



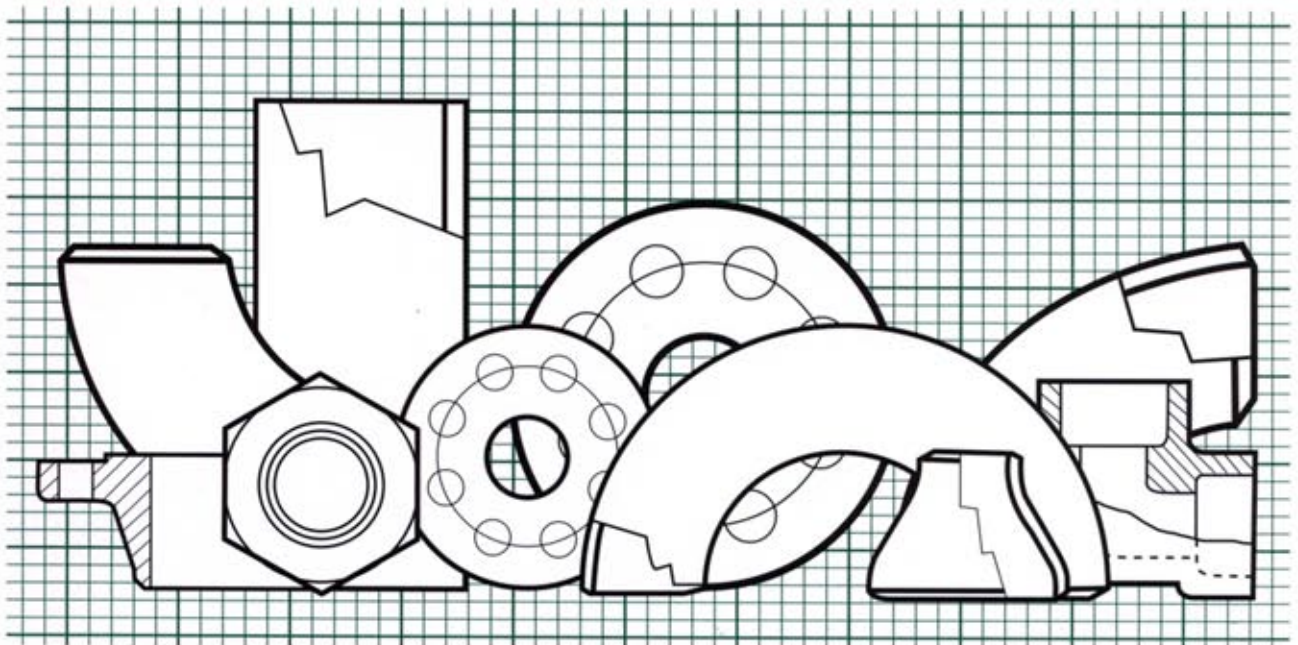
# **D K Jones Limited**

# **Piping Products**

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Dimensional Catalogue  
Forged & Outlet Fittings

