Threaded Fittings Selection and Thread Compatibility Guide

ASME B16.11 Forged Threaded Fittings for Industrial Small-Bore Piping

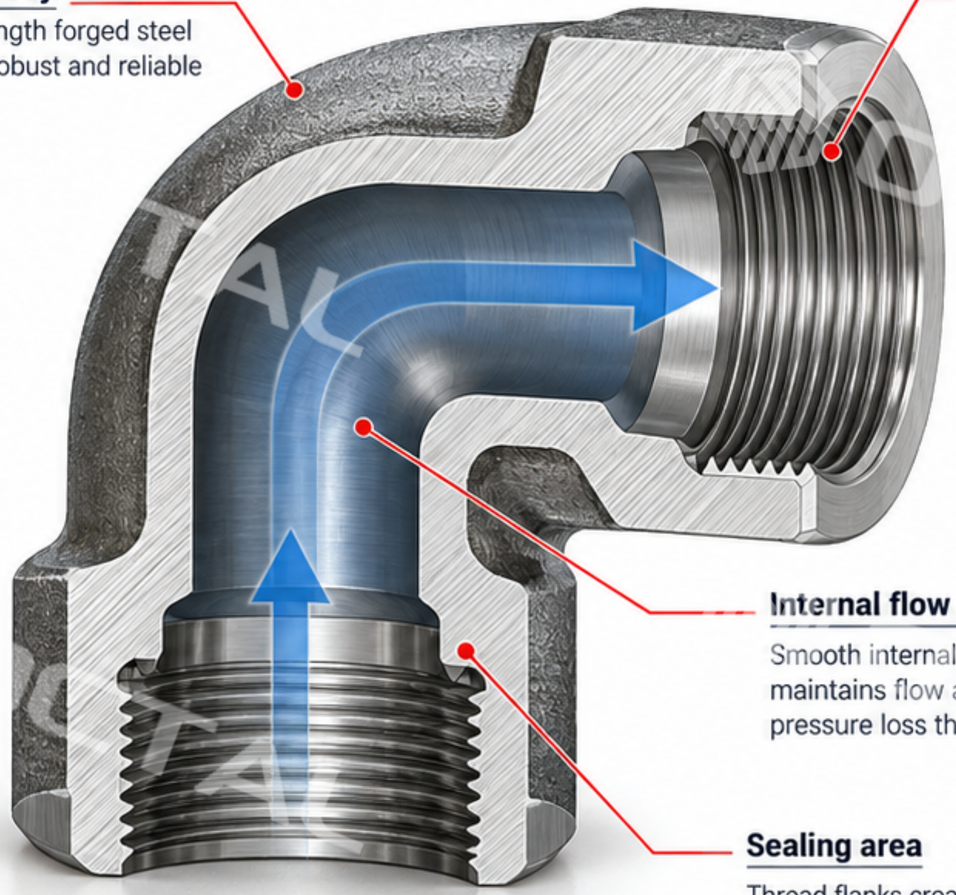


THREADED FITTINGS

STRUCTURE AND KEY ELEMENTS

Threaded fittings are forged components used to change the direction, join or terminate piping in threaded pipe systems. They provide a strong, leak-tight connection and are manufactured from forged steel for high mechanical strength and reliability.





Forged body

High-strength forged steel body for robust and reliable service.

Threaded connection

Female pipe threads (typically NPT or BSPT) for connection to threaded pipe or fittings.

Internal flow passage

Smooth internal passage maintains flow and minimizes pressure loss through the fitting.

Sealing area

Thread flanks create a metal-to-metal seal when tightened, providing a leak-tight connection.

