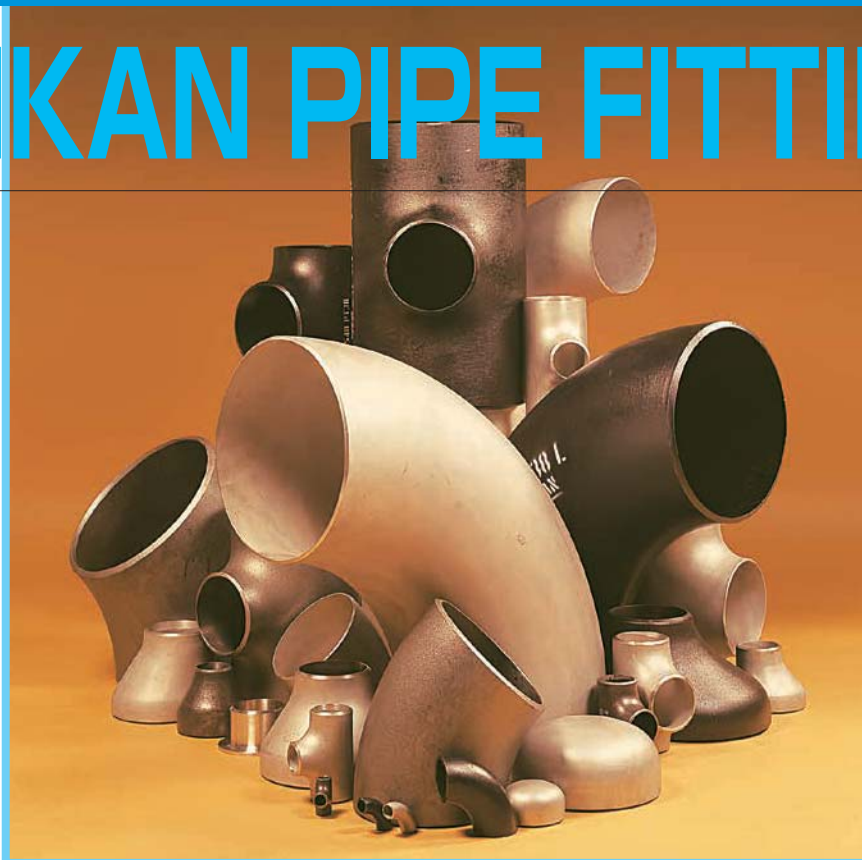




BENKAN PIPE FITTINGS



CONTENTS

| | |
|--------------------------------------------------------|----|
| <i>BENKAN</i> Butt-Welding Fittings..... | 1 |
| Inspection Procedure..... | 3 |
| Wall Thickness Schedules..... | 5 |
| Butt-Welding Fittings Weight and Volume | 9 |
| Long and Short Radius Elbows | 11 |
| Straight and Reducing Tees..... | 13 |
| Concentric and Eccentric Reducers..... | 16 |
| Caps | 17 |
| Stainless Steel Lap Joint Stub Ends | 18 |
| Material Specification for Butt-Welding Fittings | 19 |

***BENKAN* Butt-Welding Fittings**

Wrought Steel Butt-Welding Fittings

(Carbon and Alloy Steel)



45° Elbow (Long)



Cap



90° Elbow (Long)



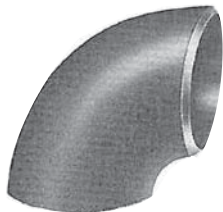
180° Elbow (Long)



T (Straight)



Reducer (Concentric)



90° Elbow (Short)



180° Elbow (Short)



T (Reducing)



Reducer (Eccentric)

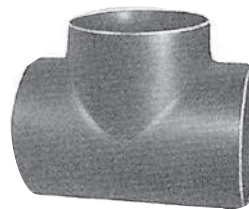
Large Diameter Wrought Steel Butt-Welding Fittings (Carbon, Alloy and Stainless Steel)



45° Elbow (Long)



90° Elbow (Long)



T (Straight)



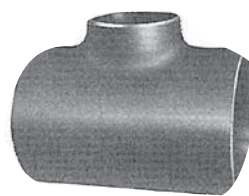
Reducer (Concentric)



Cap



90° Elbow (Short)



T (Reducing)



Reducer (Eccentric)

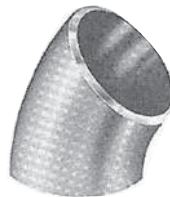
Stainless Steel Butt-Welding Fittings



90° Elbow (Long)



T (Straight)



45° Elbow (Long)



Cap



90° Elbow (Short)



T (Reducing)



Reducer (Concentric)



Lap Joint Stub End



Reducer (Eccentric)

| Material Items | Carbon and Alloy Steel | Stainless Steel |
|-------------------|---------------------------|---------------------------------|
| | Coating | Rust-resistant paint (black) |
| Making | Die stamping | Electrolysis etching |

Inspection Procedures

BENKAN butt-welding fittings are subjected to strict in-process inspection at each stage of the production process - from starting materials handling to finished product shipping. They are visually examined for conformity to company specifications and tested under the applicable ASTM, ASME, MSS and JIS codes and standards. They are also tested to make sure they conform to their intended use. Upon request, we call in officially certified test agents to witness the inspection procedures. **BENKAN** butt-welding fittings are manufactured in conformity with the following standards.

APPLICABLE STANDARDS

| | |
|-------------|----------------------------------------------------------------------------------------------------|
| ASTM A234 | Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperatures Service |
| ASTM A403 | Wrought Austenitic Stainless Steel Piping Fittings |
| ASTM A420 | Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service |
| ASME B16.9 | Factory-Made Wrought Steel Butt-Welding Fittings |
| ASME B16.28 | Wrought Steel Buttwelding Short Radius Elbows and Returns |
| MSS SP-43 | Wrought Stainless Steel Butt-Welding Fittings |
| MSS SP-75 | High Test Wrought Butt Welding Fittings |
| JIS B2309 | Butt-Welding Pipe Fittings for Light Gauge Stainless Steel Tubes for Ordinary Use |
| JIS B2311 | Steel Butt-Welding Pipe Fittings for Ordinary Use |
| JIS B2312 | Steel Butt-Welding Pipe Fittings |
| JIS B2313 | Steel Plate Butt-Welding Pipe Fittings |
| JIS B2316 | Steel Socket-Welding Pipe Fittings |
| JIS B2321 | Aluminum and Aluminum Alloy Butt-Welding Pipe Fittings |

STARTING MATERIAL RECEIVING INSPECTION

BENKAN butt-welding fittings are made of materials which meet ASTM and intracompany specifications.

Starting material inspection is carried out as follows:

1) Dimensional Inspection

Dimensions are inspected at each end of the purchased material.

2) Visual Inspection

Inspection is performed according to **BENKAN**'s "acceptable surface condition" standard.

3) Collating

Judgement is made as to whether it is worthy of the inspection by computerised collating the described items with the materials certificates.

The following other inspections are performed if necessary.

- Ultrasonic Examination
- Magnetic Particle Examination
- Radiographic Examination
- Liquid Penetrant Examination
- Ultrasonic Thickness Inspection
- Mechanical Test
- Others

IN-PROCESS INSPECTION

BENKAN butt-welding fittings are manufactured with carefully selected materials of the finest metallurgical quality on well-controlled jigs, tools or molds based on **BENKAN**'s various working standards. Meeting quality specifications is a key feature of **BENKAN** butt-welding fittings.

The following are the major in-process inspection items.

- Visual Inspection
- Dimensional Inspection
- Shape Inspection
- Hardness Test
- Temperature Check
- Processing Conditions Check
- Material Identification (by marking)
- Others

FINAL INSPECTION

The final inspection of **BENKAN** butt-welding fittings is performed as follows:

1) Standard Product Inspection

Applicable for **BENKAN** butt-welding fittings produced under ASME B16.9, B16.28 and other specifications.

VISUAL INSPECTION

BENKAN butt-welding fittings are visually inspected to confirm that both internal and external surfaces are smooth and without harmful defects. **BENKAN**'s "acceptable surface condition" standard is used as the standard for visual tests.

DIMENSIONAL INSPECTION

BENKAN butt-welding fittings are inspected for conformity with ASME or MSS dimensional tolerances (see table on page 24-27).

2) Special Product Inspection

Applicable for every products manufactured to meet specifications requested by customers.

VISUAL INSPECTION

BENKAN butt-welding fittings are visually inspected. Criteria are based on those of the standard product. Special specifications are determined by agreement between the customer and BENKAN.

DIMENSIONAL INSPECTION

The inspection is usually based on specifications stipulated by the customer.

SPECIAL INSPECTION

In the case of "special requirements" specified by the customer, nondestructive examinations and mechanical tests are performed.

3) Inspection Certificates

BENKAN certificates are issued in the following form unless otherwise requested by the customer.

