




# NATIONAL FITTINGS LIMITED

An  9001 certified company

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"a step up in value, a step down in cost"





## INDUSTRY AND GOVERNMENT STANDARDS & APPROVALS



**ISO 9001**



(ABS)	American Bureau of Shipping
(ANSI)	American National Standards Institution
(AWWA)	American Water Works Association : C-606
(API)	American Petroleum Institute
(ASHRAE)	American Society of Heating, Refrigeration & Air Conditioning Engineers
(ASME)	American Society of Mechanical Engineers
(ASTM)	American Society of Testing & Materials
(BBA)	British Board of Agreement
(BOCA)	Building Officials & Code Administrators
(BMI)	Bureau of Marine Inspection
(BPR)	Bureau of Public Roads
(CDC)	Civil Defense Certificate, Dubai
(COA)	Corps of Engineers - CEGS 15000
(FAA)	Federal Aviation administration; HVAC, Plumbing, Fire Protection
(FHA)	Federal Housing Administration
(FM)	Factory Mutual Engineering Corp.
(IAPMO)	International Association of Plumbing & Mechanical Officials
(MEA)	Materials and Equipment acceptance
(NAVFAC)	Naval facilities Engineering Command: NFGS 15000 Series
(NFPA)	National Fire Protection Association
(NSF)	NSF International
(SBCCI)	Southern Building Code Congress International
(TVA)	Tennessee Valley Authority; Fire Protection, Storm drains
(UL)	Underwriter's Laboratories, Inc.
(ULC)	Underwriter's Laboratories of Canada

### WORLDWIDE

(AS)	AS 4041 - 1992 Australian Standard (3.24.10)
(BV)	Bureau Veritas
(DNV)	Det Norske Veritas
(DVGW)	Deutscher Verein des Gas-und Wasserfaches





## Technical Information on the National Brand Ductile Iron Pipe Fittings

### 1. Introduction

Pipe fittings are normally used in places where they are hidden from sight and often overlooked. Any leak that occurs as a result of interior pipe fittings can develop into a costly accident before the personnel may notice it. Careful selection of fittings beforehand can assure users of the National Brand pipe fittings years of maintenance-free service.

For over 30 years the National Brand has lived up to its reputation for excellence which is known the world over. As a result of its strict adherence to quality standards, the National Brand pipe fittings bear the UL listing and FM approval marks as that organization's official seal of certified quality.

### 2. Pressure-Temperature Ratings

The National Brand pipe fittings are used extensively for steam, air, water, gas, oil and many other fluids, and are proved to withstand the pressure shown in the following table.

#### Pressure - Temperature Ratings

Fluids and Temperature	Maximum Working Pressure	
Steam, Air, Gas and Oil under 300° C (570° F)	10 kg/cm <sup>2</sup>	150 lbs/in <sup>2</sup>
Steam, Air, Gas and Oil and Water under 200° C (400° F)	14	200
Water, Non-shock under 120° C (250° F)	20	300

### 3. Types and Sizes

Standard types and sizes of the National Brand pipe fittings are shown in tables on pages 16 to 35 Non-standard types and sizes are also available on a special made-to-order basis.

The nominal size of a pipe fitting is shown by the one size of a pipe with which it is engages. In the case of pipe fittings with more than two ends of different diameters, the nominal sizes are represented as follows:

In the case of those with two outlets, larger bore is called

1. and smaller one 2. In the case of those with three outlets, the two bores on the same or parallel center line are 1 and 2 according to size and the rest one 3. In the four outlets type, the largest bore is 1. the one on the same or parallel centre line with 1 is 2. and the other two are 3 and 4 according to size. (refer to the paragraph "ordering Information").

### 4. Material

The National Brand pipe fittings are manufactured exclusively of Ductile Iron. Compared with ductile iron, one distinctive feature is that its uniformity of metal structure is far superior to ductile iron. This uniformity is ensured even in the inner.

part of thick castings and results in greater strength of the fitting. The following table shows a comparison between various standards for material used in ductile iron pipe fittings and also lists the properties of the National Brand pipe fittings.

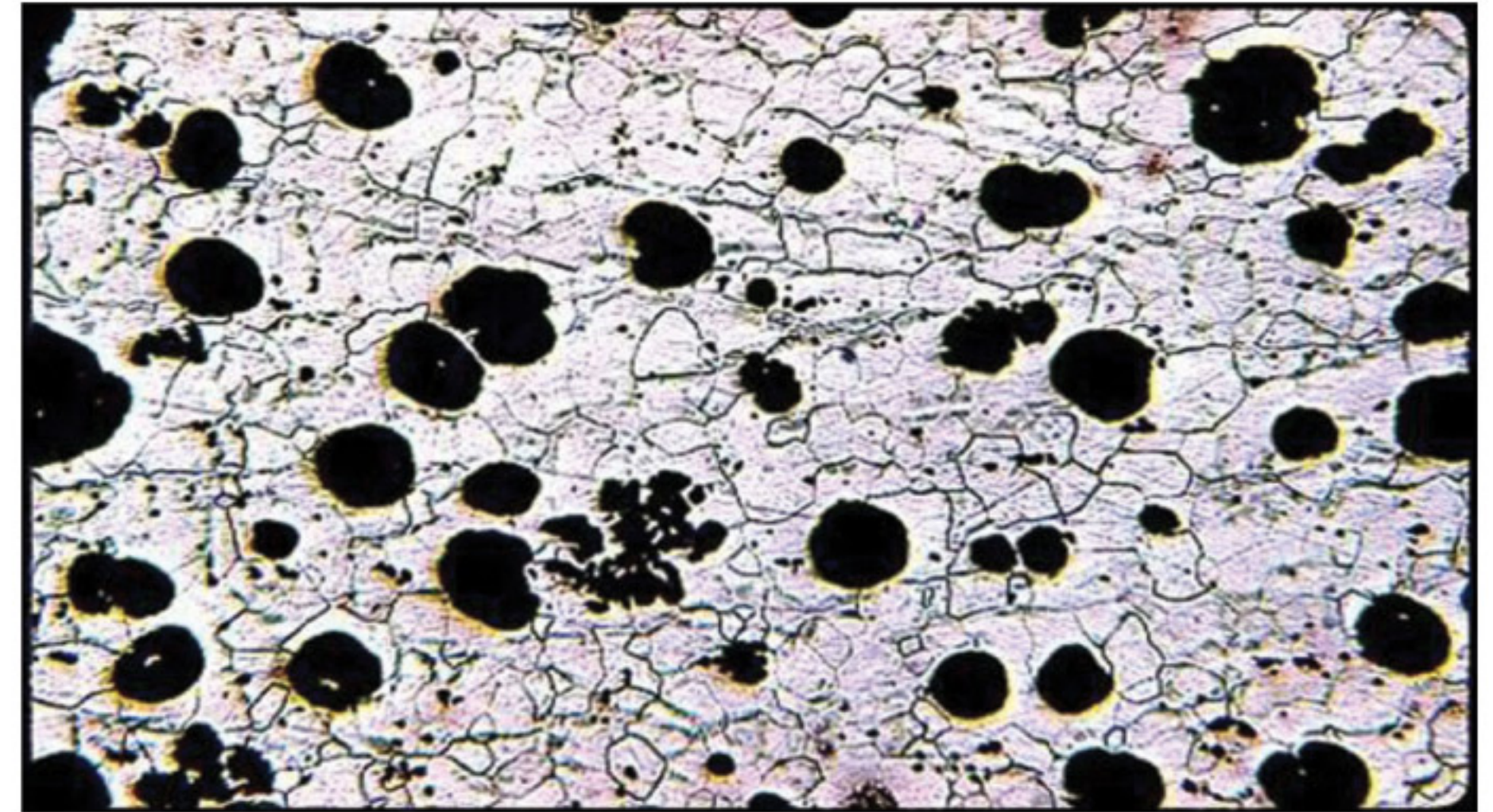




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	Material	Tensile Strength kg/mm <sup>2</sup>	Yield Strength kg/mm <sup>2</sup>	Elongation in 2 in
National Brand	Ductile Iron	6500	6500	12
ANSI STANDARD	Ductile Iron	5000	5000	12