ASME B16.11 | THREADED FITTINGS

FORGED STEEL THREADED COUPLING

HIGH PRESSURE FORGED FITTINGS

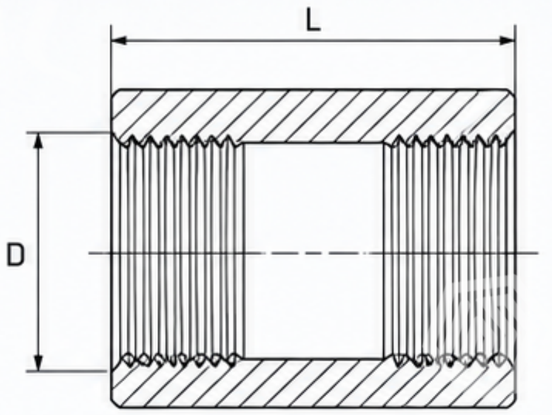
FOR INDUSTRIAL PIPING SYSTEMS

PRODUCT OVERVIEW

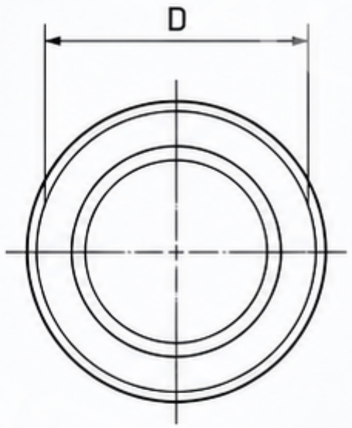
Threaded couplings in accordance with ASME B16.11 are forged fittings used to connect two lengths of threaded pipe. They are suitable for high-pressure piping systems in a wide range of industrial applications.



DIMENSIONAL DETAILS



LONGITUDINAL SECTION



END VIEW

L = Coupling Length (Min.)
D = Outside Diameter (Min.)

STANDARD

Standard	**ASME B16.11**

Forged fittings, sockets, and threaded fittings for high-pressure service.

SIZE RANGE

Size	**NPS 1/8 - NPS 4**

Nominal Pipe Size (NPS) from 1/8 to 4, inclusive.

THREAD TYPE

Thread	**NPT / BSPT / BSPP**

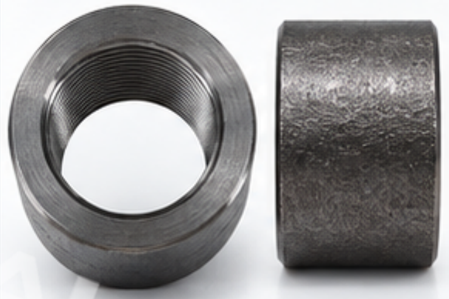
Female threaded ends as per NPT, BSPT or BSPP.

PRESSURE CLASSES

Class	**Class 2000**
	Class 3000
	Class 6000

Rated working pressure in accordance with ASME B16.11.

ADDITIONAL VIEWS



END VIEW

SIDE VIEW

DIMENSIONS (ASME B16.11)

NPS	Outside Diameter D (Min.) mm	Length L (Min.) mm
1/8	16	25
1/4	19	32
3/8	22	32
1/2	28	38
3/4	32	44
1	38	51
1 1/4	48	60
1 1/2	54	64
2	67	76
2 1/2	83	89
3	95	102
4	121	127

Dimensions are minimums in accordance with ASME B16.11. Values are in millimeters and for reference only.

MATERIAL

Typical Materials	
Forged Carbon Steel	ASTM A105
Forged Low Alloy Steel	ASTM A182 F11 ASTM A182 F22
Forged Stainless Steel	ASTM A182 F304 ASTM A182 F316 ASTM A182 F316L

Other materials may be supplied in accordance with ASME B16.11.

APPLICATIONS

- High-pressure piping systems
- Oil and gas
- Petrochemical and chemical processing
- Power generation
- Refineries
- Process and utility lines

PRESSURE RATINGS (ASME B16.11)

Class	Rated Working Pressure (psi)	Rated Working Pressure (bar)
2000	2,000	138
3000	3,000	207
6000	6,000	414