INSPECTION BY VARIOUS AUTHORITIES

1) Inspection by a Bureau of Shipping

Products subject to this inspection are made from starting materials stipulated by the regulations of the bureau. The starting materials and products are inspected for appearance, dimensions, and conformity to designated specifications. The Bureau of Shipping witnesses and certifies inspection, and certificates from them are forwarded to the customer. **BENKAN** butt-welding fittings are inspected by the following Bureaus of Shipping:

- ABS (ABS PACIFIC DIVISION)
- B.V (Bureau Veritas)
- LRS (Lloyd's Register ASIA)
- NK (Nippon Kaiji Kyokai)
- DNV (Det Norske Veritas)

2) Inspection by Other Organizations

- JIC (Japan Inspection Co.,Ltd.)
- SGS (SGS FAR EAST LTD.)
- MOODY INTERNATIONAL LTD.

| | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Purchaser : 需要家名 | SAMPLE | INSPECTION CERTIFICATE 検査証明書 | |
| BENKAN No. ベンカン番号 | Order No. 注文番号 | BENKAN BENKAN KIKOH Corporation KIRYU FACTORY 5-1 ROKUSENGOKU-CHO OTA CITY GUNMA PREF. JAPAN | 株式会社ベンカン機工 製作工場 群馬県太田市六丁右町5-1 TEL. 027757-4112 |
| | | Date :日付 M D Y 月 日 年 | Certificate No. 証明書番号 |
| Job No. 工 事 番 号 | Specification for Material 材 料 規 格 | Specification for Inspection 検 査 規 格 | Visual Examination 外 観 検 査 |
| MFG No (Heat Identification No.) 製 造 番 号 | Product & Size 品 名 及 び 寸 法 | | Quantity 数 量 |
| Material Heat No. 製 鋼 番 号 | | | |
| Specification | Chemical Composition 化 学 成 分 % | Tension Test 引張試験 | |
| | C Si Mn P S | Y S | TS E |
| 規定値 | 100 100 100 1000 1000 | N/mm ² | % |
| Min. 最小 | | | |
| Max. 最大 | | | |
| <p>We hereby certify that the product described herein has been manufactured in accordance with the specifications concerned and also with the purchaser's requirements and that the test results shown herein are correct. 上記注文及び引張試験の規格と引張試験の結果に従って製造され、その要求事項を満足していることを証明します。 *1: The symbol "T" after wall thickness means mm as unit. 厚さの数値の後に示す "T" はmm単位を意味します。 *2: YS=Yield strength 降伏力 YP=Yield point 降伏点 TS=Tensile strength 引張り強さ El=Elongation 伸び</p> | | | |
| | | | Manager of Quality Assurance Section 品質保証課長 |

Wall Thickness Schedules (ASME)

| Nominal Pipe Size | | Outside Diameter | Nominal Wall Thickness | | | | | | | |
|-------------------|-------|------------------|------------------------|--------|--------|--------|------|-------|-------|-------|
| A | B | | Sch5S | Sch10S | Sch40S | Sch80S | Sch5 | Sch10 | Sch20 | Sch30 |
| 8 | 1/4 | 13.7 | — | 1.65 | 2.2 | 3.0 | — | 1.65 | — | 1.9 |
| 10 | 3/8 | 17.1 | — | 1.65 | 2.3 | 3.2 | — | 1.65 | — | 1.9 |
| 15 | 1/2 | 21.3 | 1.65 | 2.1 | 2.8 | 3.7 | 1.65 | 2.1 | — | 2.4 |
| 20 | 3/4 | 26.7 | 1.65 | 2.1 | 2.9 | 3.9 | 1.65 | 2.1 | — | 2.4 |
| 25 | 1 | 33.4 | 1.65 | 2.8 | 3.4 | 4.5 | 1.65 | 2.8 | — | 2.9 |
| 32 | 1-1/4 | 42.2 | 1.65 | 2.8 | 3.6 | 4.9 | 1.65 | 2.8 | — | 3.0 |
| 40 | 1-1/2 | 48.3 | 1.65 | 2.8 | 3.7 | 5.1 | 1.65 | 2.8 | — | 3.2 |
| 50 | 2 | 60.3 | 1.65 | 2.8 | 3.9 | 5.5 | 1.65 | 2.8 | — | 3.2 |
| 65 | 2-1/2 | 73.0 | 2.1 | 3.0 | 5.2 | 7.0 | 2.1 | 3.0 | — | 4.8 |
| 80 | 3 | 88.9 | 2.1 | 3.0 | 5.5 | 7.6 | 2.1 | 3.0 | — | 4.8 |
| 90 | 3-1/2 | 101.6 | 2.1 | 3.0 | 5.7 | 8.1 | 2.1 | 3.0 | — | 4.8 |
| 100 | 4 | 114.3 | 2.1 | 3.0 | 6.0 | 8.6 | 2.1 | 3.0 | — | 4.8 |
| 125 | 5 | 141.3 | 2.8 | 3.4 | 6.6 | 9.5 | 2.8 | 3.4 | — | — |
| 150 | 6 | 168.3 | 2.8 | 3.4 | 7.1 | 11.0 | 2.8 | 3.4 | — | — |
| 200 | 8 | 219.1 | 2.8 | 3.8 | 8.2 | 12.7 | 2.8 | 3.8 | 6.4 | 7.0 |
| 250 | 10 | 273.0 | 3.4 | 4.2 | 9.3 | 12.7 | 3.4 | 4.2 | 6.4 | 7.8 |
| 300 | 12 | 323.8 | 4.0 | 4.6 | 9.5 | 12.7 | 4.0 | 4.6 | 6.4 | 8.4 |
| 350 | 14 | 355.6 | 4.0 | 4.8 | 9.5 | 12.7 | 4.0 | 6.4 | 7.9 | 9.5 |
| 400 | 16 | 406.4 | 4.2 | 4.8 | 9.5 | 12.7 | 4.2 | 6.4 | 7.9 | 9.5 |
| 450 | 18 | 457.2 | 4.2 | 4.8 | 9.5 | 12.7 | 4.2 | 6.4 | 7.9 | 11.1 |
| 500 | 20 | 508.0 | 4.8 | 5.5 | 9.5 | 12.7 | 4.8 | 6.4 | 9.5 | 12.7 |
| 550 | 22 | 558.8 | 4.8 | 5.5 | — | — | 4.8 | 6.4 | 9.5 | 12.7 |
| 600 | 24 | 609.6 | 5.5 | 6.4 | 9.5 | 12.7 | 5.5 | 6.4 | 9.5 | 14.3 |
| 650 | 26 | 660.4 | — | — | — | — | — | 7.9 | 12.7 | — |
| 700 | 28 | 711.2 | — | — | — | — | — | 7.9 | 12.7 | 15.9 |
| 750 | 30 | 762.0 | 6.4 | 7.9 | — | — | 6.4 | 7.9 | 12.7 | 15.9 |
| 800 | 32 | 812.8 | — | — | — | — | — | 7.9 | 12.7 | 15.9 |
| 850 | 34 | 863.6 | — | — | — | — | — | 7.9 | 12.7 | 15.9 |
| 900 | 36 | 914.4 | — | — | — | — | — | 7.9 | 12.7 | 15.9 |
| 950 | 38 | 965.2 | — | — | — | — | — | — | — | — |
| 1000 | 40 | 1016.0 | — | — | — | — | — | — | — | — |
| 1050 | 42 | 1066.8 | — | — | — | — | — | — | — | — |
| 1100 | 44 | 1117.6 | — | — | — | — | — | — | — | — |
| 1150 | 46 | 1168.4 | — | — | — | — | — | — | — | — |
| 1200 | 48 | 1219.2 | — | — | — | — | — | — | — | — |

*1 Figures are converted from inch to mm (inch=25.4mm)

**ASME B36.10
ASME B36.19**

(mm)

| Nominal Wall Thickness | | | | | | | | | | Nominal Pipe Size | |
|------------------------|-------|-------|------|-------|--------|--------|--------|--------|------|-------------------|-------|
| STD | Sch40 | Sch60 | XS | Sch80 | Sch100 | Sch120 | Sch140 | Sch160 | XXS | A | B |
| 2.2 | 2.2 | — | 3.0 | 3.0 | — | — | — | — | — | 8 | 1/4 |
| 2.3 | 2.3 | — | 3.2 | 3.2 | — | — | — | — | — | 10 | 3/8 |
| 2.8 | 2.8 | — | 3.7 | 3.7 | — | — | — | 4.8 | 7.5 | 15 | 1/2 |
| 2.9 | 2.9 | — | 3.9 | 3.9 | — | — | — | 5.6 | 7.8 | 20 | 3/4 |
| 3.4 | 3.4 | — | 4.5 | 4.5 | — | — | — | 6.4 | 9.1 | 25 | 1 |
| 3.6 | 3.6 | — | 4.9 | 4.9 | — | — | — | 6.4 | 9.7 | 32 | 1-1/4 |
| 3.7 | 3.7 | — | 5.1 | 5.1 | — | — | — | 7.1 | 10.2 | 40 | 1-1/2 |
| 3.9 | 3.9 | — | 5.5 | 5.5 | — | — | — | 8.7 | 11.1 | 50 | 2 |
| 5.2 | 5.2 | — | 7.0 | 7.0 | — | — | — | 9.5 | 14.0 | 65 | 2-1/2 |
| 5.5 | 5.5 | — | 7.6 | 7.6 | — | — | — | 11.1 | 15.2 | 80 | 3 |
| 5.7 | 5.7 | — | 8.1 | 8.1 | — | — | — | — | — | 90 | 3-1/2 |
| 6.0 | 6.0 | — | 8.6 | 8.6 | — | 11.1 | — | 13.5 | 17.1 | 100 | 4 |
| 6.6 | 6.6 | — | 9.5 | 9.5 | — | 12.7 | — | 15.9 | 19.1 | 125 | 5 |
| 7.1 | 7.1 | — | 11.0 | 11.0 | — | 14.3 | — | 18.3 | 21.9 | 150 | 6 |
| 8.2 | 8.2 | 10.3 | 12.7 | 12.7 | 15.1 | 18.3 | 20.6 | 23.0 | 22.2 | 200 | 8 |
| 9.3 | 9.3 | 12.7 | 12.7 | 15.1 | 18.3 | 21.4 | 25.4 | 28.6 | 25.4 | 250 | 10 |
| 9.5 | 10.3 | 14.3 | 12.7 | 17.5 | 21.4 | 25.4 | 28.6 | 33.3 | 25.4 | 300 | 12 |
| 9.5 | 11.1 | 15.1 | 12.7 | 19.1 | 23.8 | 27.8 | 31.8 | 35.7 | — | 350 | 14 |
| 9.5 | 12.7 | 16.7 | 12.7 | 21.4 | 26.2 | 31.0 | 36.5 | 40.5 | — | 400 | 16 |
| 9.5 | 14.3 | 19.1 | 12.7 | 23.8 | 29.4 | 34.9 | 39.7 | 45.2 | — | 450 | 18 |
| 9.5 | 15.1 | 20.6 | 12.7 | 26.2 | 32.5 | 38.1 | 44.5 | 50.0 | — | 500 | 20 |
| 9.5 | — | 22.2 | 12.7 | 28.6 | 34.9 | 41.3 | 47.6 | 54.0 | — | 550 | 22 |
| 9.5 | 17.5 | 24.6 | 12.7 | 31.0 | 38.9 | 46.0 | 52.4 | 59.5 | — | 600 | 24 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 650 | 26 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 700 | 28 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 750 | 30 |
| 9.5 | 17.5 | — | 12.7 | — | — | — | — | — | — | 800 | 32 |
| 9.5 | 17.5 | — | 12.7 | — | — | — | — | — | — | 850 | 34 |
| 9.5 | 19.1 | — | 12.7 | — | — | — | — | — | — | 900 | 36 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 950 | 38 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1000 | 40 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1050 | 42 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1100 | 44 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1150 | 46 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1200 | 48 |