**Micro Structure National Brand Ductile Iron**



## 5. Distance between Ends and Tolerances

The distance between ends of the National Brand pipe fittings is shown in the tables on page 16 to 35. The tolerance is shown below

Lengths in Millimeters	Below 30	30 to 50	50 to 75	75 to 100	100 to 150	150 to 200	200 to 300	300 to 400
Tolerance in millimeters (plus or minus)	15	2	2.5	3	3.5	4	5	6

Nominal Size (in.)	Threads			
	Gauge Dia D (mm)	Number of Threads per Inch	Min. Length of Threads	
			Female I (mm)	Male I (mm)
1	33.249	11	15	19
1 ¼	41.910	11	17	22
1 ½	47.803	11	18	22
2	59.614	11	20	26
2 ½	75.184	11	23	30
3	87.884	11	25	34
3 ½	100.330	11	26	35
4	113.030	11	28	40



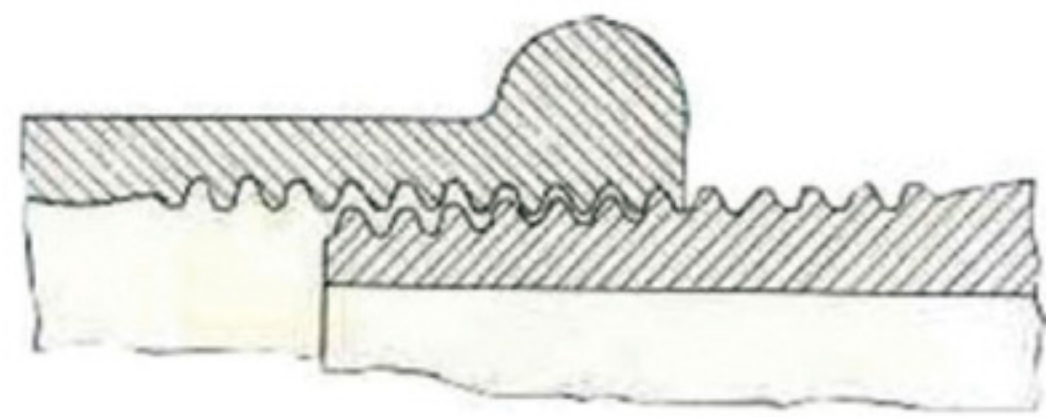


## 6. Threads

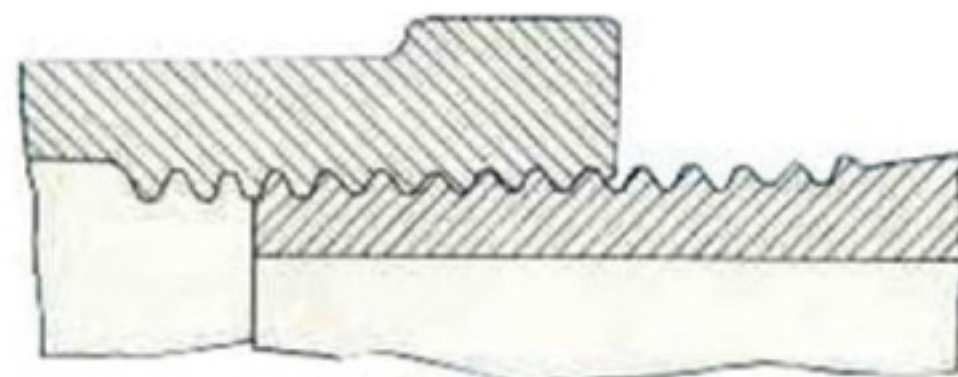
The National Brand pipe fittings threads are machined according to the highly accurate American or British standards. As the following cross-section diagrams show, taper female threads engage taper male threads more closely than do parallel female threads. However, because of distinctive requirements in the uses of these fittings. It is difficult to label either type thread for fittings as more desirable in practice. The National Brand can deliver fittings with either parallel or taper threading upon client specifications or requirements.

A unique machine threads the National Brand pipe fittings simultaneously at all outlets. In two, three or four outlet types, or in 45° to 180° angle types, the axis angle error is almost entirely eliminated.

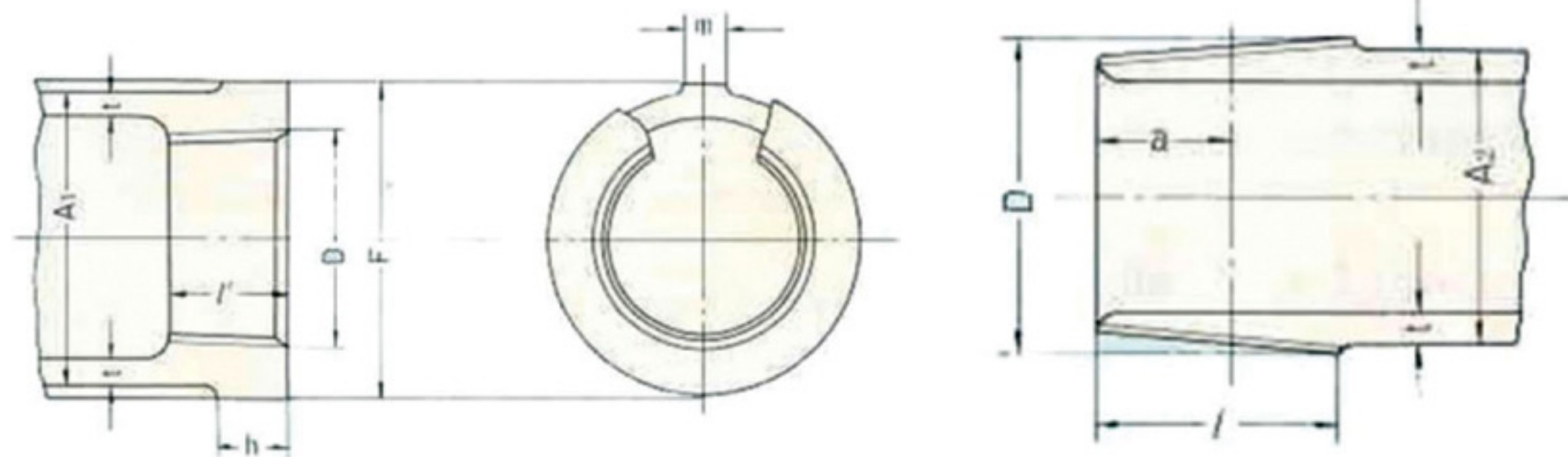
The elaborate chamfering of the threaded end allows the pipe fitting to be attached to the pipe easily and smoothly. Breakage around the joint is exceedingly rare.



Parallel Threaded Fittings: Tapper Threaded Pipe



Taper Threaded Fittings: Tapper Threaded Pipe



"a" in the above diagram denotes gauge length.  
The outer end surface of the screwed part are chamfered.

Min. outside diam. of body behind thread		Wall thickness t (mm)	Bands		Ribs	
Female A <sub>1</sub> (mm)	Male A <sub>2</sub> (mm)		Outside diam. F (mm)	Width h (mm)	Width m (mm)	No of Ribs Socket & Cap
15	9	2	18	5	3	2
19	12	2.5	22	5	3	2
23	14	2.5	26	5	3	2
27	18	2.5	30	6	4	2
33	24	4	36	6	4	2
41	30	3	44	7	5	2
50	39	3.5	53	8	5	2
56	44	3.5	60	9	5	2
69	56	4	73	11	5	2
86	72	4.5	91	12	6	2
99	84	5	105	13	7	2
113	97	5.5	119	14	8	2
127	110	6	133	16	8	4
154	136	6.5	161	18	8	4
182	160	7.5	189	20	8	4
234	210	8	244	24	9	4
288	260	9	300	28	11	6





## 7. Coating

The National Brand pipe fittings are of the black or galvanized type. Galvanized fittings are practically corrosion-free. Life test result have shown that under ordinary conditions pipe fittings remain corrosion-free for 40 years, and even under highly unfavorable condition, are free from corrosion for at least ten years.