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# **FORGED STEEL FITTINGS**

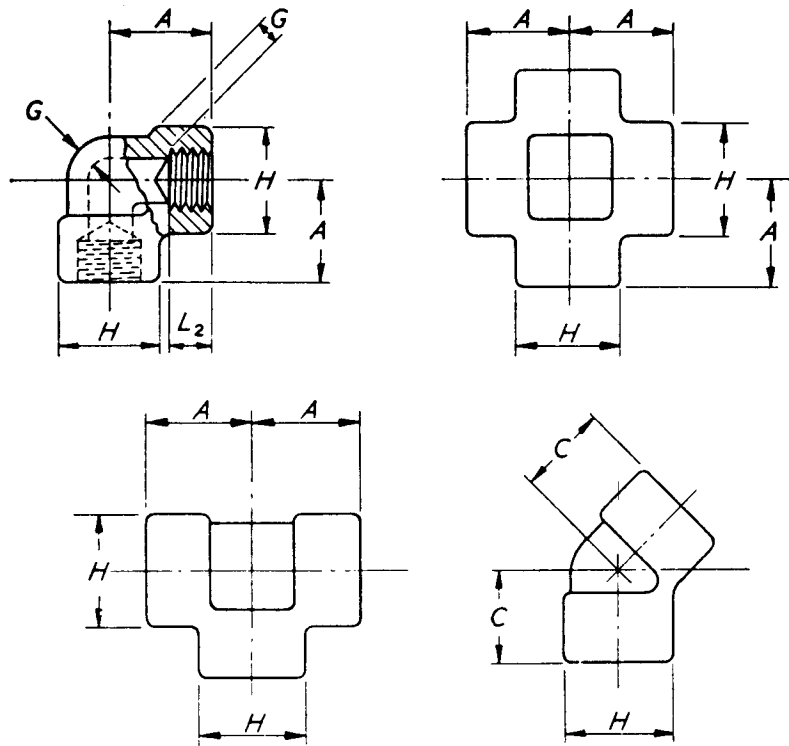
**BS 3799 & ANSI B16.11**

**Screwed Fittings 3000 lb & 6000 lb**

**Socket Weld Fittings 3000 lb & 6000 lb**

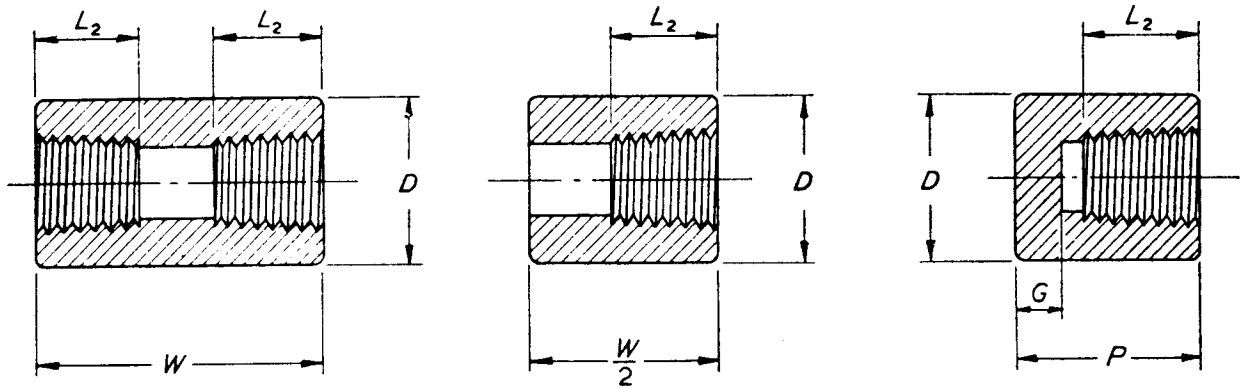
**Tolerances**

**Weights**



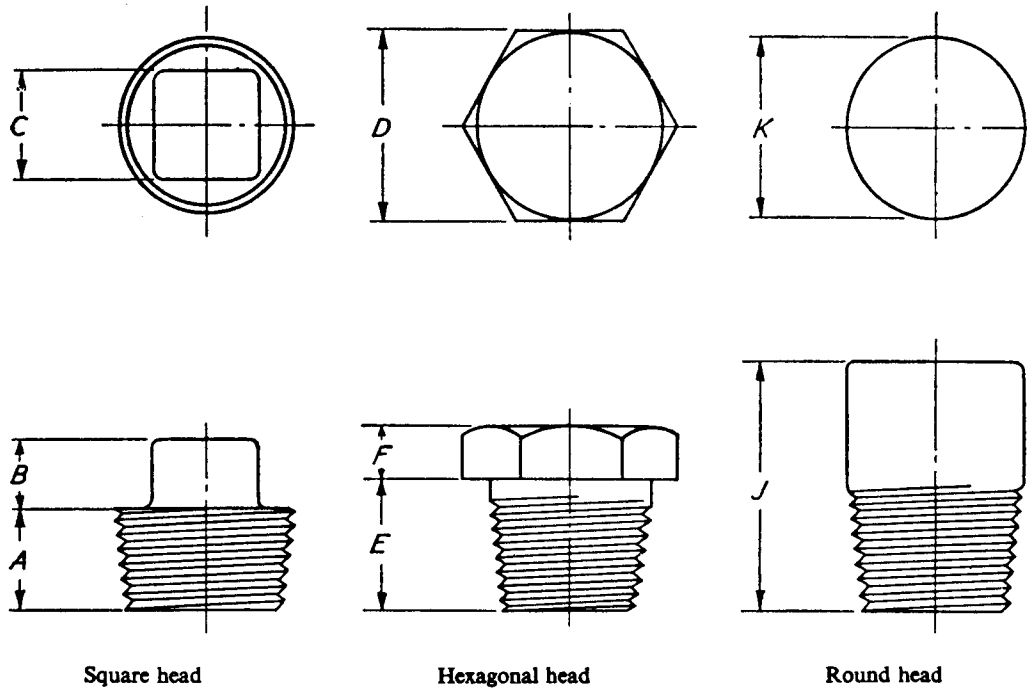
**Screwed fittings. Dimensions of 90° elbows, crosses, tees and 45° elbows**