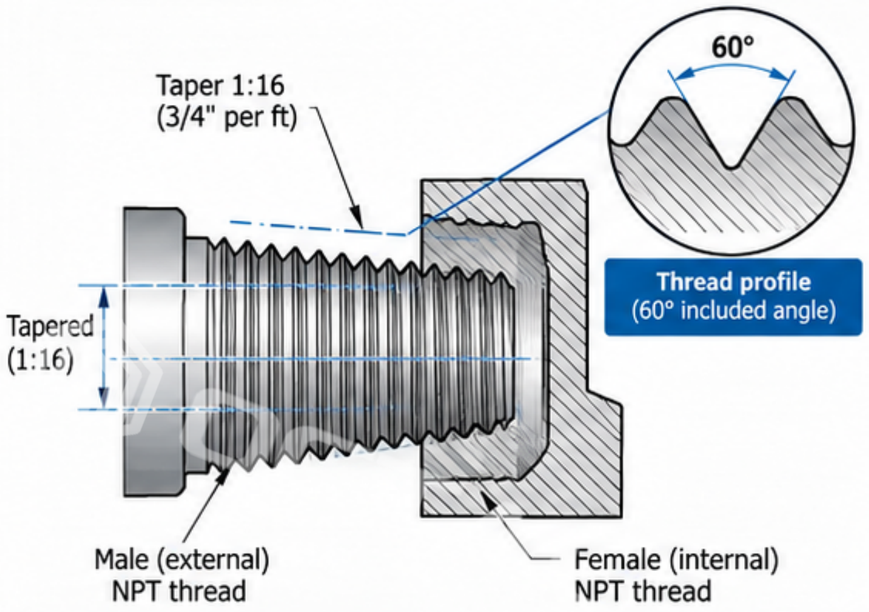
Ratings are in accordance with ASME B16.11 for Class 2000, 3000 and 6000.

FEATURES

- Forged construction for high strength and reliability
- Available in Class 2000, 3000 and 6000
- Female threaded ends (NPT, BSPT or BSPP)
- Suitable for high-pressure and high-temperature service
- Used to connect two lengths of threaded pipe
- Compact and robust design

NPT

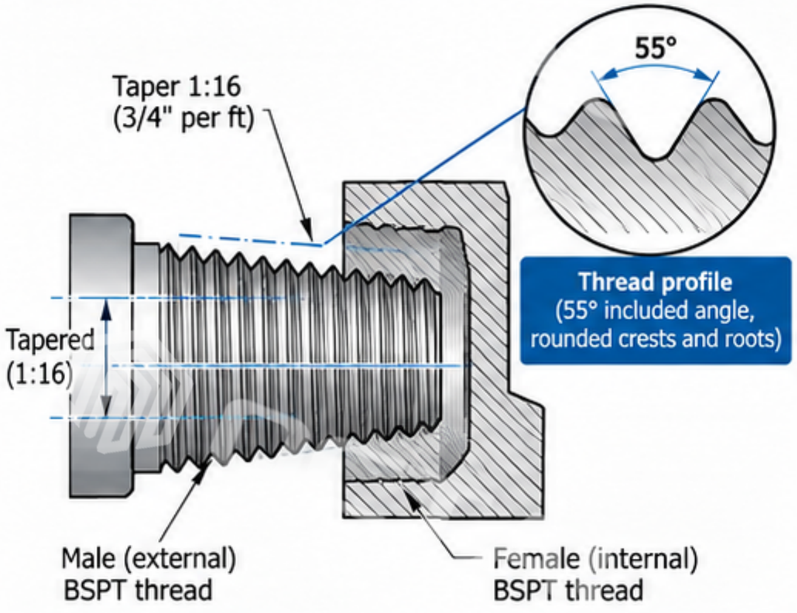
Tapered thread profile



Thread shape	60° included angle Tapered (1:16)
Sealing method	Seal by thread interference and sealant (e.g. PTFE tape or pipe dope).
Connection difference	Tapered thread. Wedge action creates interference for sealing.