All the fittings are dipped in melted zinc before threading. This hot

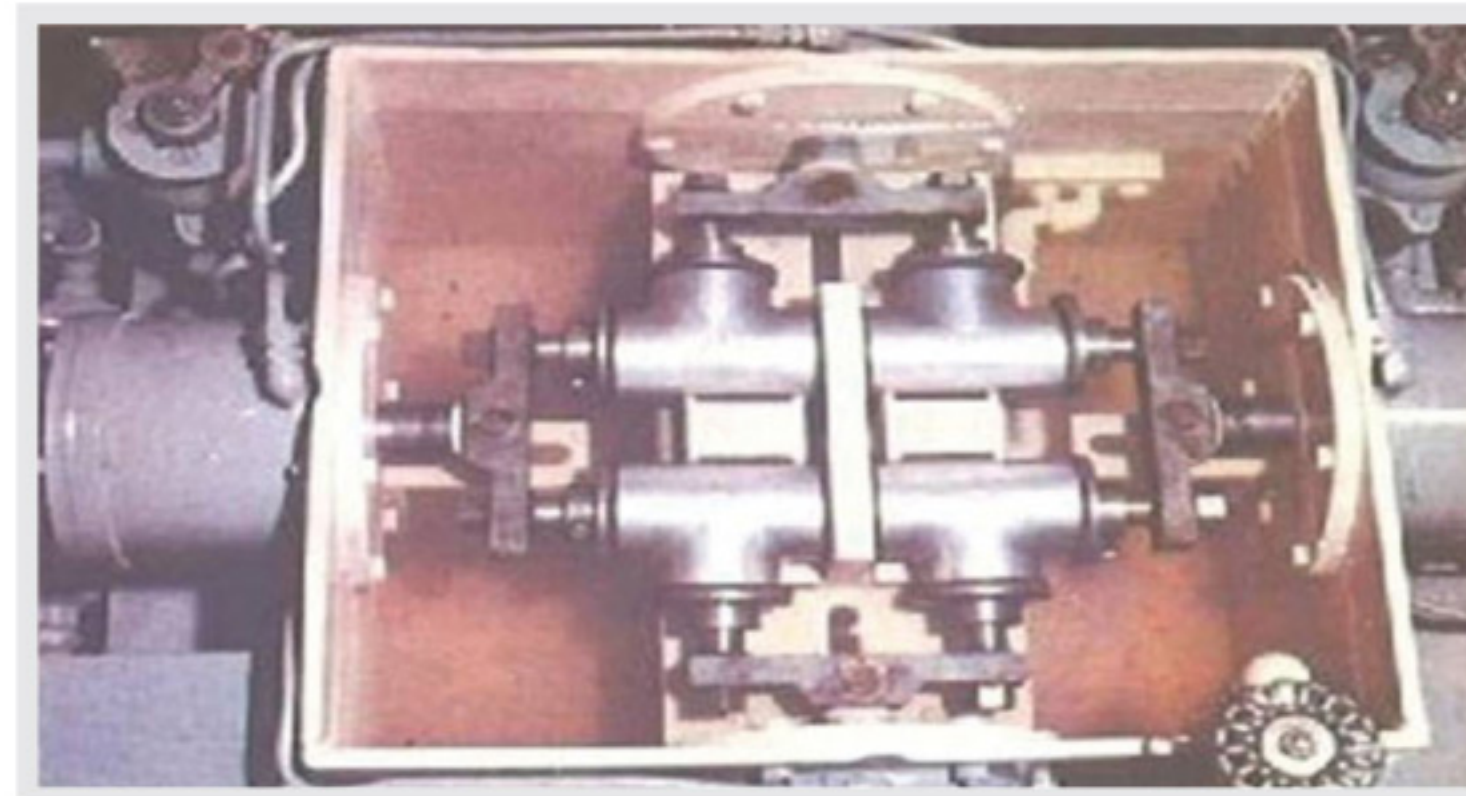
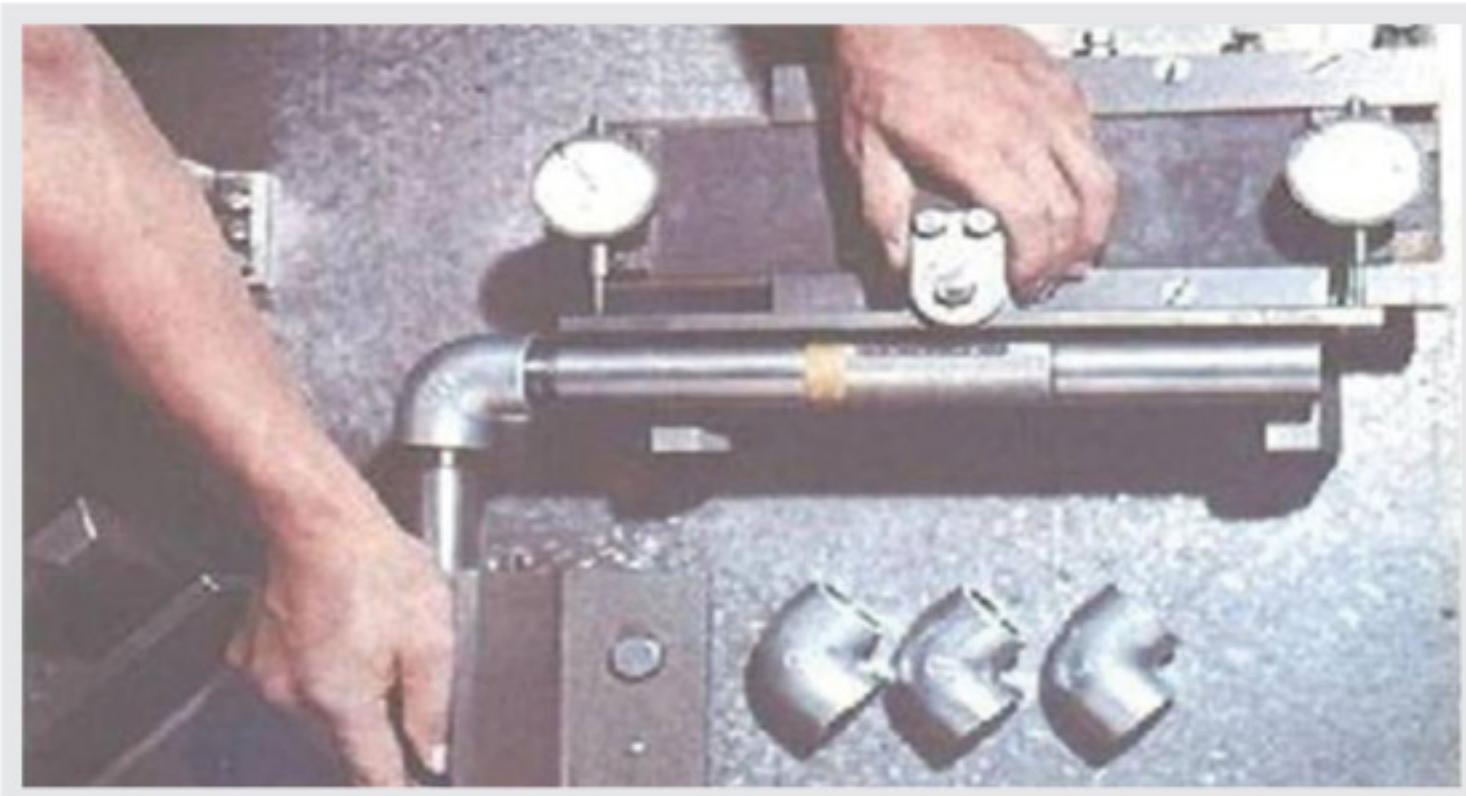
Zone dipping process has proven-in countless experiments to be superior to various other galvanized methods, including electroplating, metal spraying.