| Nominal size   |       | Centre-to-end<br>90° elbows, tees,<br>crosses |      | Centre-to-end<br>45° elbows |      | Outside diameter<br>of band (min.) |      | Wall thickness<br>(min.) |      | Length<br>of thread<br>(min.)<br><br>L <sub>2</sub> |
|----------------|-------|---|------|-----------------------------|------|------------------------------------|------|--------------------------|------|---|
|                |       | A   | A    | C                           | C    | H                                  | H    | G                        | G    |   |
|                |       | 3000  | 6000 | 3000                        | 6000 | 3000                               | 6000 | 3000                     | 6000 |   |
| in             | mm    | mm  | mm   | mm                          | mm   | mm                                 | mm   | mm                       | mm   | mm  |
| $\frac{1}{8}$  | (6)   | 21  | —    | 17                          | —    | 22                                 | —    | 3.2                      | —    | 6.70  |
| $\frac{1}{4}$  | (8)   | 25  | —    | 19                          | —    | 25                                 | —    | 3.3                      | —    | 10.21   |
| $\frac{3}{8}$  | (10)  | 29  | —    | 22                          | —    | 33                                 | —    | 3.5                      | —    | 10.36   |
| $\frac{1}{2}$  | (15)  | 33  | 38   | 25                          | 29   | 38                                 | 46   | 4.1                      | 8.2  | 13.56   |
| $\frac{3}{4}$  | (20)  | 38  | 44   | 29                          | 33   | 46                                 | 56   | 4.3                      | 8.5  | 13.86   |
| 1              | (25)  | 44  | 51   | 33                          | 35   | 56                                 | 62   | 5.0                      | 9.9  | 17.34   |
| $1\frac{1}{4}$ | (32)  | 51  | 60   | 35                          | 43   | 62                                 | 75   | 5.3                      | 10.6 | 17.95   |
| $1\frac{1}{2}$ | (40)  | 60  | 64   | 43                          | 44   | 75                                 | 84   | 5.5                      | 11.1 | 18.38   |
| 2              | (50)  | 64  | 83   | 44                          | 52   | 84                                 | 102  | 6.0                      | 12.0 | 19.22   |
| $2\frac{1}{2}$ | (65)  | 83  | 95   | 52                          | —    | 102                                | 121  | 7.6                      | 15.3 | 28.89   |
| 3              | (80)  | 95  | 114  | 64                          | —    | 121                                | 146  | 8.3                      | 16.6 | 30.48   |
| 4              | (100) | 114   | —    | 79                          | —    | 152                                | —    | 9.3                      | —    | 33.02   |



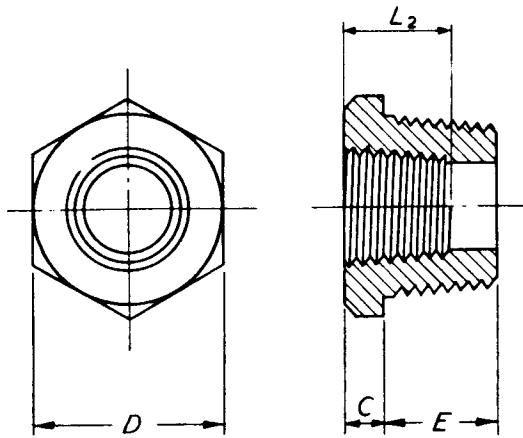
**Screwed fittings. Dimensions of couplings, half-couplings and caps**