BSPT

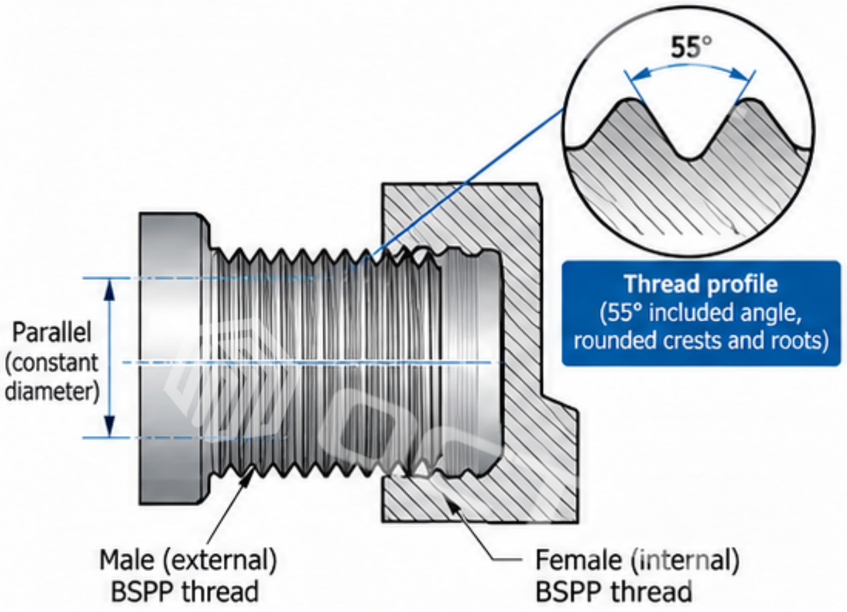
Tapered thread with different geometry



Thread shape	55° included angle Tapered (1:16) with rounded crests and roots (Whitworth form).
Sealing method	Seal by thread interference and sealant (e.g. PTFE tape or pipe dope).
Connection difference	Tapered thread with different geometry (55° Whitworth form) not interchangeable with NPT.

BSPP

Parallel thread profile

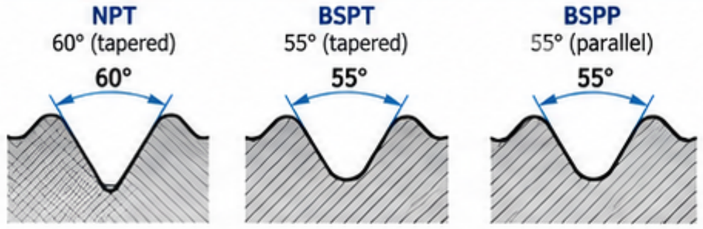


Thread shape	55° included angle Parallel (constant diameter) with rounded crests and roots (Whitworth form).
Sealing method	Seal by gasket, O-ring, or sealing face (washer/seal).
Connection difference	Parallel thread. Does not seal by thread interference. Requires a gasket, O-ring, or metal-to-metal sealing face.

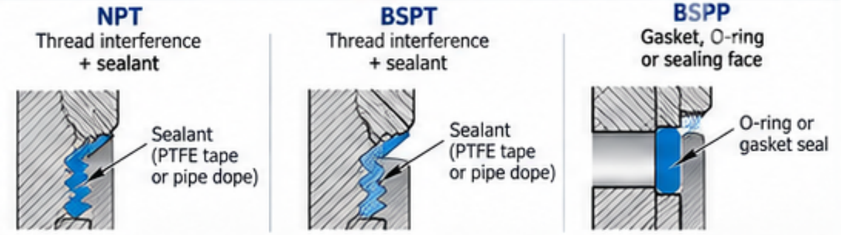
KEY COMPARISONS

Taper vs parallel	NPT and BSPT are tapered (1:16). BSPP is parallel (constant diameter).
Thread angle	NPT = 60° | BSPT = 55° (Whitworth) | BSPP = 55° (Whitworth)
Sealing concept	NPT & BSPT seal by thread interference and sealant. BSPP seals by gasket, O-ring, or sealing face.
Interchangeability	NPT, BSPT and BSPP are not interchangeable.

THREAD PROFILE COMPARISON (ENLARGED)



SEALING METHOD ILLUSTRATION



Threaded Fittings – Material Selection Guide

COMPARISON OF COMMON MATERIALS FOR FORGED THREADED FITTINGS IN INDUSTRIAL APPLICATIONS

RELIABLE CONNECTIONS
FOR DEMANDING SYSTEMS

CARBON STEEL

STANDARDS
ASTM A105
ASTM A350 LF2

Widely used forged threaded fittings for general industrial and utility service.



TYPICAL INDUSTRIAL APPLICATIONS



General industrial piping systems



Utility piping (steam, water, air)



Oil and gas auxiliary systems

PERFORMANCE CHARACTERISTICS

Good Mechanical Strength
Suitable for a wide range of industrial service conditions with reliable performance.

Reliable Machinability
Allows precise and consistent threaded connections with good dimensional control.

Cost-Effective Service
Widely available and economical for general purpose applications.