Wall Thickness Schedules (JIS)

| Nominal Pipe Size | | Outside Diameter | Nominal Wall Thickness | | | | | | | |
|-------------------|-------|------------------|------------------------|--------|--------|------|-----|-------|-------|-------|
| A | B | | Sch5S | Sch10S | Sch20S | FSGP | LG | Sch10 | Sch20 | Sch30 |
| 8 | 1/4 | 13.8 | 1.2 | 1.65 | 2.0 | 2.3 | — | — | — | — |
| 10 | 3/8 | 17.3 | 1.2 | 1.65 | 2.0 | 2.3 | — | — | — | — |
| 15 | 1/2 | 21.7 | 1.65 | 2.1 | 2.5 | 2.8 | — | — | — | — |
| 20 | 3/4 | 27.2 | 1.65 | 2.1 | 2.5 | 2.8 | — | — | — | — |
| 25 | 1 | 34.0 | 1.65 | 2.8 | 3.0 | 3.2 | — | — | — | — |
| 32 | 1-1/4 | 42.7 | 1.65 | 2.8 | 3.0 | 3.5 | — | — | — | — |
| 40 | 1-1/2 | 48.6 | 1.65 | 2.8 | 3.0 | 3.5 | — | — | — | — |
| 50 | 2 | 60.5 | 1.65 | 2.8 | 3.5 | 3.8 | — | — | 3.2 | — |
| 65 | 2-1/2 | 76.3 | 2.1 | 3.0 | 3.5 | 4.2 | — | — | 4.5 | — |
| 80 | 3 | 89.1 | 2.1 | 3.0 | 4.0 | 4.2 | — | — | 4.5 | — |
| 90 | 3-1/2 | 101.6 | 2.1 | 3.0 | 4.0 | 4.2 | — | — | 4.5 | — |
| 100 | 4 | 114.3 | 2.1 | 3.0 | 4.0 | 4.5 | — | — | 4.9 | — |
| 125 | 5 | 139.8 | 2.8 | 3.4 | 5.0 | 4.5 | — | — | 5.1 | — |
| 150 | 6 | 165.2 | 2.8 | 3.4 | 5.0 | 5.0 | 5.0 | — | 5.5 | — |
| 175 | 7 | 190.7 | — | — | — | 5.3 | — | — | — | — |
| 200 | 8 | 216.3 | 2.8 | 4.0 | 6.5 | 5.8 | 5.8 | — | 6.4 | 7.0 |
| 225 | 9 | 241.8 | — | — | — | 6.2 | — | — | — | — |
| 250 | 10 | 267.4 | 3.4 | 4.0 | 6.5 | 6.6 | 6.6 | — | 6.4 | 7.8 |
| 300 | 12 | 318.5 | 4.0 | 4.5 | 6.5 | 6.9 | 6.9 | — | 6.4 | 8.4 |
| 350 | 14 | 355.6 | 4.0 | 5.0 | 8.0 | 7.9 | 7.9 | 6.4 | 7.9 | 9.5 |
| 400 | 16 | 406.4 | 4.5 | 5.0 | 8.0 | 7.9 | 7.9 | 6.4 | 7.9 | 9.5 |
| 450 | 18 | 457.2 | 4.5 | 5.0 | 8.0 | 7.9 | 7.9 | 6.4 | 7.9 | 11.1 |
| 500 | 20 | 508.0 | 5.0 | 5.5 | 9.5 | 7.9 | 7.9 | 6.4 | 9.5 | 12.7 |
| 550 | 22 | 558.8 | 5.0 | 5.5 | 9.5 | — | 7.9 | 6.4 | 9.5 | 12.7 |
| 600 | 24 | 609.6 | 5.5 | 6.5 | 9.5 | — | 7.9 | 6.4 | 9.5 | 14.3 |
| 650 | 26 | 660.4 | 5.5 | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | — |
| 700 | 28 | 711.2 | 5.5 | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | 15.9 |
| 750 | 30 | 762.0 | 6.5 | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | 15.9 |
| 800 | 32 | 812.8 | — | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | 15.9 |
| 850 | 34 | 863.6 | — | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | 15.9 |
| 900 | 36 | 914.4 | — | 8.0 | 12.7 | — | 7.9 | 7.9 | 12.7 | 15.9 |
| 950 | 38 | 965.2 | — | — | — | — | 7.9 | — | — | — |
| 1000 | 40 | 1016.0 | — | 9.5 | 14.3 | — | 7.9 | — | — | — |
| 1050 | 42 | 1066.8 | — | — | — | — | 7.9 | — | — | — |
| 1100 | 44 | 1117.6 | — | — | — | — | 7.9 | — | — | — |
| 1150 | 46 | 1168.4 | — | — | — | — | 7.9 | — | — | — |
| 1200 | 48 | 1219.2 | — | — | — | — | 7.9 | — | — | — |

*: No standard in JIS. However, needs by customer, it is applied from ASME B36.10.

JIS G3452
JIS G3454
JIS G3455
JIS G3456
JIS G3459
JIS G3460
JIS G3468

(mm)

| Nominal Wall Thickness | | | | | | | | | | Nominal Pipe Size | |
|------------------------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------------------|-------|
| STD | Sch40 | Sch60 | XS | Sch80 | Sch100 | Sch120 | Sch140 | Sch160 | XXS | A | B |
| *2.2 | 2.2 | 2.4 | *3.0 | 3.0 | — | — | — | — | — | 8 | 1/4 |
| *2.3 | 2.3 | 2.8 | *3.2 | 3.2 | — | — | — | — | — | 10 | 3/8 |
| *2.8 | 2.8 | 3.2 | *3.7 | 3.7 | — | — | — | 4.7 | *7.5 | 15 | 1/2 |
| *2.9 | 2.9 | 3.4 | *3.9 | 3.9 | — | — | — | 5.5 | *7.8 | 20 | 3/4 |
| *3.4 | 3.4 | 3.9 | *4.5 | 4.5 | — | — | — | 6.4 | *9.1 | 25 | 1 |
| *3.6 | 3.6 | 4.5 | *4.9 | 4.9 | — | — | — | 6.4 | *9.7 | 32 | 1-1/4 |
| *3.7 | 3.7 | 4.5 | *5.1 | 5.1 | — | — | — | 7.1 | *10.2 | 40 | 1-1/2 |
| *3.9 | 3.9 | 4.9 | *5.5 | 5.5 | — | — | — | 8.7 | *11.1 | 50 | 2 |
| *5.2 | 5.2 | 6.0 | *7.0 | 7.0 | — | — | — | 9.5 | *14.0 | 65 | 2-1/2 |
| *5.5 | 5.5 | 6.6 | *7.6 | 7.6 | — | — | — | 11.1 | *15.2 | 80 | 3 |
| *5.7 | 5.7 | 7.0 | *8.1 | 8.1 | — | — | — | 12.7 | — | 90 | 3-1/2 |
| *6.0 | 6.0 | 7.1 | *8.6 | 8.6 | — | 11.1 | — | 13.5 | *17.1 | 100 | 4 |
| *6.6 | 6.6 | 8.1 | *9.5 | 9.5 | — | 12.7 | — | 15.9 | *19.0 | 125 | 5 |
| *7.1 | 7.1 | 9.3 | *11.0 | 11.0 | — | 14.3 | — | 18.2 | *21.9 | 150 | 6 |
| — | — | — | — | — | — | — | — | — | — | 175 | 7 |
| *8.2 | 8.2 | 10.3 | *12.7 | 12.7 | 15.1 | 18.2 | 20.6 | 23.0 | *22.2 | 200 | 8 |
| — | — | — | — | — | — | — | — | — | — | 225 | 9 |
| *9.3 | 9.3 | 12.7 | *12.7 | 15.1 | 18.2 | 21.4 | 25.4 | 28.6 | *25.4 | 250 | 10 |
| *9.5 | 10.3 | 14.3 | *12.7 | 17.4 | 21.4 | 25.4 | 28.6 | 33.3 | *25.4 | 300 | 12 |
| 9.5 | 11.1 | 15.1 | 12.7 | 19.0 | 23.8 | 27.8 | 31.8 | 35.7 | — | 350 | 14 |
| 9.5 | 12.7 | 16.7 | 12.7 | 21.4 | 26.2 | 30.9 | 36.5 | 40.5 | — | 400 | 16 |
| 9.5 | 14.3 | 19.0 | 12.7 | 23.8 | 29.4 | 34.9 | 39.7 | 45.2 | — | 450 | 18 |
| 9.5 | 15.1 | 20.6 | 12.7 | 26.2 | 32.5 | 38.1 | 44.4 | 50.0 | — | 500 | 20 |
| 9.5 | 15.9 | 22.2 | 12.7 | 28.6 | 34.9 | 41.3 | 47.6 | 54.0 | — | 550 | 22 |
| 9.5 | 17.5 | 24.6 | 12.7 | 31.0 | 38.9 | 46.0 | 52.4 | 59.5 | — | 600 | 24 |
| 9.5 | 18.9 | 26.4 | 12.7 | 34.0 | 41.6 | 49.1 | 56.6 | 64.2 | — | 650 | 26 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 700 | 28 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 750 | 30 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 800 | 32 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 850 | 34 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 900 | 36 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 950 | 38 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1000 | 40 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1050 | 42 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1100 | 44 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1150 | 46 |
| 9.5 | — | — | 12.7 | — | — | — | — | — | — | 1200 | 48 |