| Nominal size   |       | End to end couplings | End to end caps |      | Outside diameter (min.) |      | Cap end wall thickness (min.) |      | Length of thread (min.) |
|----------------|-------|----------------------|-----------------|------|-------------------------|------|-------------------------------|------|-------------------------|
|                |       | $W$                  | $P$             | $P$  | $D$                     | $G$  | $G$                           |      |                         |
|                |       | 3000 and 6000        | 3000            | 6000 | 3000                    | 6000 | 3000                          | 6000 | $L_1$                   |
| in             | mm    | mm                   | mm              | mm   | mm                      | mm   | mm                            | mm   | mm                      |
| $\frac{1}{8}$  | (6)   | 32                   | 19              | —    | 16                      | 22   | 5                             | —    | 6.70                    |
| $\frac{1}{4}$  | (8)   | 35                   | 25              | 27   | 19                      | 25   | 5                             | 6    | 10.21                   |
| $\frac{3}{8}$  | (10)  | 38                   | 25              | 27   | 22                      | 32   | 5                             | 6    | 10.36                   |
| $\frac{1}{2}$  | (15)  | 48                   | 32              | 33   | 29                      | 38   | 6                             | 8    | 13.56                   |
| $\frac{3}{4}$  | (20)  | 51                   | 37              | 38   | 35                      | 45   | 6                             | 8    | 13.86                   |
| 1              | (25)  | 60                   | 41              | 43   | 45                      | 57   | 10                            | 11   | 17.34                   |
| $1\frac{1}{2}$ | (32)  | 67                   | 45              | 46   | 57                      | 64   | 10                            | 11   | 17.95                   |
| $1\frac{1}{2}$ | (40)  | 79                   | 45              | 48   | 64                      | 76   | 11                            | 13   | 18.38                   |
| 2              | (50)  | 86                   | 48              | 51   | 76                      | 92   | 13                            | 16   | 19.22                   |
| $2\frac{1}{2}$ | (65)  | 92                   | 60              | —    | 92                      | —    | 16                            | —    | 28.89                   |
| 3              | (80)  | 108                  | 65              | —    | 108                     | —    | 19                            | —    | 30.48                   |
| 4              | (100) | 121                  | 68              | —    | 140                     | —    | 22                            | —    | 33.02                   |



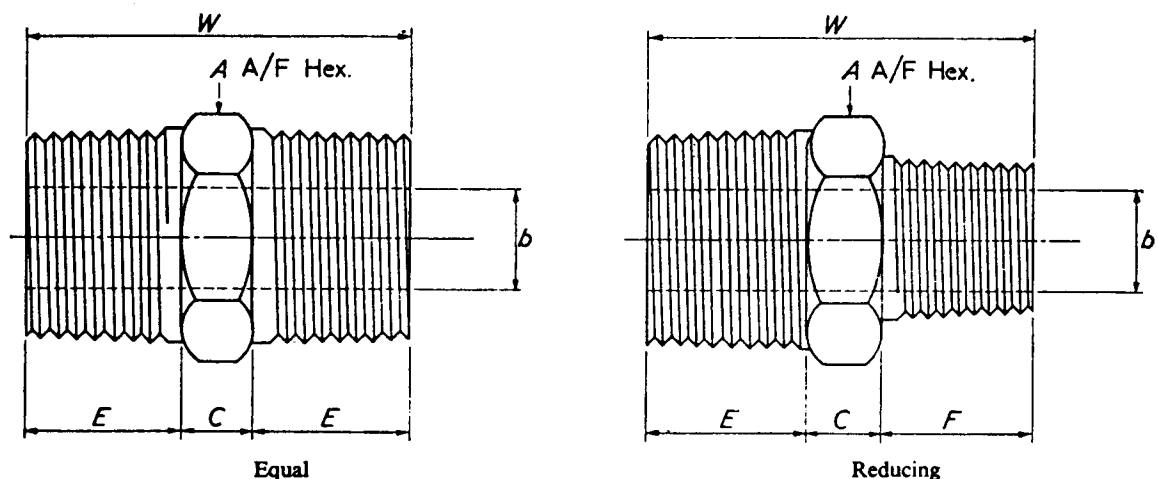
### Screwed fittings. Minimum dimensions of pipe plugs