STAINLESS STEEL

STANDARDS
ASTM A182 F304
ASTM A182 F316
ASTM A182 F321

Corrosion-resistant forged threaded fittings for demanding and hygienic environments.



TYPICAL INDUSTRIAL APPLICATIONS



Chemical processing systems



Corrosive environments (acids, chemicals, seawater)



Clean utility systems (pharma, food & beverage)

PERFORMANCE CHARACTERISTICS

Excellent Corrosion Resistance
Resists oxidation and a wide range of corrosive media for longer service life.

Clean Surface
Smooth, clean finish suitable for hygienic and sensitive applications.

Suitable for Demanding Service
Performs well in corrosive, high-purity, and critical process systems.

ALLOY STEEL

STANDARDS
ASTM A182 F11
ASTM A182 F22

High-strength forged threaded fittings for high-temperature and high-pressure service.



TYPICAL INDUSTRIAL APPLICATIONS



High-temperature service (steam, hot gas)



High-pressure service systems



Power generation systems

PERFORMANCE CHARACTERISTICS

Improved Temperature Resistance
Maintains strength and stability at elevated temperatures in severe service conditions.

Strong Mechanical Performance
High strength and creep resistance for high-pressure applications.

Suitable for Severe Service
Designed for power generation, refinery, and other high-temperature, high-pressure environments.

TYPES OF THREADED FITTINGS

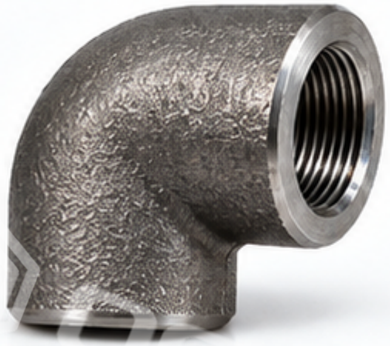
PRODUCT CLASSIFICATION FOR FORGED THREADED FITTINGS

COMMON FITTING TYPES

FOR INDUSTRIAL PIPING SYSTEMS

THREADED ELBOW

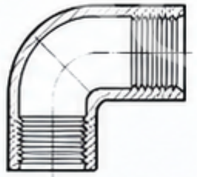
CHANGES DIRECTION OF THE PIPE RUN



Elbow fittings change the direction of flow in a threaded piping system, typically 90° (also available in 45°).

TYPICAL APPLICATIONS

- Direction change in piping
- Space-constrained layouts
- General industrial service



THREADED TEE

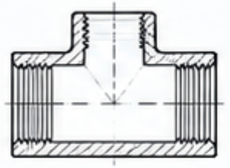
PROVIDES A BRANCH CONNECTION



Tee fittings provide a 90° branch connection to create a three-way junction in a threaded piping system.

TYPICAL APPLICATIONS

- Branch line connections
- Distribution of flow
- Process and utility piping



COUPLING

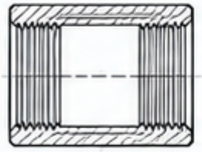
JOINS TWO THREADED PIPES IN A STRAIGHT RUN



Couplings join two lengths of threaded pipe in a straight line, providing a strong and leak-tight connection.

TYPICAL APPLICATIONS

- Straight pipe joining
- Line extension or repair
- General industrial service



UNION

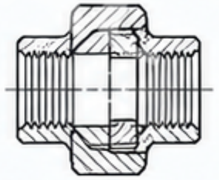
ALLOWS QUICK DISCONNECTION



Union fittings provide a detachable joint, allowing for easy disassembly and maintenance of the piping system.

TYPICAL APPLICATIONS

- Equipment isolation
- Maintenance and servicing
- Locations requiring disassembly



BUSHING

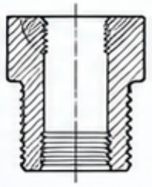
REDUCES PIPE SIZE



Bushing fittings reduce the pipe size by providing a larger male thread and a smaller female thread.

TYPICAL APPLICATIONS

- Pipe size reduction
- Equipment connections
- Adaptation to smaller lines



PLUG

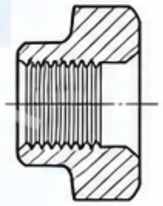
SEALS A THREADED OPENING



Plug fittings close and seal a female threaded opening in a pipe, fitting, or equipment port.