## 8. Manufacturing Process of the National Brand Ductile Iron Pipe Fittings

The National Brand pipe fittings are manufactured by a fully mechanized mass production system. Strict quality control governs every stage of the manufacturing process. The manufacturing facilities include induction melting, mechanized sand conditioning, molding & settling and highly reliable quality assurance equipments and methods.

## 9. Quality Assurance

All the national ductile iron pipe fittings are individually air tested under water. Periodic testing of angularity is also rested to conform to standards.

























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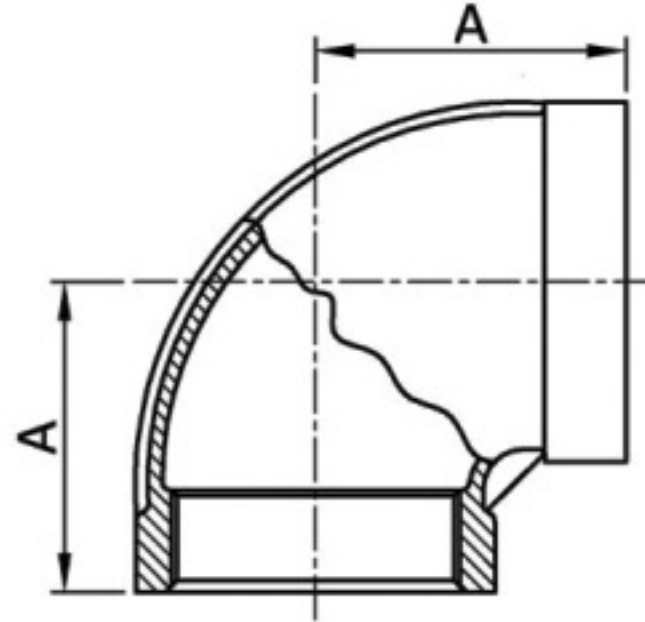




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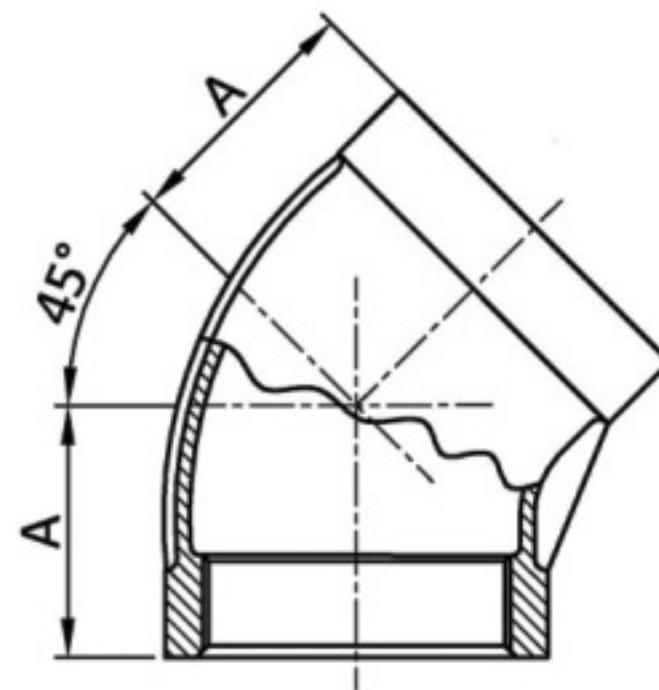


ELBOW 90° - STYLE 61



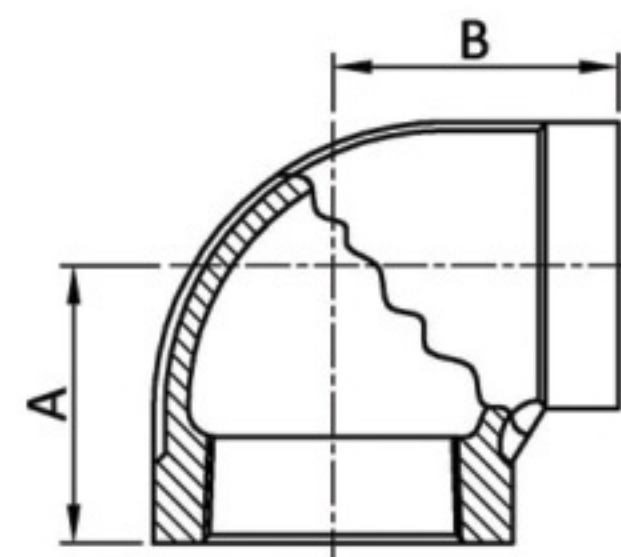
SIZE	A		WEIGHT Kg
	mm	Inch	
1"	38.1	1.5	0.29
1-1/4"	44.5	1.75	0.45
1-1/2"	49.3	1.94	0.67
2"	57.2	2.25	0.84

ELBOW 45° - STYLE 62



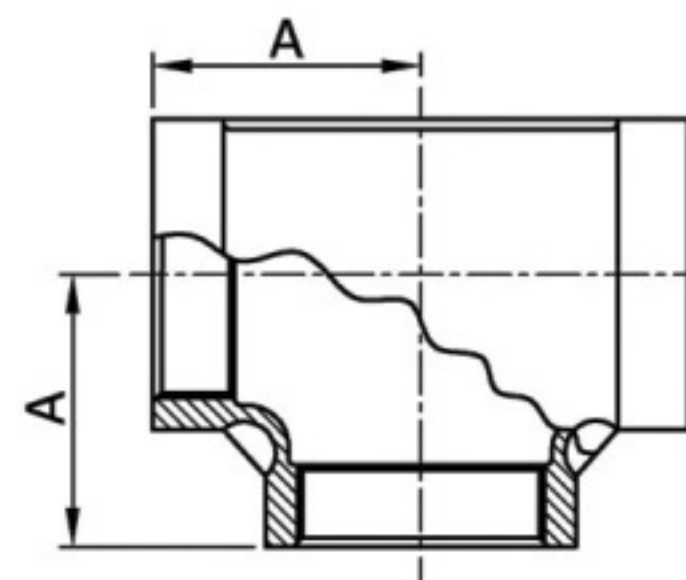
SIZE	A		WEIGHT Kg
	mm	Inch	
1"	28.5	1.12	0.25
1-1/4"	32.8	1.29	0.39
1-1/2"	36.3	1.42	0.51
2"	42.7	1.68	0.79

REDUCING ELBOW - SYTLE 63



SIZE	L		S		WEIGHT Kg
	mm	Inch	mm	Inch	
1" x 1/2"	32.0	1.26	34.5	1.36	0.22
1" x 3/4"	34.8	1.37	36.8	1.45	0.24
1 1/4" x 1/2"	34.0	1.33	38.9	1.53	0.45
1 1/4" x 3/4"	36.8	1.42	41.1	1.62	0.46
1 1/4" x 1"	40.1	1.58	42.4	1.67	0.49
1 1/2" x 1/2"	35.8	1.41	42.2	1.66	0.59
1 1/2" x 3/4"	38.6	1.52	44.5	1.75	0.52
1 1/2" x 1"	41.9	1.65	45.7	1.8	0.53
1 1/2" x 1 1/4"	46.2	1.82	47.8	1.88	0.53
2" x 1/2"	37.8	37.8	47.8	1.88	0.61
2" x 3/4"	40.6	40.6	50.0	1.97	0.63
2" x 1"	43.9	43.9	51.3	2.02	0.68
2" x 1 1/4"	48.3	1.9	53.3	2.1	0.82
2" x 1 1/2"	51.3	2.02	54.9	2.16	0.83