| Nominal size   |       | Square head |    |    | Hexagonal head |    |    | Round head |     |
|----------------|-------|-------------|----|----|----------------|----|----|------------|-----|
|                |       | A           | B  | C  | D              | E  | F  | J          | K   |
| in             | mm    | mm          | mm | mm | mm             | mm | mm | mm         | mm  |
| $\frac{1}{8}$  | (6)   | 10          | 6  | 7  | 11             | 10 | 6  | 35         | 10  |
| $\frac{1}{4}$  | (8)   | 11          | 6  | 10 | 16             | 15 | 6  | 41         | 14  |
| $\frac{3}{8}$  | (10)  | 13          | 8  | 11 | 18             | 16 | 8  | 41         | 18  |
| $\frac{1}{2}$  | (15)  | 14          | 10 | 14 | 22             | 20 | 8  | 45         | 21  |
| $\frac{3}{4}$  | (20)  | 16          | 11 | 16 | 27             | 21 | 10 | 45         | 27  |
| 1              | (25)  | 19          | 13 | 21 | 35             | 25 | 10 | 51         | 33  |
| $1\frac{1}{4}$ | (32)  | 21          | 14 | 24 | 45             | 26 | 14 | 51         | 43  |
| $1\frac{1}{2}$ | (40)  | 21          | 16 | 29 | 51             | 26 | 16 | 51         | 48  |
| 2              | (50)  | 22          | 18 | 33 | 64             | 27 | 18 | 64         | 60  |
| $2\frac{1}{2}$ | (65)  | 27          | 19 | 38 | 76             | 41 | 19 | 70         | 73  |
| 3              | (80)  | 29          | 21 | 43 | 89             | 42 | 21 | 70         | 90  |
| 4              | (100) | 32          | 32 | 64 | 118            | 45 | 32 | 76         | 114 |



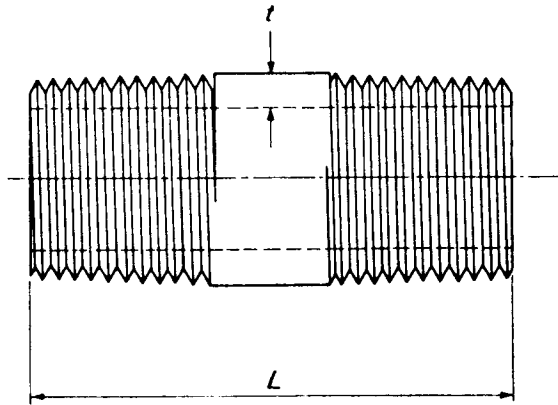
**Screwed fittings. Minimum dimensions of bushings**

| Nominal size   |       | $C$ | $D$ | $E$ |
|----------------|-------|-----|-----|-----|
| in             | mm    | mm  | mm  | mm  |
| $\frac{1}{4}$  | (8)   | 3   | 16  | 15  |
| $\frac{3}{8}$  | (10)  | 4   | 18  | 16  |
| $\frac{1}{2}$  | (15)  | 5   | 22  | 20  |
| $\frac{3}{4}$  | (20)  | 6   | 27  | 21  |
| 1              | (25)  | 6   | 35  | 25  |
| $1\frac{1}{4}$ | (32)  | 7   | 45  | 26  |
| $1\frac{1}{2}$ | (40)  | 8   | 51  | 26  |
| 2              | (50)  | 9   | 64  | 27  |
| $2\frac{1}{2}$ | (65)  | 10  | 76  | 41  |
| 3              | (80)  | 10  | 90  | 42  |
| 4              | (100) | 13  | 118 | 45  |