BUTT-WELDING FITTINGS WEIGHT AND VOLUME

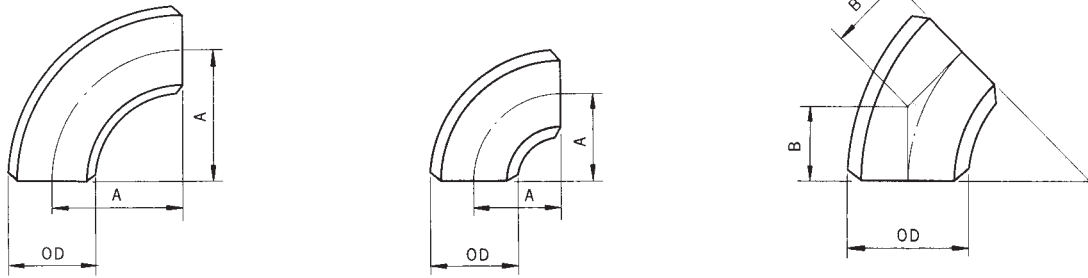
| Nominal Pipe Size | WEIGHT (Kg) | | | | | | | | | |
|----------------------|-------------|---------|-----------|-------|-------|-------|-------|-------|---------|-------|
| | 90° LONG | | 90° SHORT | | TEE | | CAP | | REDUCER | |
| | STD | XS | STD | XS | STD | XS | STD | XS | STD | XS |
| 1/2 | 0.08 | 0.10 | — | — | 0.08 | 0.11 | 0.04 | 0.05 | — | — |
| 3/4 | 0.10 | 0.13 | — | — | 0.12 | 0.16 | 0.05 | 0.07 | 0.06 | 0.07 |
| 1 | 0.15 | 0.19 | 0.10 | 0.13 | 0.25 | 0.31 | 0.11 | 0.14 | 0.11 | 0.14 |
| 1-1/4 | 0.26 | 0.34 | 0.17 | 0.22 | 0.42 | 0.55 | 0.14 | 0.19 | 0.15 | 0.20 |
| 1-1/2 | 0.37 | 0.49 | 0.24 | 0.32 | 0.60 | 0.80 | 0.17 | 0.23 | 0.24 | 0.32 |
| 2 | 0.65 | 0.89 | 0.43 | 0.59 | 0.87 | 1.19 | 0.23 | 0.33 | 0.37 | 0.50 |
| 2-1/2 | 1.30 | 1.70 | 0.87 | 1.14 | 1.67 | 2.19 | 0.40 | 0.53 | 0.70 | 0.91 |
| 3 | 2.03 | 2.73 | 1.35 | 1.82 | 2.41 | 3.25 | 0.66 | 0.91 | 0.91 | 1.22 |
| 3-1/2 | 2.82 | 3.91 | 1.88 | 2.61 | 3.17 | 4.39 | 0.96 | 1.36 | 1.28 | 1.77 |
| 4 | 3.83 | 5.36 | 2.55 | 3.57 | 4.11 | 5.75 | 1.17 | 1.68 | 1.53 | 2.14 |
| 5 | 6.55 | 9.23 | 4.37 | 6.15 | 6.60 | 9.30 | 1.92 | 2.77 | 2.50 | 3.52 |
| 6 | 10.1 | 15.3 | 6.75 | 10.2 | 9.71 | 14.7 | 2.89 | 4.48 | 3.61 | 5.45 |
| 8 | 20.4 | 30.9 | 13.6 | 20.6 | 18.1 | 27.4 | 5.20 | 8.05 | 5.71 | 8.63 |
| 10 | 36.2 | 48.7 | 24.1 | 32.5 | 30.9 | 41.7 | 9.17 | 12.5 | 9.65 | 13.0 |
| 12 | 52.8 | 69.9 | 35.2 | 46.6 | 44.2 | 58.4 | 13.3 | 17.7 | 13.7 | 18.2 |
| 14 | 67.9 | 89.9 | 45.2 | 59.9 | 53.5 | 70.9 | 15.9 | 21.2 | 25.5 | 33.8 |
| 16 | 89.0 | 118.0 | 59.3 | 78.6 | 66.1 | 87.7 | 20.0 | 26.7 | 30.9 | 41.0 |
| 18 | 112.9 | 149.8 | 75.3 | 99.9 | 83.9 | 111.3 | 25.5 | 34.1 | 37.7 | 50.0 |
| 20 | 139.7 | 185.5 | 93.1 | 123.7 | 103.8 | 137.8 | 31.8 | 42.5 | 56.3 | 74.7 |
| 22 | 169.3 | 225.0 | 112.8 | 150.0 | 125.8 | 167.2 | 38.7 | 51.7 | 62.3 | 82.8 |
| 24 | 201.7 | 268.3 | 134.5 | 178.8 | 139.2 | 185.1 | 45.0 | 60.1 | 68.4 | 90.9 |
| 26 | 237.0 | 315.3 | 158.0 | 210.2 | 176.1 | 234.3 | 50.3 | 67.3 | 89.3 | 118.7 |
| 28 | 275.2 | 366.2 | 183.5 | 244.2 | 198.2 | 263.8 | 56.0 | 74.8 | 96.5 | 128.4 |
| 30 | 316.2 | 420.9 | 210.8 | 280.6 | 228.3 | 303.9 | 61.9 | 82.8 | 103.8 | 138.1 |
| 32 | 360.1 | 479.4 | 240.0 | 319.6 | 260.4 | 346.7 | 68.2 | 91.2 | 111.0 | 147.8 |
| 34 | 406.8 | 541.7 | 271.2 | 361.2 | 294.6 | 392.4 | 74.8 | 100.0 | 118.3 | 157.5 |
| 36 | 456.3 | 607.8 | 304.2 | 405.2 | 331.0 | 440.9 | 81.7 | 109.2 | 125.5 | 167.2 |
| 38 | 508.7 | 677.8 | — | — | 369.5 | 492.3 | 94.4 | 126.2 | 132.8 | 176.9 |
| 40 | 563.9 | 751.5 | 376.0 | 501.0 | 410.1 | 546.5 | 102.1 | 136.5 | 140.0 | 186.6 |
| 42 | 622.0 | 829.0 | 414.7 | 552.7 | 421.3 | 561.6 | 110.1 | 147.2 | 147.3 | 196.3 |
| 44 | 682.9 | 910.3 | 455.3 | 606.9 | 474.5 | 632.5 | 124.9 | 166.9 | 154.5 | 206.0 |
| 46 | 746.7 | 995.5 | — | — | 520.4 | 693.8 | 133.7 | 178.7 | 188.8 | 251.6 |
| 48 | 813.3 | 1,084.4 | 542.2 | 722.9 | 568.4 | 757.9 | 142.8 | 191.0 | 197.2 | 262.9 |

* Weight and volume are according to theoretical calculation.

* Figures of tees are on equal tees and figures of reducers are on one size reduction reducers.

| VOLUME (m ³) | | | | | Nominal Pipe Size |
|--------------------------|--------------|-------|-------|---------|----------------------|
| 90° LONG | 90° SHORT | TEE | CAP | REDUCER | |
| — | — | — | — | — | 1/2 |
| — | — | — | — | — | 3/4 |
| — | — | — | — | — | 1 |
| — | — | — | — | — | 1-1/4 |
| — | — | — | — | — | 1-1/2 |
| 0.001 | 0.001 | 0.001 | — | — | 2 |
| 0.002 | 0.001 | 0.001 | — | 0.001 | 2-1/2 |
| 0.003 | 0.002 | 0.002 | — | 0.001 | 3 |
| 0.004 | 0.003 | 0.003 | 0.001 | 0.001 | 3-1/2 |
| 0.005 | 0.004 | 0.004 | 0.001 | 0.001 | 4 |
| 0.010 | 0.007 | 0.007 | 0.001 | 0.002 | 5 |
| 0.016 | 0.011 | 0.011 | 0.002 | 0.004 | 6 |
| 0.037 | 0.025 | 0.022 | 0.005 | 0.007 | 8 |
| 0.070 | 0.046 | 0.040 | 0.009 | 0.013 | 10 |
| 0.118 | 0.079 | 0.067 | 0.015 | 0.021 | 12 |
| 0.164 | 0.109 | 0.091 | 0.021 | 0.042 | 14 |
| 0.245 | 0.163 | 0.126 | 0.029 | 0.059 | 16 |
| 0.349 | 0.232 | 0.179 | 0.042 | 0.080 | 18 |
| 0.479 | 0.319 | 0.246 | 0.059 | 0.131 | 20 |
| 0.638 | 0.424 | 0.327 | 0.052 | 0.159 | 22 |
| 0.828 | 0.551 | 0.388 | 0.066 | 0.189 | 24 |
| 1.053 | 0.700 | 0.540 | 0.083 | 0.266 | 26 |
| 1.315 | 0.875 | 0.649 | 0.103 | 0.308 | 28 |
| 1.618 | 1.076 | 0.800 | 0.125 | 0.354 | 30 |
| 1.964 | 1.306 | 0.974 | 0.151 | 0.403 | 32 |
| 2.355 | 1.566 | 1.170 | 0.180 | 0.455 | 34 |
| 2.796 | 1.859 | 1.391 | 0.212 | 0.510 | 36 |
| 3.288 | 2.187 | 1.639 | 0.248 | 0.568 | 38 |
| 3.835 | 2.550 | 1.914 | 0.288 | 0.629 | 40 |
| 4.440 | 2.953 | 2.023 | 0.332 | 0.694 | 42 |
| 5.105 | 3.395 | 2.400 | 0.381 | 0.761 | 44 |
| 5.833 | 3.879 | 2.753 | 0.433 | 0.971 | 46 |
| 6.627 | 4.407 | 3.138 | 0.491 | 1.057 | 48 |

