ASME B16.9, ASME B16.9 Specification, ASME B16.9 Production Standards, ASME B16.9 Butt Weld Fittings, ASME B16.9 Stainless Steel Buttweld Fittings, ASME B16.9 Carbon Steel Buttweld Fittings, ASME B16.9 Butt Weld Tube Fittings, ASME B16.9 Seamless Buttweld Fittings. ASME B16.9 Schedule 40 Weld Elbows.

ASME B16.9 is a comprehensive standard that provides detailed specifications for factory-made wrought buttwelding fittings used in various piping systems. Here's a deeper dive into the specific areas you mentioned:

1.Overall Dimensions

-Nominal Pipe Sizes (NPS): **ASME B16.9 Specification** covers fittings for pipe sizes from NPS ½ inch through NPS 48 inches (DN 15 through DN 1200).

-Types of Fittings: The **ASME B16.9 Production Standard** includes dimensions for various types of fittings such as:

- **Butt Welding Elbows** (45° and 90°): Long radius and short radius elbows
- **Butt Welding Tees**: Straight tees and reducing tees
- Reducers: Concentric and eccentric reducers
- Caps: End caps used to terminate a pipeline
- Stub Ends: Used in combination with lap joint flanges

Dimensional Specifications: For each type of **ASME B16.9 Butt Weld Fittings**, the standard provides detailed dimensions including:

- Outside Diameter (OD)
- Inside Diameter (ID)
- Center-to-End Dimensions: For elbows and tees
- End-to-End Dimensions: For reducers
- Overall Lengths: For fittings like caps

ASME B16 9 Standard Specifications, Sizes and Schedules

Standard	ANSI / ASME B16.9, MSS SP-43, API 590-605
Dimension	ASME/ ANSI B16.9 | ASME B16.28 | MSS-SP-43 | BS1560 | BS4504 | BS10
Thickness of Fitting	SCH10, SCH 20, SCH30, STD SCH40, SCH80, SCH60, XS, SCH100, SCH 120, SCH140, SCH 160, XXS available with NACE MR 01-75
Size Ranges	½" NB to 24" NB in Schedule 10s, 40s, 80s, 160s, XXS.
Types	Welded | Seamless | Fabricated
Sizes	Seamless ButtWeld Fitting: From 1/2" - 10" Welded ButtWeld Fitting: From 1/2" - 48"

Size Table of Pipe Fittings ANSI b16.9

Product range and theoretical weights (kg)									
DN	Schedule 10S			Schedule 40S			Schedule 80S		
	90° Elbow	45° Elbow	Equal tee	90° Elbow	45° Elbow	Equal tee	90° Elbow	45° Elbow	Equal tee
8	0.02	0.01	0.03	0.03	0.02	0.06	0.04	0.03	0.07
10	0.03	0.02	0.05	0.03	0.02	0.03	0.06	0.04	0.09
15	0.06	0.03	0.09	0.08	0.04	0.10	0.10	0.05	0.14
20	0.07	0.03	0.13	0.08	0.04	0.17	0.11	0.05	0.20
25	0.14	0.08	0.28	0.15	0.11	0.29	0.22	0.14	0.38
32	0.23	0.11	0.49	0.26	0.17	0.59	0.40	0.23	0.68
40	0.30	0.17	0.68	0.40	0.23	0.86	0.51	0.29	1.02
50	0.50	0.25	0.85	0.70	0.40	1.28	0.91	0.59	1.59
65	0.85	0.48	1.41	1.40	0.77	2.19	1.81	0.99	3.13
80	1.25	0.63	1.77	2.20	1.08	3.31	2.97	1.50	4.45
90	1.70	0.75	2.67	2.83	1.42	4.08	4.00	2.00	5.44
100	2.10	1.08	3.46	4.47	2.09	5.27	6.18	2.81	7.71
150	5.45	2.72	8.07	10.89	5.44	10.99	16.32	8.16	13.61
200	10.20	5.33	15.65	21.54	10.77	20.91	33.11	16.56	28.12
250	18.15	9.75	26.46	38.56	19.27	35.38	51.71	25.86	49.90
300	25.80	13.62	39.46	59.42	29.71	62.14	79.38	39.69	83.91