**Screwed fittings. Dimensions of hexagonal nipples**

| Nominal size   |        |                                   |           | A      | W      | E      | b    |      | C      | F      |
|----------------|--------|-----------------------------------|-----------|--------|--------|--------|------|------|--------|--------|
| Equal          |        | Reducing                          |           | (min.) | (min.) | (min.) | 3000 | 6000 | (min.) | (min.) |
| in             | mm (6) | in                                | mm        | mm     | mm     | mm     | mm   | mm   | mm     | mm     |
| $\frac{1}{8}$  | —      | —                                 | —         | 11     | 26     | 10     | 5    | 2    | 6      | —      |
| $\frac{1}{4}$  | (8)    | —                                 | —         | 15     | 36     | 15     | 8    | 6    | 6      | —      |
| —              | —      | $\frac{1}{4} \times \frac{1}{8}$  | (8 × 6)   | 15     | 31     | 15     | 5    | 2    | 6      | 10     |
| $\frac{3}{8}$  | (10)   | —                                 | —         | 18     | 40     | 16     | 11   | 8    | 8      | —      |
| —              | —      | $\frac{3}{8} \times \frac{1}{4}$  | (10 × 8)  | 18     | 39     | 16     | 8    | 6    | 8      | 15     |
| $\frac{1}{2}$  | (15)   | —                                 | —         | 22     | 48     | 20     | 14   | 11   | 8      | —      |
| —              | —      | $\frac{1}{2} \times \frac{3}{8}$  | (15 × 10) | 22     | 44     | 20     | 11   | 8    | 8      | 16     |
| —              | —      | $\frac{1}{2} \times \frac{1}{2}$  | (15 × 8)  | 22     | 43     | 20     | 8    | 6    | 8      | 15     |
| $\frac{3}{4}$  | (20)   | —                                 | —         | 27     | 52     | 21     | 19   | 13   | 10     | —      |
| —              | —      | $\frac{3}{4} \times \frac{1}{2}$  | (20 × 15) | 27     | 50     | 21     | 14   | 11   | 9      | 20     |
| —              | —      | $\frac{3}{4} \times \frac{3}{8}$  | (20 × 10) | 27     | 46     | 21     | 11   | 8    | 9      | 16     |
| 1              | (25)   | —                                 | —         | 35     | 60     | 25     | 24   | 17   | 10     | —      |
| —              | —      | $1 \times \frac{3}{4}$            | (25 × 20) | 35     | 56     | 25     | 19   | 13   | 10     | 21     |
| —              | —      | $1 \times \frac{1}{2}$            | (25 × 15) | 35     | 55     | 25     | 14   | 11   | 10     | 20     |
| $1\frac{1}{2}$ | (40)   | —                                 | —         | 50     | 68     | 26     | 38   | 30   | 16     | —      |
| —              | —      | $1\frac{1}{2} \times 1$           | (40 × 25) | 50     | 67     | 26     | 24   | 17   | 16     | 25     |
| —              | —      | $1\frac{1}{2} \times \frac{3}{4}$ | (40 × 20) | 50     | 63     | 26     | 19   | 13   | 16     | 21     |
| —              | —      | $1\frac{1}{2} \times \frac{1}{2}$ | (40 × 15) | 50     | 62     | 26     | 14   | 11   | 16     | 20     |
| 2              | (50)   | —                                 | —         | 62     | 71     | 27     | 49   | 39   | 17     | —      |
| —              | —      | $2 \times 1\frac{1}{2}$           | (50 × 40) | 62     | 70     | 27     | 38   | 30   | 17     | 26     |
| —              | —      | $2 \times 1$                      | (50 × 25) | 62     | 70     | 27     | 24   | 17   | 18     | 25     |
| —              | —      | $2 \times \frac{3}{4}$            | (50 × 20) | 62     | 65     | 27     | 19   | 13   | 17     | 21     |
| —              | —      | $2 \times \frac{1}{2}$            | (50 × 15) | 62     | 65     | 27     | 14   | 11   | 18     | 20     |