Long and Short Radius Elbows

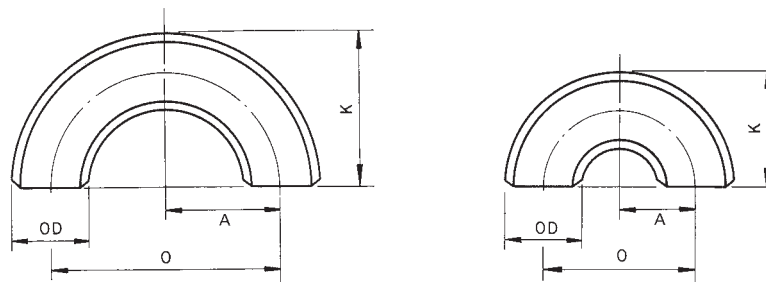


ASME B16.9 B16.28

*BENKAN's Standards (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | Center-to-End | | | |
|----------------------------------|---------------------------------------|-------------------|--------------|--------------------|---------------|
| | | Long Radius Elbow | | Short Radius Elbow | |
| | | 90 Deg. A | 45 Deg. B | 90 Deg. A | 45 Deg.* B |
| 1/2 | 21.3 | 38.1 | 15.7 | — | — |
| 3/4 | 26.7 | 38.1 | 19.1 | — | — |
| 1 | 33.4 | 38.1 | 22.4 | 25.4 | — |
| 1-1/4 | 42.2 | 47.8 | 25.4 | 31.8 | — |
| 1-1/2 | 48.3 | 57.2 | 28.4 | 38.1 | — |
| 2 | 60.3 | 76.2 | 35.1 | 50.8 | — |
| 2-1/2 | 73.0 | 95.3 | 44.5 | 63.5 | — |
| 3 | 88.9 | 114.3 | 50.8 | 76.2 | 31.6 |
| 3-1/2 | 101.6 | 133.4 | 57.2 | 88.9 | 36.8 |
| 4 | 114.3 | 152.4 | 63.5 | 101.6 | 42.1 |
| 5 | 141.3 | 190.5 | 79.2 | 127.0 | 52.6 |
| 6 | 168.3 | 228.6 | 95.3 | 152.4 | 63.4 |
| 8 | 219.1 | 304.8 | 127.0 | 203.2 | 84.2 |
| 10 | 273.0 | 381.0 | 158.8 | 254.0 | 105.2 |
| 12 | 323.8 | 457.2 | 190.5 | 304.8 | 126.3 |
| 14 | 355.6 | 533.4 | 222.3 | 355.6 | 147.3 |
| 16 | 406.4 | 609.6 | 254.0 | 406.4 | 168.3 |
| 18 | 457.2 | 685.8 | 285.8 | 457.2 | 189.4 |
| 20 | 508.0 | 762.0 | 317.5 | 508.0 | 210.4 |
| 22 | 558.8 | 838.2 | 342.9 | 558.8 | 231.5 |
| 24 | 609.6 | 914.4 | 381.0 | 609.6 | 252.5 |
| 26 | 660.4 | 990.6 | 406.4 | 660.4* | 273.5 |
| 28 | 711.2 | 1066.8 | 438.2 | 711.2* | 294.6 |
| 30 | 762.0 | 1143.0 | 469.9 | 762.0* | 315.6 |
| 32 | 812.8 | 1219.2 | 501.7 | 812.8* | 336.7 |
| 34 | 863.6 | 1295.4 | 533.4 | 863.6* | 357.7 |
| 36 | 914.4 | 1371.6 | 565.2 | 914.4* | 378.8 |
| 38 | 965.2 | 1447.8 | 599.9 | 965.2* | 399.8 |
| 40 | 1016.0 | 1524.0 | 632.0 | 1016.0* | 420.8 |
| 42 | 1066.8 | 1600.2 | 660.4 | 1066.8* | 441.9 |
| 44 | 1117.6 | 1676.4 | 695.5 | 1117.6* | 462.9 |
| 46 | 1168.4 | 1752.6 | 726.9 | — | — |
| 48 | 1219.2 | 1828.8 | 759.0 | 1219.2* | 505.0 |
| 52* | 1320.8 | — | — | 1320.8 | 547.1 |
| 54* | 1371.6 | 2057.4 | 852.2 | 1371.6 | 568.1 |
| 56* | 1422.4 | 2133.6 | 883.8 | — | — |
| 60* | 1524.0 | 2286.0 | 946.9 | 1524.0 | 631.3 |
| 66* | 1676.4 | 2514.6 | 1041.6 | — | — |
| 72* | 1828.8 | 2743.2 | 1262.5 | — | — |
| 80* | 2032.0 | — | — | 2032.0 | 841.7 |

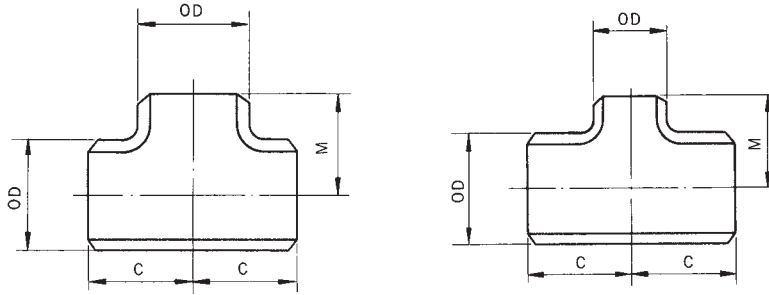
Long and Short Radius Return Elbows



ASME B16.9
ASME B16.28 (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | Long Radius | | Short Radius | |
|----------------------------------|---------------------------------------|---------------------------|-----------------------|---------------------------|-----------------------|
| | | Center-to- Center O | Back-to- Face K | Center-to- Center O | Back-to- Face K |
| 1/2 | 21.3 | 76.2 | 47.8 | — | — |
| 3/4 | 26.7 | 76.2 | 50.8 | — | — |
| 1 | 33.4 | 76.2 | 55.6 | 50.8 | 41.1 |
| 1-1/4 | 42.2 | 95.3 | 69.9 | 63.5 | 52.3 |
| 1-1/2 | 48.3 | 114.3 | 82.6 | 76.2 | 62.0 |
| 2 | 60.3 | 152.4 | 106.4 | 101.6 | 81.0 |
| 2-1/2 | 73.0 | 190.5 | 131.8 | 127.0 | 100.1 |
| 3 | 88.9 | 228.6 | 158.8 | 152.4 | 120.7 |
| 3-1/2 | 101.6 | 266.7 | 184.2 | 177.8 | 139.7 |
| 4 | 114.3 | 304.8 | 209.6 | 203.2 | 158.8 |
| 5 | 141.3 | 381.0 | 261.9 | 254.0 | 196.9 |
| 6 | 168.3 | 457.2 | 312.7 | 304.8 | 236.5 |
| 8 | 219.1 | 609.6 | 414.3 | 406.4 | 312.7 |
| 10 | 273.0 | 762.0 | 517.6 | 508.0 | 390.7 |

Straight and Reducing Tees



**MSS SP-75
ASME B16.9**

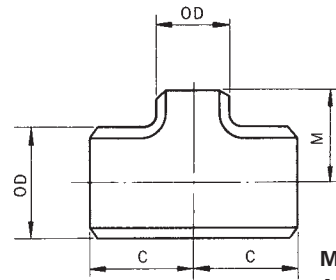
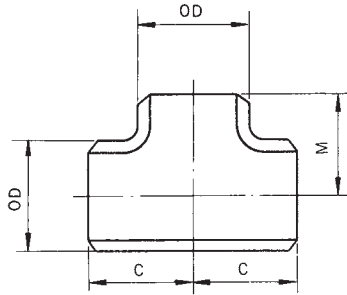
*BENKAN's Standards (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | | Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | |
|-------------------------|------------------------------|--------|---------------|----------------------------|-------------------------|------------------------------|--------|---------------|----------------------------|
| | Run | Outlet | Run C | Outlet ⁽¹⁾⁽²⁾ M | | Run | Outlet | Run C | Outlet ⁽¹⁾⁽²⁾ M |
| 1/2 x 1/2 | 21.3 | 21.3 | 25.4 | 25.4 | 5 x 5 | 141.3 | 141.3 | 124.0 | 124.0 |
| 3/8 | | 17.3 | | 25.4 | 4 | | 114.3 | | 117.3 |
| 1/4 | | 13.7 | | 25.4 | 3-1/2 | | 101.6 | | 114.3 |
| 3/4 x 3/4 | 26.7 | 26.7 | 28.4 | 28.4 | 3 | | 88.9 | | 111.3 |
| 1/2 | | 21.3 | | 28.4 | 2-1/2 | | 73.0 | | 108.0 |
| 3/8 | | 17.3 | | 28.4 | 2 | | 60.3 | | 104.6 |
| 1 x 1 | 33.4 | 33.4 | 38.1 | 38.1 | 1-1/2* | | 48.3 | | |
| 3/4 | | 26.7 | | 38.1 | 6 x 6 | 168.3 | 168.3 | 142.7 | 142.7 |
| 1/2 | | 21.3 | | 38.1 | 5 | | 141.3 | | 136.7 |
| 1-1/4 x 1-1/4 | 42.2 | 42.2 | 47.8 | 47.8 | 4 | | 114.3 | | 130.0 |
| 1 | | 33.4 | | 47.8 | 3-1/2 | | 101.6 | | 127.0 |
| 3/4 | | 26.7 | | 47.8 | 3 | | 88.9 | | 124.0 |
| 1/2 | | 21.3 | | 47.8 | 2-1/2 | | 73.0 | | 120.7 |
| 1-1/2 x 1-1/2 | 48.3 | 48.3 | 57.2 | 57.2 | 2* | | 60.3 | | |
| 1-1/4 | | 42.2 | | 57.2 | 8 x 8 | 219.1 | 219.1 | 177.8 | 177.8 |
| 1 | | 33.4 | | 57.2 | 6 | | 168.3 | | 168.1 |
| 3/4 | | 26.7 | | 57.2 | 5 | | 141.3 | | 162.1 |
| 1/2 | | 21.3 | | 57.2 | 4 | | 114.3 | | 155.5 |
| 2 x 2 | 60.3 | 60.3 | 63.5 | 63.5 | 3-1/2 | | 101.6 | | 152.4 |
| 1-1/2 | | 48.3 | | 60.5 | 3* | | 88.9 | | |
| 1-1/4 | | 42.2 | | 57.2 | 10 x 10 | 273.0 | 273.0 | 215.9 | 215.9 |
| 1 | | 33.4 | | 50.8 | 8 | | 219.1 | | 203.2 |
| 3/4 | | 26.7 | | 44.5 | 6 | | 168.3 | | 193.5 |
| 1/2* | | 21.3 | | | 5 | | 141.3 | | 190.5 |
| 2-1/2 x 2-1/2 | 73.0 | 73.0 | 76.2 | 76.2 | 4 | | 114.3 | | 184.2 |
| 2 | | 60.3 | | 69.9 | 12 x 12 | 323.8 | 323.8 | 254.0 | 254.0 |
| 1-1/2 | | 48.3 | | 66.5 | 10 | | 273.1 | | 241.3 |
| 1-1/4 | | 42.2 | | 63.5 | 8 | | 219.1 | | 228.6 |
| 1 | | 33.4 | | 57.2 | 6 | | 168.3 | | 218.9 |
| 3 x 3 | 88.9 | 88.9 | 85.9 | 85.9 | 5 | | 141.3 | | 215.9 |
| 2-1/2 | | 73.0 | | 82.6 | 14 x 14 | 355.6 | 355.6 | 279.4 | 279.4 |
| 2 | | 60.3 | | 76.2 | 12 | | 323.8 | | 269.7 |
| 1-1/2 | | 48.3 | | 73.2 | 10 | | 273.0 | | 257.0 |
| 1-1/4 | | 42.2 | | 69.9 | 8 | | 219.1 | | 247.7 |
| 1* | | 33.4 | | | 6 | | 168.3 | | 238.3 |
| 3-1/2 x 3-1/2 | 101.6 | 101.6 | 95.3 | 95.3 | 16 x 16 | 406.4 | 406.4 | 304.8 | 304.8 |
| 3 | | 88.9 | | 91.9 | 14 | | 355.6 | | 304.8 |
| 2-1/2 | | 73.0 | | 88.9 | 12 | | 323.8 | | 295.1 |
| 2 | | 60.3 | | 82.6 | 10 | | 273.0 | | 282.4 |
| 1-1/2 | | 48.3 | | 79.2 | 8 | | 219.1 | | 273.1 |
| 4 x 4 | 114.3 | 114.3 | 104.6 | 104.6 | 6 | | 168.3 | | 263.7 |
| 3-1/2 | | 101.6 | | 101.6 | 18 x 18 | 457.2 | 457.2 | 342.9 | 342.9 |
| 3 | | 88.9 | | 98.6 | 16 | | 406.4 | | 330.2 |
| 2-1/2 | | 73.0 | | 95.3 | 14 | | 355.6 | | 330.2 |
| 2 | | 60.3 | | 88.9 | 12 | | 323.8 | | 320.5 |
| 1-1/2 | | 48.3 | | 85.9 | 10 | | 273.0 | | 307.8 |
| 1-1/4* | | 42.2 | | | 8 | | 219.1 | | 298.5 |
| 1* | | 33.5 | | | | | | | |