Product range and theoretical weights (kg)									
DN	Schedule 10S			Schedule 40S			Schedule 80S		
	Con reducer	Ecc reducer	Reducing tee	Con reducer	Ecc reducer	Reducing tee	Con reducer	Ecc reducer	Reducing tee
40x25	0.19	0.19	0.60	0.26	0.26	0.76	0.34	0.34	0.90
50x25	0.28	0.28	0.73	0.40	0.40	1.10	0.54	0.54	1.37
50x40	0.31	0.31	0.76	0.45	0.45	1.15	0.59	0.59	1.43
80x50	0.55	0.55	1.56	1.00	1.00	2.91	1.79	1.79	3.91
100x50	0.78	0.78	2.94	1.50	1.50	4.48	1.95	1.95	6.55
100x80	0.87	0.87	3.04	1.74	1.74	4.64	2.33	2.33	6.79
150x80	1.82	1.82	6.86	3.95	3.95	9.68	5.51	5.51	11.57
150x100	1.96	1.96	7.10	4.07	4.07	11.94	5.96	5.96	11.97
200x100	3.01	3.01	13.46	6.55	6.55	17.98	9.23	9.23	24.18
200x150	3.19	3.19	14.08	6.74	6.74	18.82	10.12	10.12	25.31

ASME B16.9 Standard covers a wide range of materials for butt-welded fittings to accommodate various applications, especially in piping systems subjected to different pressures, temperatures, and corrosive environments. The standard includes several materials and grades, which are broadly categorized as follows:

2. ASME B16.9 Butt Weld Pipe Fittings Materials

Carbon Steel

- ASTM A234 WPB
- ASTM A420 WPL3 WPL6 (low-temperature service)
- **ASME B16.9 Carbon Steel Buttweld Fittings** Applications: Suitable for general service conditions, including oil, gas, and water pipelines, where toughness and strength are required.

Alloy Steel

- ASTM A234 WP11, WP22, WP9 WP91
- ASTM A860 WPHY 42, WPHY 46, WPHY 52, WPHY 60, WPHY 65, WPHY 70 (High-yield strength materials)
- **ASME B16.9 Alloy Steel Buttweld Fittings** Applications: Used in high-temperature and high-pressure environments, such as power plants, refineries, and chemical plants.

Stainless Steel

- ASTM A403 WP304, WP304L, WP316, WP316L, WP321, WP347
- **ASME B16.9 Stainless Steel Buttweld Fittings** Applications: Ideal for corrosive environments, including food processing, pharmaceuticals, and chemical industries.

Duplex Stainless Steel

- ASTM A815 UNS S31803 (Duplex 2205)
- ASTM A815 UNS S32750 (Super Duplex 2507)
- **ASME B16.9 Duplex Stainless Steel Buttweld Fittings** Applications: Provides higher strength and corrosion resistance, used in oil and gas, marine, and chemical processing industries.

Nickel Alloys

- ASTM B366 UNS N06600 (Inconel 600), UNS N06625 (Inconel 625), UNS N08825 (Incoloy 825)
- ASTM B366 UNS N10276 (Hastelloy C276)
- ASTM B366 UNS N04400 (Monel 400)
- ASTM B366 UNS N06022 (Hastelloy C22)
- **ASME B16.9 Nickel Alloy Buttweld Fittings** Applications: Used in applications requiring specific resistance to certain chemicals or environments, such as sulfuric acid plants, chemical processing, and pollution control equipment.

These materials and grades ensure that **ASME B16.9 Bw Fittings** manufactured under ASME B16.9 can meet the demanding requirements of various industries, providing safety, durability, and performance in a wide range of conditions.

3. ASME B16.9 Butt Welding Fittings Tolerances

-Dimensional Tolerances: The standard defines acceptable tolerances on the dimensions to ensure uniformity and proper fit-up in the field:

-Wall Thickness: Variations are allowed but must fall within specific tolerances to ensure

structural integrity.

-Outside Diameter: Tolerances are provided for OD variations to ensure the fitting aligns properly with the connected pipe.

-End Preparation: Includes tolerances on the bevel angle, root face, and root gap to facilitate welding.

-Angular Tolerances: Defined for elbows and other angular **ASME B16.9 Seamless Buttweld Fittings** to ensure accurate changes in direction in piping systems.

-Concentricity: The standard includes tolerances for the concentricity of fittings to ensure the inside and outside diameters are aligned.