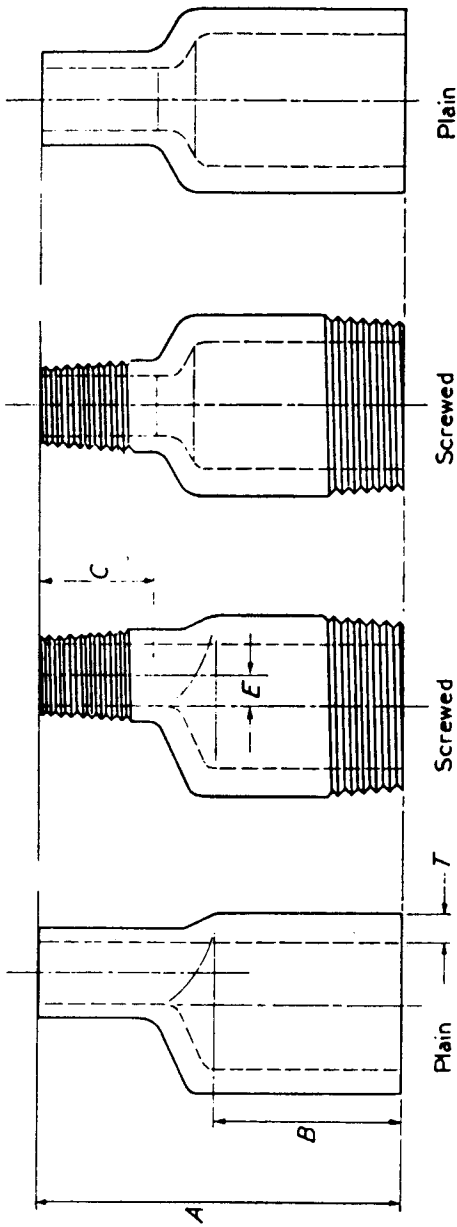


### Screwed fittings. Dimensions of round nipples

| Nominal size   |       | Std. lengths<br><i>L</i> * |    |     |     | Wall thickness<br><i>t</i> |      |
|----------------|-------|----------------------------|----|-----|-----|----------------------------|------|
|                |       |                            |    |     |     | 3000                       | 6000 |
| in             | mm    | mm                         |    |     |     |                            |      |
| $\frac{1}{8}$  | (6)   | 50                         | 75 | 100 | 150 |                            | —    |
| $\frac{1}{4}$  | (8)   | 50                         | 75 | 100 | 150 |                            | —    |
| $\frac{3}{8}$  | (10)  | 50                         | 75 | 100 | 150 |                            | —    |
| $\frac{1}{2}$  | (15)  | —                          | 75 | 100 | 150 | Schedule 80                | XXS  |
| $\frac{3}{4}$  | (20)  | —                          | 75 | 100 | 150 |                            |      |
| 1              | (25)  | —                          | 75 | 100 | 150 |                            |      |
| $1\frac{1}{2}$ | (40)  | —                          | 75 | 100 | 150 |                            |      |
| 2              | (50)  | —                          | 75 | 100 | 150 |                            |      |
| $2\frac{1}{2}$ | (65)  | —                          | —  | 100 | 150 |                            |      |
| 3              | (80)  | —                          | —  | 100 | 150 |                            |      |
| 4              | (100) | —                          | —  | —   | 150 |                            |      |

\* Other lengths are available when specified.