Note (1) Outlet dimension "M" for NPS 26 and larger is recommended but not required.

Note (2) Outlet dimension "M" for run sizes NPS 14 and larger is recommended but not required.

Straight and Reducing Tees

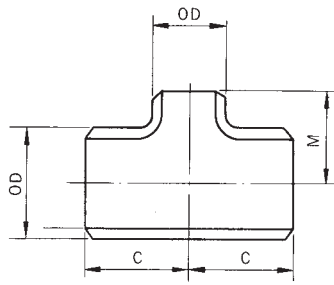
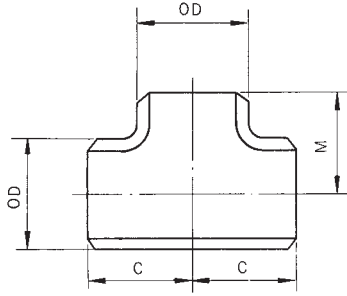


**MSS SP-75
ASME B16.9**

*BENKAN's Standards (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | | Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | | | |
|-------------------------|------------------------------|--------|---------------|----------------|-------------------------|------------------------------|---------|---------------|----------------|-------|-------|
| | Run | Outlet | Run C | Outlet(1)(2) M | | Run | Outlet | Run C | Outlet(1)(2) M | | |
| 20 x 20 | 508.0 | 508.0 | 381.0 | 381.0 | 30 x 12 | 762.0 | 323.8 | 558.8 | 472.6 | | |
| 18 | | 457.2 | | 368.3 | 10 | | 273.0 | | 460.2 | | |
| 16 | | 406.4 | | 355.6 | 32 x 32 | 812.8 | 812.8 | 596.9 | 596.9 | | |
| 14 | | 355.6 | | 355.6 | | | 30 | | 762.0 | 584.2 | |
| 12 | | 323.8 | | 345.9 | | | 28 | | 711.2 | 571.5 | |
| 10 | | 273.0 | | 333.2 | | | 26 | | 660.4 | 571.5 | |
| 8 | | 219.1 | | 323.9 | | | 24 | | 609.6 | 558.8 | |
| 22 x 22 | 558.8 | 558.8 | 419.1 | 419.1 | 22 | 558.8 | 546.1 | | | | |
| 20 | | 508.0 | | 406.4 | 20 | 508.0 | 533.4 | | | | |
| 18 | | 457.2 | | 393.7 | 18 | 457.2 | 520.7 | | | | |
| 16 | | 406.4 | | 381.0 | 16 | 406.4 | 508.0 | | | | |
| 14 | | 355.6 | | 381.0 | 14 | 355.6 | 508.0 | | | | |
| 12 | | 323.8 | | 371.3 | 34 x 34 | 863.6 | 863.6 | 635.0 | 635.0 | | |
| 10 | | 273.0 | | 358.6 | | | 32 | | 812.8 | 622.3 | |
| 24 x 24 | 609.6 | 609.6 | 431.8 | 431.8 | 30 | 762.0 | 609.6 | | | | |
| 22 | | 558.8 | | 431.8 | 28 | 711.2 | 596.9 | | | | |
| 20 | | 508.0 | | 431.8 | 26 | 660.4 | 596.9 | | | | |
| 18 | | 457.2 | | 419.1 | 24 | 609.6 | 584.2 | | | | |
| 16 | | 406.4 | | 406.4 | 22 | 558.8 | 571.5 | | | | |
| 14 | | 355.6 | | 406.4 | 20 | 508.0 | 558.8 | | | | |
| 12 | | 323.8 | | 396.7 | 18 | 457.2 | 546.1 | | | | |
| 10 | | 273.0 | | 384.0 | 16 | 406.4 | 533.4 | | | | |
| 26 x 26 | | 660.4 | | 660.4 | 495.3 | 495.3 | 36 x 36 | 914.4 | 914.4 | 673.1 | 673.1 |
| 24 | 609.6 | | 482.6 | 34 | | 863.6 | 660.4 | | | | |
| 22 | 558.8 | | 469.9 | 32 | | 812.8 | 647.7 | | | | |
| 20 | 508.0 | | 457.2 | 30 | | 762.0 | 635.0 | | | | |
| 18 | 457.2 | | 444.5 | 28 | | 711.2 | 622.3 | | | | |
| 16 | 406.4 | | 431.8 | 26 | | 660.4 | 622.3 | | | | |
| 14 | 355.6 | | 431.8 | 24 | | 609.6 | 609.6 | | | | |
| 12 | 323.8 | | 422.1 | 22 | | 558.8 | 596.9 | | | | |
| 28 x 28 | 711.2 | | 711.2 | 520.7 | | 520.7 | 20 | | 508.0 | | 584.2 |
| | | | 660.4 | | | 520.7 | 18 | | 457.2 | | 571.5 |
| | | 609.6 | 508.0 | | 16 | 406.4 | 558.8 | | | | |
| | | 558.8 | 495.3 | | 38 x 38 | 965.2 | 965.2 | 711.2 | 711.2 | | |
| | | 508.0 | 482.6 | | | | 36 | | 914.4 | 711.2 | |
| | | 457.2 | 469.9 | | | | 34 | | 863.6 | 698.5 | |
| 406.4 | 457.2 | 32 | 812.8 | 685.8 | | | | | | | |
| 14 | 355.6 | 457.2 | 30 | 762.0 | 673.1 | | | | | | |
| 12 | 323.8 | 447.5 | 28 | 711.2 | 647.7 | | | | | | |
| 30 x 30 | 762.0 | 762.0 | 558.8 | 558.8 | 26 | 660.4 | 647.7 | | | | |
| | | 711.2 | | 546.1 | 24 | 609.6 | 635.0 | | | | |
| | | 660.4 | | 546.1 | 22 | 558.8 | 622.3 | | | | |
| | | 609.6 | | 533.4 | 20 | 508.0 | 609.6 | | | | |
| | | 558.8 | | 520.7 | 18 | 457.2 | 596.9 | | | | |
| | | 508.0 | | 508.0 | 30 x 30 | 762.0 | 762.0 | 673.1 | 673.1 | | |
| | | 457.2 | | 495.3 | | | 28 | | 711.2 | 647.7 | |
| | | 406.4 | | 482.6 | | | 26 | | 660.4 | 647.7 | |
| | | 355.6 | | 482.6 | | | 24 | | 609.6 | 635.0 | |
| | 482.6 | 22 | 558.8 | 622.3 | | | | | | | |