TEE - STYLE 64



SIZE	A		WEIGHT Kg
	mm	Inch	
1"	38.1	1.5	0.41
1-1/4"	44.5	1.75	0.60
1-1/2"	49.3	1.94	0.77
2"	57.2	2.25	1.20

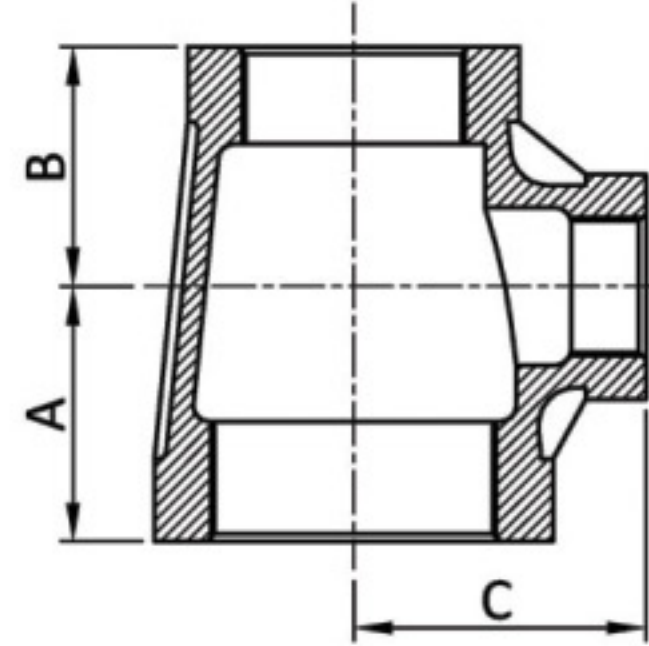




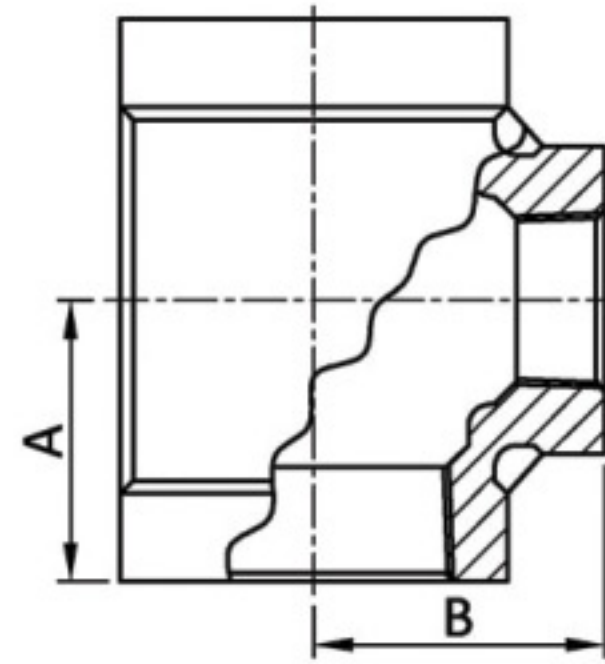
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## REDUCING TEE - STYLE 65

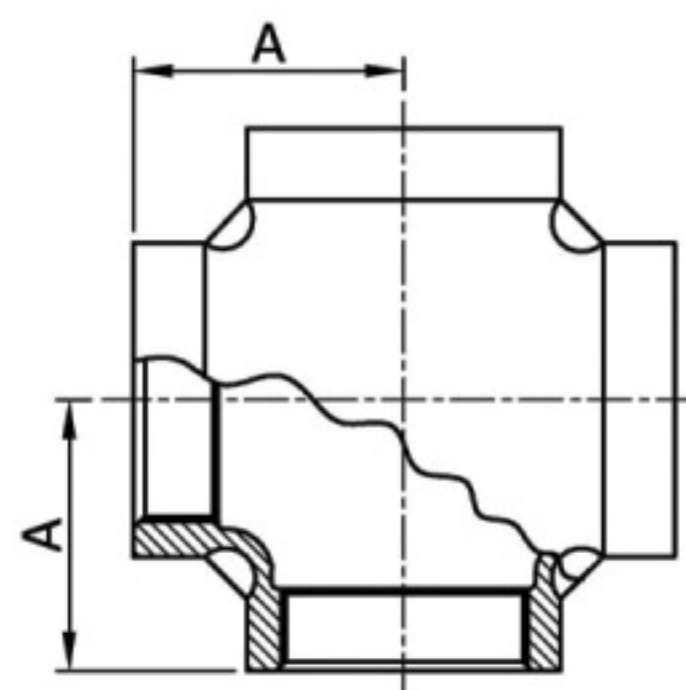


SIZE	A		B		C		WEIGHT Kg
	mm	Inch	mm	Inch	mm	Inch	
1 1/4" x 1" x 1/2"	34.0	1.34	34.0	1.26	38.9	1.53	0.39
1 1/4" x 1" x 3/4"	36.8	1.45	36.8	1.37	41.2	1.62	0.39
1 1/4" x 1" x 1"	40.1	1.57	40.1	1.5	42.4	1.67	0.45
1 1/2" x 1 1/4" x 1/2"	35.8	1.41	35.8	1.34	42.2	1.66	0.5
1 1/2" x 1 1/4" x 3/4"	38.6	1.52	38.6	1.45	44.5	1.75	0.54
1 1/2" x 1 1/4" x 1"	41.9	1.65	41.9	1.65	45.7	1.8	0.63
1 1/2" x 1 1/4" x 1 1/4"	46.2	1.82	46.2	1.58	47.8	1.9	0.68
2" x 1 1/2" x 1 1/2"	57.2	2.25	57.2	1.45	57.2	2.25	0.69
2" x 1 1/2" x 3/4"	40.5	1.6	40.5	1.51	50	1.97	0.67
2" x 1 1/2" x 1"	43.9	1.73	43.9	1.65	51.3	2.02	0.74
2" x 1 1/2" x 1 1/4"	48.3	1.9	48.3	1.82	53.3	2.1	0.84
2" x 1 1/2" x 1 1/2"	51.3	2.02	51.3	1.94	54.9	2.16	0.91



SIZE	A		B		WEIGHT Kg
	mm	Inch	mm	Inch	
1 1/4" x 1" x 1/2"	33	1.30	34	1.34	0.36
1 1/4" x 1" x 3/4"	33	1.30	34	1.34	0.41
1 1/4" x 1 1/4" x 1/2"	34	1.34	38.9	1.53	0.45
1 1/2" x 1 1/4" x 3/4"	36.8	1.45	41.2	1.62	0.5
1 1/2" x 1 1/4" x 1"	40.1	1.58	42.4	1.67	0.53
1 1/2" x 1 1/2" x 1/2"	35.8	1.51	42.2	1.66	0.63
1 1/2" x 1 1/2" x 3/4"	38.6	1.52	44.5	1.75	0.63
1 1/2" x 1 1/2" x 1"	41.9	1.65	45.7	1.80	0.68
1 1/2" x 1 1/2" x 1 1/4"	46.2	1.82	47.8	1.88	0.69
2" x 2" x 1/2"	37.9	1.49	47.8	1.88	0.67
2" x 2" x 3/4"	40.6	1.60	50.0	1.97	0.74
2" x 2" x 1"	43.9	1.73	51.3	2.02	0.84
2" x 2" x 1 1/4"	48.3	1.90	53.3	2.09	0.91
2" x 2" x 1 1/2"	51.3	2.01	54.9	2.16	0.63

## CROSS - STYLE 66



SIZE	A		WEIGHT Kg
	mm	Inch	
1"	38.1	1.5	0.45
1-1/4"	44.5	1.75	0.72
1-1/2"	49.3	1.94	0.95
2"	57.2	2.25	1.37

