requirements, but this usually involves special order processes and compliance with applicable standards.

What is the significance of flange dimension tolerances in Taylor Forge flanges?

Tolerances ensure that flanges fit correctly and maintain seal integrity. Precise adherence to dimension tolerances as per standards like ANSI B16.5 is essential for safety, performance, and compatibility in piping systems.

Related keywords: taylor forge flanges size, taylor forge flange specifications, taylor forge flange dimensions, taylor forge flange standards, taylor forge flange catalog, taylor forge pipe flanges, taylor forge flange types, taylor forge flange material, taylor forge flange pressure ratings, taylor forge flange dimensions chart