TYPICAL APPLICATIONS

- Sealing unused ports
- Pressure testing
- System isolation



CAP

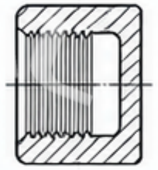
CLOSES THE END OF A PIPE



Cap fittings close the end of a male threaded pipe, providing a permanent or temporary end closure.

TYPICAL APPLICATIONS

- Pipe end closure
- System isolation
- Temporary or permanent sealing



APPLICATION GUIDE – THREADED FITTINGS

RELIABLE CONNECTIONS FOR INSTRUMENTATION, UTILITY AND AUXILIARY PIPING SYSTEMS

Forged threaded fittings are widely used for small-bore piping in industrial plants, providing leak-tight, high-strength connections for instrumentation, utilities and auxiliary services.

1. INSTRUMENTATION PIPING

PRESSURE GAUGES, VALVES AND SMALL-BORE CONNECTIONS





TYPICAL FITTING

90° THREADED ELBOW (FORGED)

APPLICATION NOTE

Threaded fittings are used in instrumentation lines to connect pressure gauges, isolation valves and small-bore tubing. They provide a compact, reliable solution for gauge connections and instrument air or process signals.

2. UTILITY PIPING

PLANT AIR AND WATER SERVICE LINES





TYPICAL FITTING

THREADED TEE (FORGED)

APPLICATION NOTE

Threaded fittings are commonly used in utility piping for plant air and water systems. They provide a practical and durable connection method for general service lines, including distribution, isolation valves and equipment branches.

3. OIL & GAS AUXILIARY PIPING

SAMPLING, INSTRUMENTATION AND AUXILIARY SERVICE LINES





TYPICAL FITTING

THREADED UNION (FORGED)

APPLICATION NOTE

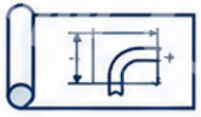
Threaded fittings are used in oil and gas facilities for auxiliary piping, including instrument air, sampling lines and small-diameter process connections. They provide robust, leak-tight joints for critical auxiliary services in harsh environments.

PURCHASING CHECKLIST – THREADED FITTINGS

KEY INFORMATION TO CONFIRM BEFORE ORDERING ASME B16.11 FORGED THREADED FITTINGS

CHECKLIST		ITEM	WHAT TO CONFIRM	REFERENCE / EXAMPLES
☐	1	**Product Type**	Confirm elbow, tee, coupling, union, bushing, plug, or cap.	Elbow / Tee / Coupling / Union / Bushing / Plug / Cap
☐	2	**Size**	Confirm NPS size required by drawings or line list.	NPS 1/8 – NPS 4 (inclusive)
☐	3	**Thread Type**	Confirm NPT, BSPT, or BSPP.	NPT / BSPT / BSPP
☐	4	**Pressure Class**	Confirm Class 2000, 3000, or 6000.	Class 2000 / 3000 / 6000
☐	5	**Material Grade**	Confirm ASTM grade such as A105, A182 F304, F316, F11, or F22.	ASTM A105 / A182 F304 / F316 / F11 / F22
☐	6	**MTC**	Confirm mill test certificate requirement.	MTC to EN 10204 3.1 (or as specified)
☐	7	**Inspection Report**	Confirm dimensional, thread, and visual inspection records.	Inspection report with dimensions, thread check, visual inspection results.

SUPPORTING DOCUMENTS AND REQUIREMENTS



DRAWINGS / LINE LIST
Verify dimensions, quantities and special requirements from project drawings or line list.



MILL TEST CERTIFICATE (MTC)
Confirm MTC to EN 10204 3.1 (or as specified) for material traceability.



INSPECTION REPORT
Confirm dimensional, thread and visual inspection records are required.



MATERIAL GRADE
Verify ASTM grade and compliance with ASME B16.11 requirements.



RECOMMENDED ORDER INFORMATION

Product:	Threaded Coupling
Standard:	ASME B16.11
Size:	NPS 1
Thread:	NPT
Class:	3000
Material:	ASTM A105
Documents:	MTC + Inspection Report

WHY IT MATTERS

Complete and accurate order information helps ensure the correct threaded fittings are supplied, reducing the risk of thread mismatch, document rejection, and installation delays in the field.