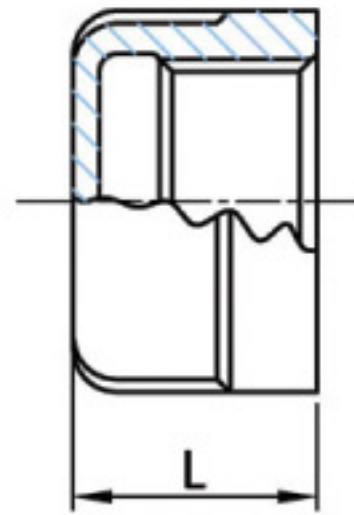




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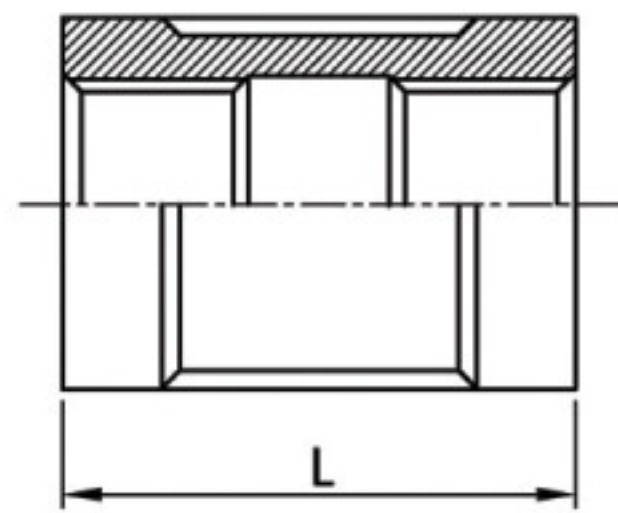


ROUND CAP - STYLE 67



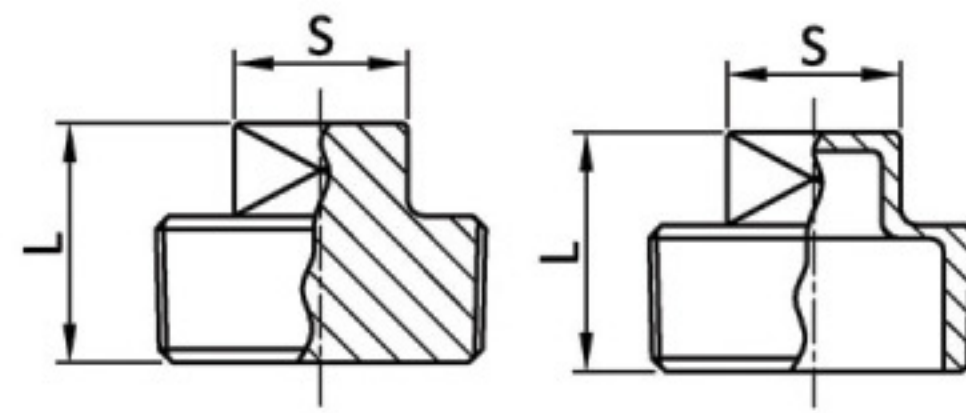
SIZE	A		WEIGHT Kg
	mm	Inch	
1"	28.0	1.1	0.15
1-1/4"	30.0	1.18	0.21
1-1/2"	32.0	1.26	0.27
2"	36.0	1.42	0.41

SOCKET - STYLE 68



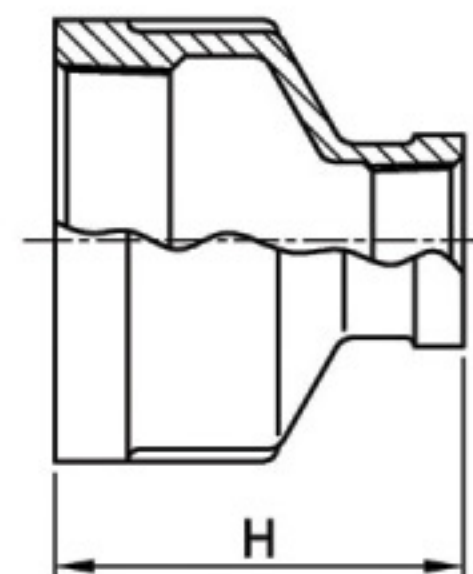
SIZE	A		WEIGHT Kg
	mm	Inch	
1"	46.0	1.81	0.22
1-1/4"	51.1	2.01	0.32
1-1/2"	53.8	2.12	0.43
2"	64.0	2.52	0.68

SQUARE PLUG - STYLE 72



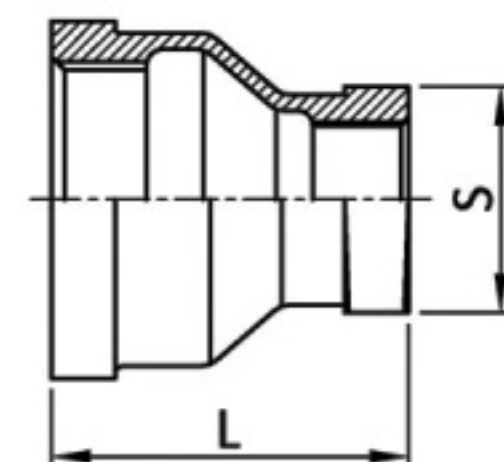
SIZE	L		S		WEIGHT Kg
	mm	Inch	mm	Inch	
1/2"	24.9	0.98	13	0.51	0.06
3/4"	27.9	1.1	14	0.55	0.12
1"	31.0	1.22	17.0	0.67	0.12
1-1/4"	35.1	1.38	22.9	0.9	0.2
1-1/2"	36.1	1.42	25.9	1.02	0.27
2"	37.0	1.46	30.0	1.18	0.43

REDUCING SOCKET - STYLE 74



SIZE	A		WEIGHT Kg
	mm	Inch	
1 1/4"x1"	54.0	2.12	0.38
1-1/2"x1"	59.1	2.32	0.35
1-1/2"x1-1/4"	59.1	2.32	0.38
2"x1-1/4"	67.1	2.64	0.61
2"x1-1/2"	67.1	2.64	0.63

HEX REDUCER - STYLE 75

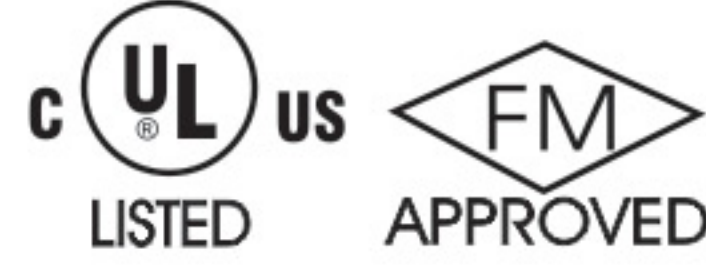


SIZE	L		S(Hex)		WEIGHT Kg
	mm	Inch	mm	Inch	
1" x 1/2"	43.2	1.7	28.4	1.12	0.18
1" x 3/4"	43.2	1.7	35.1	1.38	0.23