ASME B16.9 Tolerances

All Fittings [Notes (1) and (2)]				Center-to-End Dimensions of 90 deg and 45 deg Elbows and Tees, *A, B, C, M*	Overall Length of Reducers and Lap Joint Stub Ends, *F, H*	Overall Length of Caps, *E*	180 deg Returns		
Nominal Pipe Size (NPS)	DN	Outside Diameter at Bevel, *D* [Notes (3) and (4)]	Inside Diameter at End [Notes (3) and (5)]				Center-to-Center Dimension, *O*	Back-to-Face Dimension, *K*	Alignment of Ends, *U*
½ to 2½	15–65	+1.6, −0.8	0.8	2	2	3	6	6	1
3 to 3½	80–90	1.6	1.6	2	2	3	6	6	1
4	100	1.6	1.6	2	2	3	6	6	1
5 to 8	125–200	+2.4, −1.6	1.6	2	2	6	6	6	1
10 to 18	250–450	+4.0, −3.2	3.2	2	2	6	10	6	2
20 to 24	500–600	+6.4, −4.8	4.8	2	2	6	10	6	2
26 to 30	650–750	+6.4, −4.8	4.8	3	5	10	...	...	...
32 to 48	800–1 200	+6.4, −4.8	4.8	5	5	10	...	...	...

Lap Joint Stub Ends [Note (6)]					Angularity Tolerances			
Nominal Pipe Size (NPS)	DN	Outside Diameter of Lap, *G*	Fillet Radius of Lap, *R*	Lap Thickness	Nominal Pipe Size (NPS)	DN	Off Angle, *Q*	Off Plane, *P*
½ to 2½	15–65	+0, −1	+0, −1	+1.6, −0	½ to 4	15–100	1	2
3 to 3½	80–90	+0, −1	+0, −1	+1.6, −0	5 to 8	125–200	2	4
4	100	+0, −1	+0, −2	+1.6, −0	10 to 12	250–300	3	5
5 to 8	125–200	+0, −1	+0, −2	+1.6, −0	14 to 16	350–400	3	6
10 to 18	250–450	+0, −2	+0, −2	+3.2, −0	18 to 24	450–600	4	10
20 to 24	500–600	+0, −2	+0, −2	+3.2, −0	26 to 30	650–750	5	10
26 to 30	650–750	...	...	...	32 to 42	800–1 050	5	13
32 to 48	800–1 200	...	...	...	44 to 48	1 100–1 200	5	19

GENERAL NOTES:
(a) For reference, see Table 2 Illustration on page 6.
(b) All dimensions are in millimeters.
(c) Tolerances are equal plus and minus except as noted.

NOTES:
(1) The inside diameter and the nominal wall thicknesses at ends are to be specified by the purchaser.
(2) A minimum wall thickness of 87.5% applies unless the purchaser specifies a different wall thickness tolerance. See Fig. 1, Note (1)(a).
(3) Out-of-round is the sum of absolute values of plus and minus tolerances.
(4) This tolerance may not apply in localized areas of formed fittings where increased wall thickness is required to meet design requirements of para. 2.2.
(5) Unless otherwise specified by the purchaser, these tolerances apply to the nominal inside diameter, which equals the difference between the nominal outside diameter and twice the nominal wall thickness.
(6) See Table 10 for limiting dimensions of outside diameter of barrel.

4. Pressure-Temperature Ratings

-Ratings: While ASME B16.9 primarily focuses on the dimensions and tolerances, the pressure-temperature ratings for the fittings are typically determined by the corresponding pipe and material standards (e.g., ASME B31.3 for process piping).

-Design Considerations: **ASME B16.9 Butt Weld Tube Fittings** must be capable of withstanding the same pressure-temperature ratings as the connected piping.

5. ASME B16.9 Schedule 40 Weld Fittings Testing

-Hydrostatic Testing: **BW Fittings** may be subjected to hydrostatic testing to ensure they can withstand the required pressure without leakage. However, the specific testing requirements are usually governed by the piping code or project specifications.

-Non-Destructive Examination (NDE): Depending on the material and application, fittings may be subjected to NDE methods such as radiographic testing (RT), ultrasonic testing (UT), or dye penetrant testing (PT) to check for internal or surface defects.

-Destructive Testing: Tensile, hardness, and impact testing might be conducted to verify the mechanical properties of the fitting material, although these are more typical of the material specification.

6. ASME B16.9 Butt Welded Fittings Marking

-Identification: Each fitting must be marked with specific details to ensure traceability and compliance:

-Manufacturer's Name or Trademark

-Material Grade: The **ASME B16.9 Pipe Fittings** material specification (e.g., ASTM standard) and grade must be marked on the fitting.

-Size: The nominal pipe size and wall thickness (schedule) or specific dimension standard.

-Heat Number: This allows traceability back to the material's production batch, crucial for quality control.

-Specification Number: Indicating compliance with **ASME B16.9 Specification**.

-Marking Methods: Markings are typically done using low-stress stamps or etching to avoid damaging the fitting.

ASME B16.9 Production Standard ensures that the fittings produced under this standard are consistent, reliable, and compatible with the corresponding piping systems, supporting safe and effective operation across various industries.