Straight and Reducing Tees

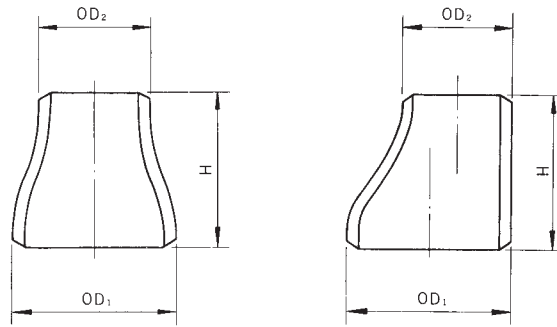


**MSS SP-75
ASME B16.9**

*BENKAN's Standards (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | | Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | | Center-to-End | |
|-------------------------|------------------------------|--------|---------------|----------------|-------------------------|------------------------------|--------|---------------|----------------|
| | Run | Outlet | Run C | Outlet(1)(2) M | | Run | Outlet | Run C | Outlet(1)(2) M |
| 40 x 40 | 1016.0 | 1016.0 | 749.3 | 749.3 | 46 x 26 | 1168.4 | 660.4 | 850.9 | 736.6 |
| 38 | | 965.2 | | 749.3 | 24 | | 609.6 | | 723.9 |
| 36 | | 914.4 | | 736.6 | 22 | | 558.8 | | 723.9 |
| 34 | | 863.6 | | 723.9 | 20* | | 508.0 | | 723.9 |
| 32 | | 812.8 | | 711.2 | 48 x 48 | 1219.2 | 1219.2 | 889.0 | 838.2 |
| 30 | | 762.0 | | 698.5 | 46 | | 1168.4 | | 838.2 |
| 28 | | 711.2 | | 673.1 | 44 | | 1117.6 | | 838.2 |
| 26 | | 660.4 | | 673.1 | 42 | | 1066.8 | | 812.8 |
| 24 | | 609.6 | | 660.4 | 40 | | 1016.0 | | 812.8 |
| 22 | | 558.8 | | 647.7 | 38 | | 965.2 | | 812.8 |
| 20 | | 508.0 | | 635.0 | 36 | | 914.4 | | 787.4 |
| 18 | | 457.2 | | 622.3 | 34 | | 863.6 | | 787.4 |
| 42 x 42 | 1066.8 | 1066.8 | 762.0 | 711.2 | 32 | | 812.8 | | 787.4 |
| 40 | | 1016.0 | | 711.2 | 30 | | 762.0 | | 762.0 |
| 38 | | 965.2 | | 711.2 | 28 | | 711.2 | | 762.0 |
| 36 | | 914.4 | | 711.2 | 26 | | 660.4 | | 762.0 |
| 34 | | 863.6 | | 711.2 | 24 | | 609.6 | | 736.6 |
| 32 | | 812.8 | | 711.2 | 22 | | 558.8 | | 736.6 |
| 30 | | 762.0 | | 711.2 | 52 x 52* | 1320.8 | 1320.8 | 965.2 | 914.4 |
| 28 | | 711.2 | | 698.5 | 48* | | 1219.2 | | 863.6 |
| 26 | | 660.4 | | 698.5 | 44* | | 1117.6 | | 812.8 |
| 24 | | 609.6 | | 660.4 | 40* | | 1016.0 | | 762.0 |
| 22 | | 558.8 | | 660.4 | 54 x 54* | 1371.6 | 1371.6 | 1003.3 | 952.5 |
| 20 | | 508.0 | | 660.4 | 52* | | 1320.8 | | 914.4 |
| 18 | | 457.2 | | 647.7 | 48* | | 1219.2 | | 863.6 |
| 16 | | 406.4 | | 635.0 | 44* | | 1117.6 | | 863.6 |
| 44 x 44 | 1117.6 | 1117.6 | 812.8 | 762.0 | 40* | | 1016.0 | | 812.8 |
| 42 | | 1066.8 | | 762.0 | 28* | | 711.2 | | 787.4 |
| 40 | | 1016.0 | | 749.3 | 20* | | 508.0 | | 787.4 |
| 38 | | 965.2 | | 736.6 | 56 x 56* | 1422.4 | 1422.4 | 1041.4 | 965.2 |
| 36 | | 914.4 | | 723.9 | 52* | | 1320.8 | | 914.4 |
| 34 | | 863.6 | | 723.9 | 48* | | 1219.2 | | 863.6 |
| 32 | | 812.8 | | 711.2 | 44* | | 1117.6 | | 812.8 |
| 30 | | 762.0 | | 711.2 | 40* | | 1016.0 | | 812.8 |
| 28 | | 711.2 | | 698.5 | 28* | | 711.2 | | 812.8 |
| 26 | | 660.4 | | 698.5 | 20* | | 508.0 | | 812.8 |
| 24 | | 609.6 | | 698.5 | 60 x 60* | 1524.0 | 1524.0 | 1117.6 | 1016.0 |
| 22 | | 558.8 | | 685.8 | 56* | | 1422.4 | | 965.2 |
| 20 | | 508.0 | | 685.8 | 52* | | 1320.8 | | 914.4 |
| 46 x 46 | 1168.4 | 1168.4 | 850.9 | 800.1 | 48* | | 1219.2 | | 863.6 |
| 44 | | 1117.6 | | 800.1 | 40* | | 1016.0 | | 863.6 |
| 42 | | 1066.8 | | 787.4 | 28* | | 711.2 | | 863.6 |
| 40 | | 1016.0 | | 774.7 | 20* | | 508.0 | | 863.6 |
| 38 | | 965.2 | | 762.0 | 66 x 66* | 1676.4 | 1676.4 | 1219.2 | 1066.8 |
| 36 | | 914.4 | | 762.0 | | | | | |
| 34 | | 863.6 | | 749.3 | | | | | |
| 32 | | 812.8 | | 749.3 | | | | | |
| 30 | | 762.0 | | 736.6 | | | | | |
| 28 | | 711.2 | | 736.6 | | | | | |

Concentric and Eccentric Reducers



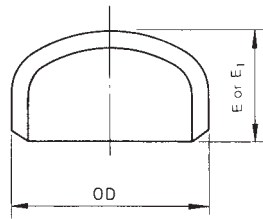
**MSS SP-75
ASME B16.9**

*BENKAN's Standards (mm)

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel | | End-to-End H | Nominal Pipe Size (NPS) | Outside Diameter at Bevel | | End-to-End H | Nominal Pipe Size (NPS) | Outside Diameter at Bevel | | End-to-End H |
|-------------------------------------------|---------------------------|-----------------------------------------|--------------|--------------------------------------|---------------------------|-------------------------------------------|--------------|---------------------------------|---------------------------|-----------------------------------------------|--------------|
| | Large End OD ₁ | Small End OD ₂ | | | Large End OD ₁ | Small End OD ₂ | | | Large End OD ₁ | Small End OD ₂ | |
| 3/4 x 1/2 3/8 | 26.7 | 21.3 17.3 | 38.1 | 10 x 8 6 | 273.0 | 219.1 168.3 | 177.8 | 34 x 32 30 | 863.6 | 812.8 762.0 | 609.6 |
| 1 x 3/4 1/2 | 33.4 | 26.7 21.3 | 50.8 | 5 4 | | 141.3 114.3 | | 26 24 | | 660.4 609.6 | |
| 1-1/4 x 1 3/4 1/2 | 42.2 | 33.4 26.7 21.3 | 50.8 | 12 x 10 8 6 | 323.8 | 273.0 219.1 168.3 | 203.2 | 36 x 34 32 30 | 914.4 | 863.6 812.8 762.0 | 609.6 |
| 1-1/2 x 1-1/4 1 3/4 1/2 | 48.3 | 42.2 33.4 26.7 21.3 | 63.5 | 5 14 x 12 10 8 | | 141.3 323.8 273.0 219.1 | | 26 24 38 x 36 34 | | 660.4 609.6 914.4 863.6 | |
| 2 x 1-1/2 1-1/4 1 3/4 | 60.3 | 48.3 42.2 33.4 26.7 | 76.2 | 6 16 x 14 12 10 | 406.4 | 355.6 323.8 273.0 | 355.6 | 32 30 28 26 | | 812.8 762.0 711.2 660.4 | |
| 2-1/2 x 2 1-1/2 1-1/4 1 | 73.0 | 60.3 48.3 42.2 33.4 | 88.9 | 8 18 x 16 14 12 | | 219.1 457.2 355.6 323.8 | | 40 x 38 36 34 32 | 1016.0 | 965.2 914.4 863.6 812.8 | 609.6 |
| 3 x 2-1/2 2 1-1/2 1-1/4 | 88.9 | 73.0 60.3 48.3 42.2 | 88.9 | 10 20 x 18 16 14 | | 273.0 508.0 457.2 406.4 | | 30 42 x 40 38 36 | | 762.0 1016.0 965.2 914.4 | |
| 3-1/2 x 3 2-1/2 2 1-1/2 1-1/4 | 101.6 | 88.9 73.0 60.3 48.3 42.2 | 101.6 | 12 22 x 20 18 16 14 | | 323.8 508.0 457.2 406.4 355.6 | | 34 32 30 44 x 42 40 | | 863.6 812.8 762.0 1066.8 1016.0 | 609.6 |
| 4 x 3-1/2 3 2-1/2 2 1-1/2 | 114.3 | 101.6 88.9 73.0 60.3 48.3 | 101.6 | 24 x 22 20 18 16 26 x 24 | 609.6 | 558.8 508.0 457.2 406.4 609.6 | 508.0 | 38 36 46 x 44 42 40 | | 965.2 914.4 1168.4 1066.8 1016.0 | |
| 5 x 4 3-1/2 3 2-1/2 2 | 141.3 | 114.3 101.6 88.9 73.0 60.3 | 127.0 | 22 20 18 28 x 26 24 | | 558.8 508.0 457.2 660.4 609.6 | | 38 48 x 46 44 42 40 | | 965.2 1117.6 1117.6 1066.8 1016.0 | |
| 6 x 5 4 3-1/2 3 2-1/2 | 168.3 | 141.3 114.3 101.6 88.9 73.0 | 139.7 | 20 18 30 x 28 26 24 | | 508.0 457.2 711.2 660.4 609.6 | | | | | |
| 8 x 6 5 4 3-1/2 | 219.1 | 168.3 141.3 114.3 101.6 | 152.4 | 20 32 x 30 28 26 24 | | 508.0 762.0 711.2 660.4 609.6 | | | | | |

Note (1) The shape of Reducer sizes 16" and larger may be manufactured to conical type without the tangent.
 (2) 48" and larger can be manufactured. Please contact us for size capability.