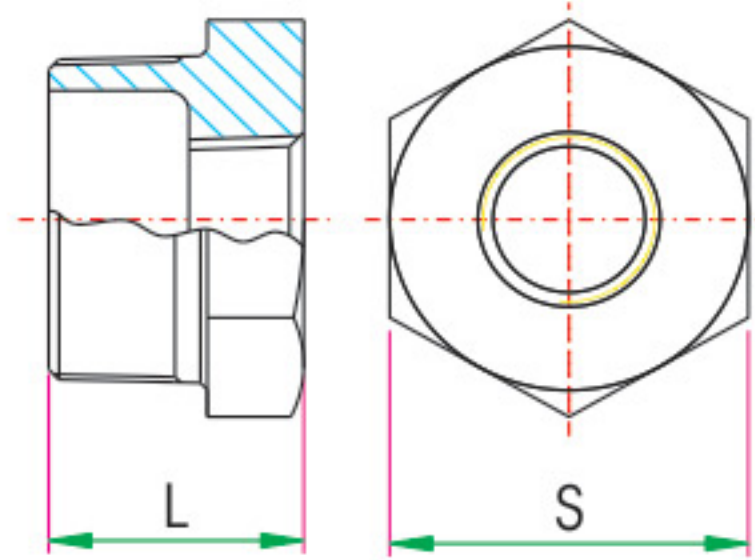




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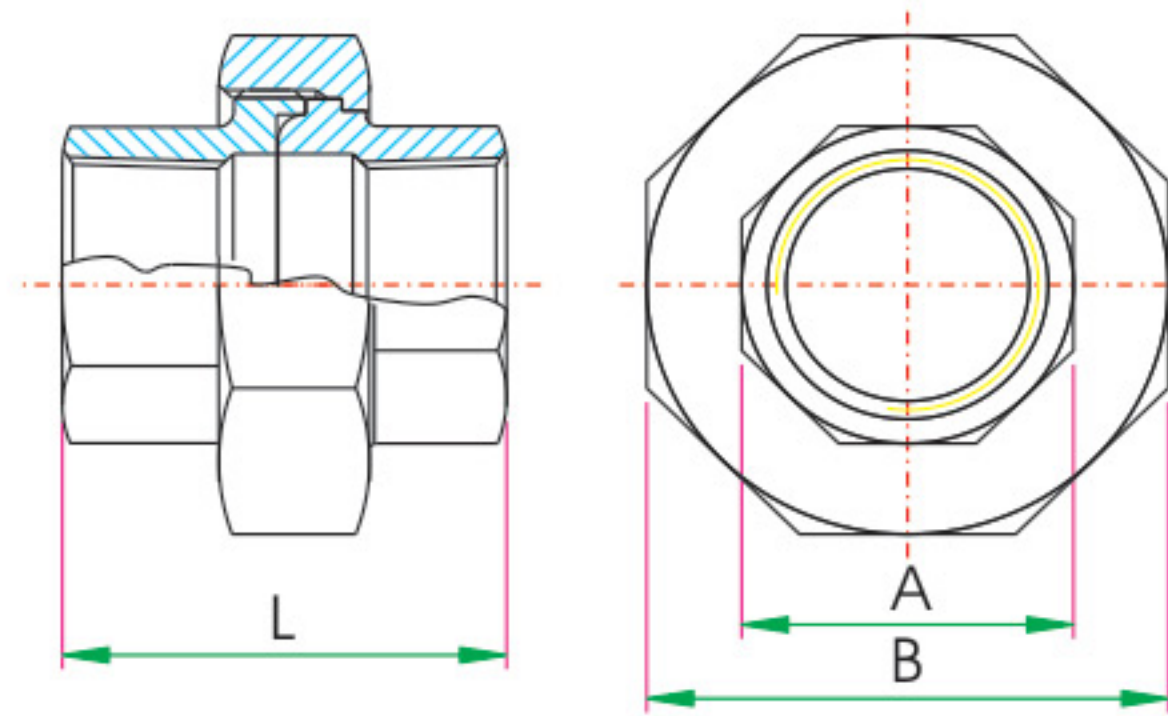


## RED HEX BUSHING - STYLE 70



Size	L		S		Size	L		S	
	mm	inch	mm	inch		mm	inch	mm	inch
1/4"X1/8"	18	0.71	17	0.55	2"X1/4"	36	1.42	65	2.56
3/8"X1/8"	21	0.83	19	0.75	2"X3/8"	36	1.42	65	2.56
3/8"X1/4"	21	0.83	19	0.75	2"X1/2"	36	1.42	65	2.56
1/2"X1/8"	23	0.91	26	1.02	2"X3/4"	36	1.42	65	2.56
1/2"X1/4"	23	0.91	26	1.02	2"X1"	36	1.42	65	2.56
1/2"X3/8"	23	0.91	26	1.02	2"X1 1/4"	36	1.42	65	2.56
3/4"X1/8"	25	0.98	31	1.22	2"X1 1/2"	36	1.42	65	2.56
3/4"X1/4"	25	0.98	31	1.22					
3/4"X3/8"	25	0.98	31	1.22					
3/4"X1/2"	25	0.98	31	1.22					
1"X 1/8"	28	1.10	38	1.50					
1"X 1/4"	28	1.10	38	1.50					
1"X 3/8"	28	1.10	38	1.50					
1"X 1/2"	28	1.10	38	1.50					
1"X 3/4"	28	1.10	38	1.50					
1 1/2"X 1/4"	31	1.22	46	1.81					
1 1/2"X 1/2"	31	1.22	46	1.81					
1 1/2"X 3/8"	31	1.22	46	1.81					
1 1/2"X 1/2"	31	1.22	46	1.81					
1 1/2"X 3/4"	31	1.22	46	1.81					
1 1/2"X 1"	31	1.22	46	1.81					
1 1/2"X 1/8"	32	1.26	52	2.05					
1 1/2"X 1/4"	32	1.26	52	2.05					
1 1/2"X 3/8"	32	1.26	52	2.05					
1 1/2"X 1/2"	32	1.26	52	2.05					
1 1/2"X 3/4"	32	1.26	52	2.05					
1 1/2"X 1"	32	1.26	52	2.05					
1 1/2"X 1 1/4"	32	1.26	52	2.05					
2"X 1/8"	36	1.42	65	2.56					

## UNION FEMALE IRON TO IRON - STYLE 72



Size	L		A		B	
	mm	inch	mm	inch	mm	inch
1/8"	36.5	1.44	18	0.71	29	1.14
1/4"	36.5	1.44	18	0.71	29	1.14
3/8"	40.5	1.59	23	0.91	36	1.42
1/2"	45	1.77	27	1.06	41	1.61
3/4"	49.5	1.95	32	1.26	49	1.93
1"	53.5	2.11	41	1.61	58	2.28
1 1/4"	57.5	2.26	49	1.93	68	2.68
1 1/2"	61.5	2.42	56	2.20	76	2.99
2"	69	2.72	69	2.72	92	3.62

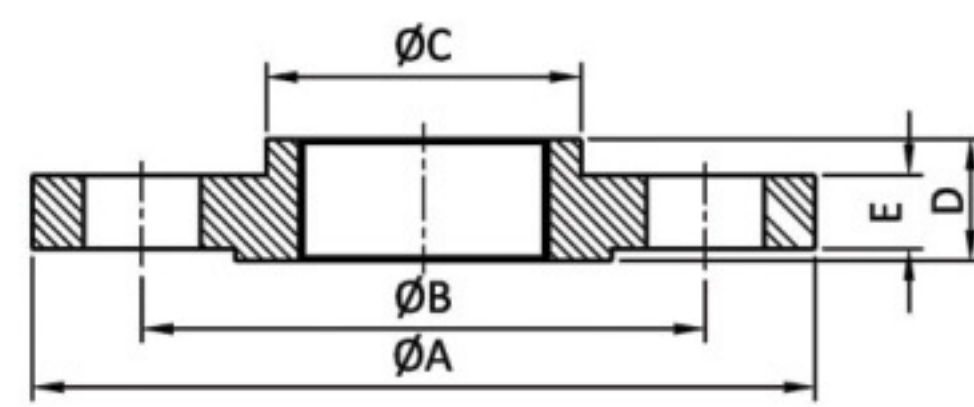
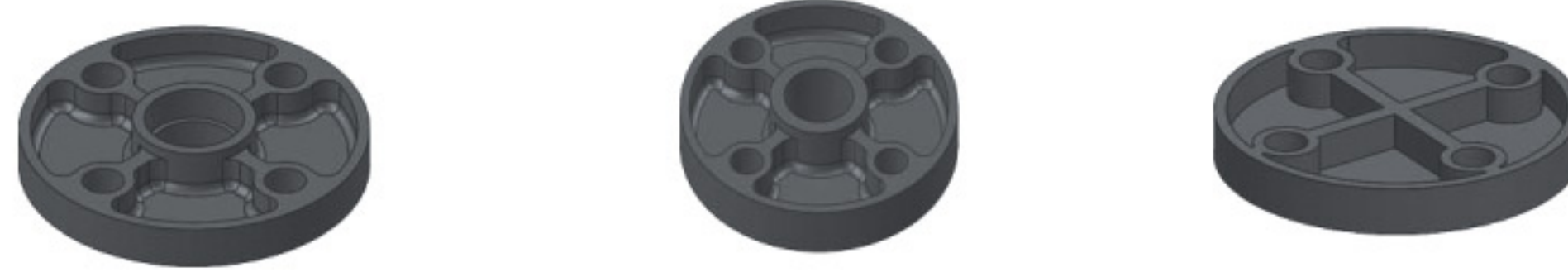




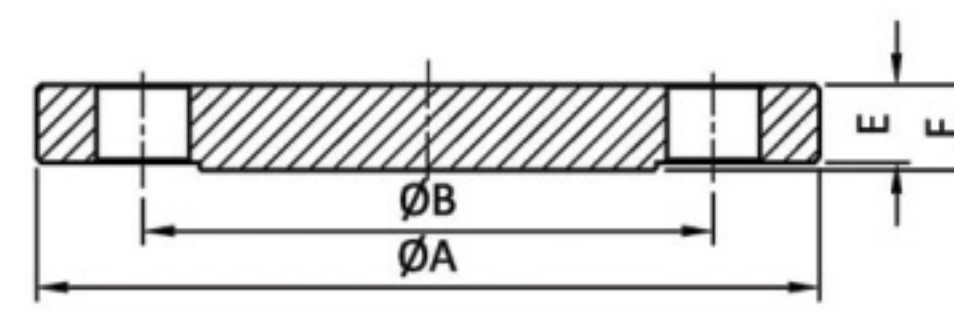
# NATIONAL FITTINGS LIMITED



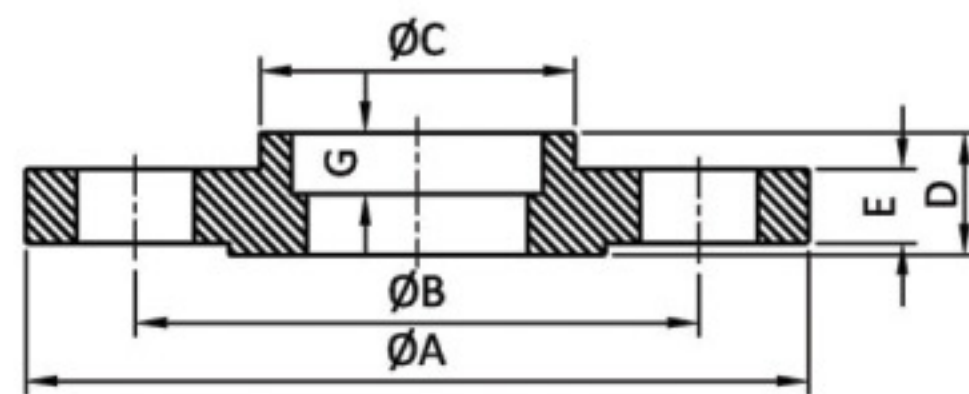
## FLANGES - STYLE-90



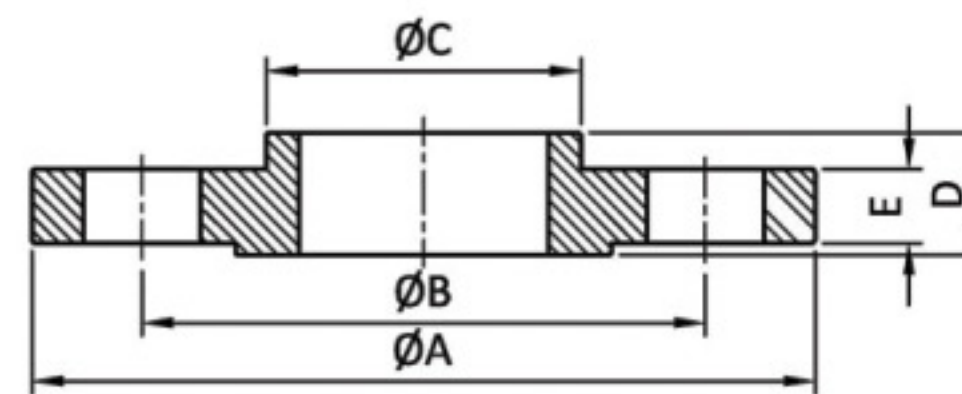
THREADED FLANGE



BLIND FLANGE



SOCKET WELD FLANGE



SLIP-ON FLANGE

SIZE	ØA		ØB		ØC		D		E		F		G		NO OF HOLES
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	
<b>ANSI</b>															
1/2	89.0	3.5	60.3	2.37	26.7	1.05	16.4	0.64	10.0	0.39	12.0	0.47	9.7	0.38	4
3/4	98.4	3.87	2.75	2.75	33.0	1.3	19.9	0.66	11.6	0.46	13.6	0.53	11.2	0.44	4
1	108.0	4.25	3.13	3.13	41.0	1.61	20.4	0.8	13.2	0.52	15.2	0.66	12.7	0.5	4
1 1/4	117.5	4.63	3.5	3.5	47.2	1.86	20.9	0.82	14.8	0.58	16.8	0.66	14.2	0.56	4
1 1/2	127	5.0	3.87	3.87	55.1	2.17	21.4	0.84	16.4	0.65	18.4	0.72	15.7	0.62	4
2	152.4	6.0	4.79	4.76	69.6	2.74	22.4	0.88	17.9	0.9	19.9	0.78	17.5	0.69	4
2 1/2	177.8	7.0	5.5	5.5	84.1	3.31	31.9	1.25	21.1	0.83	23.1	0.91	19.1	0.75	4
3	190.5	7.5	6.0	6.0	101.6	4.0	33.4	1.32	22.7	0.89	24.7	0.97	20.6	0.81	4
4	228.6	9.0	7.48	7.48	128.5	5.06	35.9	1.4	22.7	0.89	25.7	1.01	21.5	0.85	8
6	279.4	11.0	9.5	9.5	192.0	7.56	39.6	1.56	23.0	0.9	25.4	1.0	-	-	8
8	342.9	13.5	11.75	11.75	246.1	9.69	44.5	1.75	25.9	1.02	28.4	1.12	-	-	8
<b>PN-16</b>															
1/2	95.0	3.74	65.0	2.56	26.7	1.05	16.4	0.64	13.0	0.51	12.0	0.47	9.7	0.38	4
3/4	105.0	4.13	75.0	2.95	33.0	1.3	19.9	0.66	15.0	0.59	13.6	0.53	11.2	0.44	4
1	115.0	4.52	85.0	3.34	41.0	1.61	20.4	0.8	15.0	0.59	15.2	0.66	12.7	0.5	4
1 1/4	140.0	5.51	100.0	3.93	47.2	1.86	20.9	0.82	15.0	0.59	16.8	0.66	14.2	0.56	4
1 1/2	150.0	5.9	110.0	4.33	55.1	2.17	21.4	0.84	15.0	0.59	18.4	0.72	15.7	0.62	4
2	165.0	6.49	125.0	4.92	69.6	2.74	22.4	0.88	17.0	0.67	19.9	0.78	17.5	0.69	4
2 1/2	185.0	7.28	145.0	5.7	84.1	3.31	31.9	1.25	17.0	0.67	23.1	0.91	19.1	0.75	4
3	200.0	7.87	160.0	6.3	101.6	4.0	33.4	1.32	19.0	0.75	24.7	0.97	20.6	0.81	8
4	220.0	8.66	180.0	7.09	128.5	5.06	35.9	1.4	19.0	0.75	25.7	1.01	21.5	0.85	8
6	285.0	11.22	240.0	9.45	192.0	7.56	39.6	1.56	23.0	0.9	25.4	1.0	-	-	8
8	340.0	13.38	295.0	11.6	246.1	9.69	44.5	1.75	25.9	1.02	28.4	1.12	-	-	12





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