Caps



MSS SP-75 ASME B16.9 (mm)

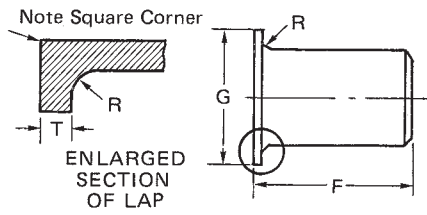
| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | Length ⁽²⁾ E | Limiting Wall Thickness for Length E | Length ⁽³⁾ E ₁ |
|-------------------------|------------------------------|-------------------------|--------------------------------------|--------------------------------------|
| 1/2 | 21.3 | 25.4 | 4.6 | 25.4 |
| 3/4 | 26.7 | 25.4 | 3.8 | 25.4 |
| 1 | 33.4 | 38.1 | 4.6 | 38.1 |
| 1-1/4 | 42.2 | 38.1 | 4.8 | 38.1 |
| 1-1/2 | 48.3 | 38.1 | 5.1 | 38.1 |
| 2 | 60.3 | 38.1 | 5.6 | 44.5 |
| 2-1/2 | 73.0 | 38.1 | 7.1 | 50.8 |
| 3 | 88.9 | 50.8 | 7.6 | 63.5 |
| 3-1/2 | 101.6 | 63.5 | 8.1 | 76.2 |
| 4 | 114.3 | 63.5 | 8.6 | 76.2 |
| 5 | 141.3 | 76.2 | 9.7 | 88.9 |
| 6 | 168.3 | 88.9 | 10.9 | 101.6 |
| 8 | 219.1 | 101.6 | 12.7 | 127.0 |
| 10 | 273.0 | 127.0 | 12.7 | 152.4 |
| 12 | 323.8 | 152.4 | 12.7 | 177.8 |
| 14 | 355.6 | 165.1 | 12.7 | 190.5 |
| 16 | 406.4 | 177.8 | 12.7 | 203.2 |
| 18 | 457.2 | 203.2 | 12.7 | 228.6 |
| 20 | 508.0 | 228.6 | 12.7 | 254.0 |
| 22 | 558.8 | 254.0 | 12.7 | 254.0 |
| 24 | 609.6 | 266.7 | 12.7 | 304.8 |

| Nominal Pipe Size (NPS) | Outside Diameter at Bevel OD | Length E |
|-------------------------|------------------------------|----------|
| 26 | 660.4 | 266.7 |
| 28 | 711.2 | 266.7 |
| 30 | 762.0 | 266.7 |
| 32 | 812.8 | 266.7 |
| 34 | 863.6 | 266.7 |
| 36 | 914.4 | 266.7 |
| 38 | 965.2 | 304.8 |
| 40 | 1016.0 | 304.8 |
| 42 | 1066.8 | 304.8 |
| 44 | 1117.6 | 342.9 |
| 46 | 1168.4 | 342.9 |
| 48 | 1219.2 | 342.9 |

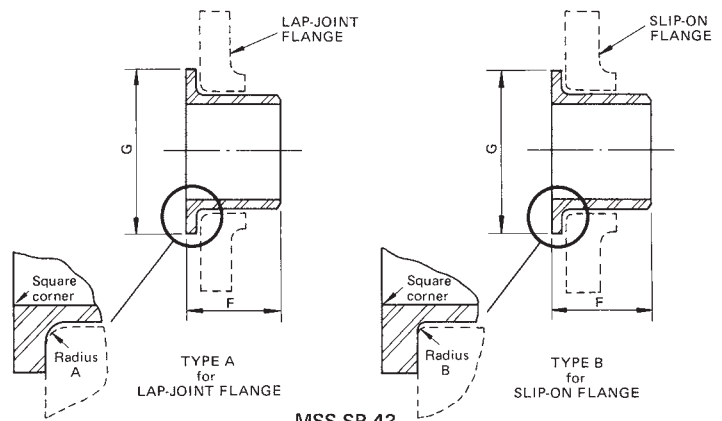
- Wall thickness for Caps up to and including 36" conform to ASME B36.10 Specifications; Caps 38" and larger conform to XS Specifications for wall thicknesses of 36". These are BENKAN Standards as no Internationally Recognized Standards have been set for such large size wall thickness.

- (1) The shape of these caps shall be ellipsoidal and shall conform to the shape requirements as given in the ASME Boiler and Pressure Vessel Code.
- (2) Length E applies for thickness not exceeding that given in column "Limiting wall Thickness for Length E".
- (3) Length E₁ applies for thickness greater than that given in column "Limiting wall Thickness" for NPS 24 and smaller. For NPS 26 and larger, Length E₁ shall be by agreement between manufacturer and purchaser.
- (4) 48" and larger can be manufactured. Please contact us for size capability.

Stainless Steel Lap Joint Stub Ends



ASME B16.9



MSS SP-43

ASME B16.9
MSS SP-43 (mm)

| NPS | Outside Diameter at Bevel | Outside Diameter of Barrel | | Length F | | Radius of Fillet R | | Diameter of Lap G |
|-------|---------------------------|----------------------------|-------|-------------|------------------|--------------------|------------|-------------------|
| | | min | max | ASME (Long) | ASME (Short)&MSS | ASME & MSS Type A | MSS Type B | |
| 1/2 | 21.3 | 20.5 | 22.8 | 76.2 | 50.8 | 3.0 | 0.8 | 35.1 |
| 3/4 | 26.7 | 25.9 | 28.1 | 76.2 | 50.8 | 3.0 | 0.8 | 42.9 |
| 1 | 33.4 | 32.6 | 35.0 | 101.6 | 50.8 | 3.0 | 0.8 | 50.8 |
| 1-1/4 | 42.2 | 41.4 | 43.6 | 101.6 | 50.8 | 4.8 | 0.8 | 63.5 |
| 1-1/2 | 48.3 | 47.5 | 49.9 | 101.6 | 50.8 | 6.4 | 0.8 | 73.2 |
| 2 | 60.3 | 59.5 | 62.4 | 152.4 | 63.5 | 7.9 | 0.8 | 91.9 |
| 2-1/2 | 73.0 | 72.2 | 75.3 | 152.4 | 63.5 | 7.9 | 0.8 | 104.6 |
| 3 | 88.9 | 88.1 | 91.3 | 152.4 | 63.5 | 9.7 | 0.8 | 127.0 |
| 3-1/2 | 101.6 | 100.8 | 104.0 | 152.4 | 76.2 | 9.7 | 0.8 | 139.7 |
| 4 | 114.3 | 113.5 | 116.7 | 152.4 | 76.2 | 11.2 | 0.8 | 157.2 |
| 5 | 141.3 | 140.5 | 144.3 | 203.2 | 76.2 | 11.2 | 1.5 | 185.7 |
| 6 | 168.3 | 167.5 | 171.3 | 203.2 | 88.9 | 12.7 | 1.5 | 215.9 |
| 8 | 219.1 | 218.3 | 222.1 | 203.2 | 101.6 | 12.7 | 1.5 | 269.7 |
| 10 | 273.0 | 272.3 | 277.2 | 254.0 | 127.0 | 12.7 | 1.5 | 323.9 |
| 12 | 323.8 | 323.1 | 328.0 | 254.0 | 152.4 | 12.7 | 1.5 | 381.0 |
| 14 | 355.6 | 354.8 | 359.9 | 304.8 | 152.4 | 12.7 | 1.5 | 412.8 |
| 16 | 406.4 | 405.6 | 411.0 | 304.8 | 152.4 | 12.7 | 1.5 | 469.9 |
| 18 | 457.2 | 456.4 | 462.0 | 304.8 | 152.4 | 12.7 | 1.5 | 533.4 |
| 20 | 508.0 | 507.2 | 514.1 | 304.8 | 152.4 | 12.7 | 1.5 | 584.2 |
| 22 | 558.8 | 558.0 | 564.9 | 304.8 | 152.4 | 12.7 | 1.5 | 641.4 |
| 24 | 609.6 | 608.8 | 615.7 | 304.8 | 152.4 | 12.7 | 1.5 | 692.2 |

Material Specification for Butt-Welding Fittings

ASTM A234/A234M

Standard Specification for
Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

| Grade and Marking Symbol |
|-------------------------------------------------------------------------------------------------------------------------------------------------|
| WPB, WPC, WP1, WP12 CL1, WP12 CL2, WP11 CL1, WP11 CL2, WP11 CL3, WP22 CL1, WP22 CL3, WP5 CL1, WP5 CL3, WP9 CL1, WP9 CL3, WPR, WP91, WP911, WP92 |

ASTM A420/A420M

Standard Specification for
Piping Fittings of Wrought Carbon and Alloy Steel for Low-Temperature Service

| Grade and Marking Symbol |
|--------------------------|
| WPL6, WPL9, WPL3, WPL8 |

ASTM A403/A403M

Standard Specification for
Wrought Austenitic Stainless Steel Piping Fittings

| Grade and Marking Symbol |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WPXM-19, WP304, WP304L, WP304H, WP304L, WP309, WP310S, WPS31254, WP316, WP316L, WP316H, WP316N, WP316LN, WP317, WP317L, WPS31725, WP31726, WP321, WP321H, WPS33228, WPS34565, WP347, WP347H, WP348, WP348H, WPS38815 |

ASTM A815/A815M

Standard Specification for
Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel

| Grade and Marking Symbol (extract) |
|-------------------------------------------------------------------------------------------------------------------------|
| Ferritic/Austenitic Stainless Steel WPS31803, WPS32101, WPS32750, WPS32950, WPS32760, WPS39274, WPS32550 WPS32205 |

ASTM A860/A860M

Standard Specification for
Wrought High-Strength Low-Alloy Steel Butt-Welding Fittings

| Grade and Marking Symbol |
|------------------------------------------------|
| WPHY42, WPHY46, WPHY52, WPHY60, WPHY65, WPHY70 |

ASTM B366

Standard Specification for
Factory-Made Wrought Nickel and Nickel Alloy Fittings

| Grade and Marking Symbol (extract) |
|---------------------------------------------------------------------------------------------------------------------------------------------------|
| WPN, WPNL, WPNC, WPHX, WPHG, WPHC22, WPHG30, WPHC4, WPNC1, WPNCMC, WPHG3, WP20CB, WPNIC, WPNIC10, WPNIC11, WPNICMC, WP904L, WPHB, WPHC276, WPHB-2 |

MSS SP-75

Standard Specification for
High-Test, Wrought, Butt-Welding Fittings

| Grade and Marking Symbol |
|---------------------------------------------------------------|
| WPHY-42, WPHY-46, WPHY-52, WPHY-56, WPHY-60, WPHY-65, WPHY-70 |

BENKAN[®] BENKAN KIKOH Corporation

TOKYO OFFICE 5-13, 2-chome, Sanno, Ota-ku, Tokyo, 143-8567, Japan
Tel: 81-3-3777-1541
Fax: 81-3-3777-1567

HEAD OFFICE 5-1, Rokusengoku-cho, Ota-city, Gunma, 379-2305, Japan
Tel: 81-277-78-4111
Fax: 81-277-78-4081