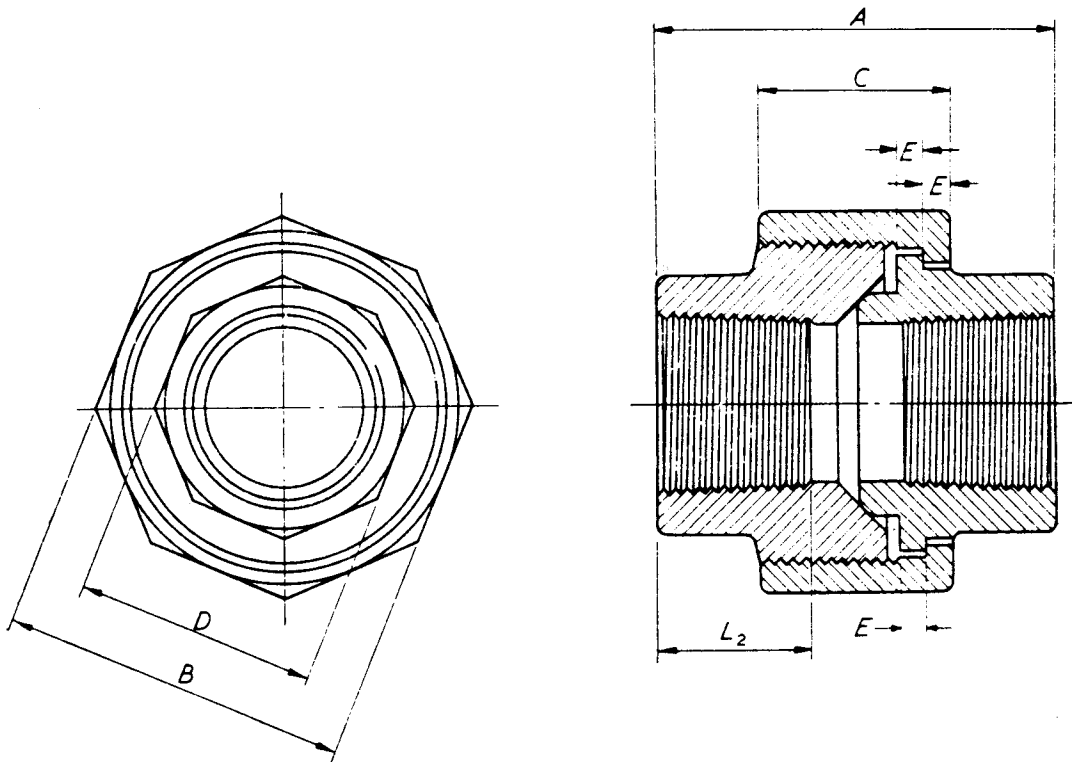


Eccentric Concentric

**Fittings. Dimensions of swage nipples**

| Nominal size | Parallel length    |                    | Eccentricity <i>F</i> |           | Thickness <i>T</i> and <i>r</i> * |                       |               |                 |
|--------------|--------------------|--------------------|-----------------------|-----------|-----------------------------------|-----------------------|---------------|-----------------|
|              | (min.)<br><i>A</i> | (min.)<br><i>B</i> | (min.)<br><i>C</i>    | 3000      | 6000                              | Screwed/Plain<br>3000 | Plain<br>6000 | Screwed<br>6000 |
| in<br>1 × 1  | mm<br>76           | mm<br>48           | mm<br>16              | mm<br>1.6 | mm<br>—                           |                       |               |                 |
| 1 × 1        | 89                 | 56                 | 19                    | 1.6       | —                                 |                       |               |                 |
| 1 × 1        | 89                 | 56                 | 19                    | 3.2       | —                                 |                       |               |                 |
| 1 × 1        | 95                 | 57                 | 22                    | 2.4       | 2.4                               |                       | Schedule 160  | XXS             |
| 1 × 1        | 95                 | 57                 | 22                    | 4.0       | 4.0                               |                       |               |                 |
| 1 × 1        | 102                | 64                 | 22                    | 2.8       | 2.0                               |                       |               |                 |
| 1 × 1        | 102                | 64                 | 22                    | 5.2       | 4.4                               |                       |               |                 |
| 1 × 1        | 114                | 70                 | 25                    | 6.7       | 6.4                               |                       |               |                 |
| 1 × 1        | 114                | 70                 | 25                    | 9.5       | 8.3                               |                       |               |                 |
| 1 × 1        | 114                | 70                 | 25                    | 11.9      | 10.7                              |                       |               |                 |
| 2 × 1        | 165                | 108                | 29                    | 5.6       | 5.2                               |                       |               |                 |
| 2 × 1        | 165                | 108                | 29                    | 12.7      | 11.5                              |                       |               |                 |
| 2 × 1        | 165                | 108                | 29                    | 15.5      | 13.5                              |                       |               |                 |
| 2 × 1        | 165                | 108                | 29                    | 17.5      | 15.9                              |                       |               |                 |
| 2 × 2        | 178                | 114                | 32                    | 4.8       | 3.2                               |                       |               |                 |
| 2 × 2        | 178                | 114                | 32                    | 10.3      | 8.3                               |                       |               |                 |
| 3 × 2        | 203                | 133                | 41                    | 7.1       | 6.7                               |                       |               |                 |
| 3 × 2        | 203                | 133                | 41                    | 11.9      | 9.9                               |                       |               |                 |
| 3 × 1        | 203                | 133                | 41                    | 17.5      | 15.5                              |                       |               |                 |
| 4 × 3        | 229                | 140                | 48                    | 11.9      | 10.7                              |                       |               |                 |
| 4 × 2        | 229                | 140                | 48                    | 19.1      | 17.5                              |                       |               |                 |

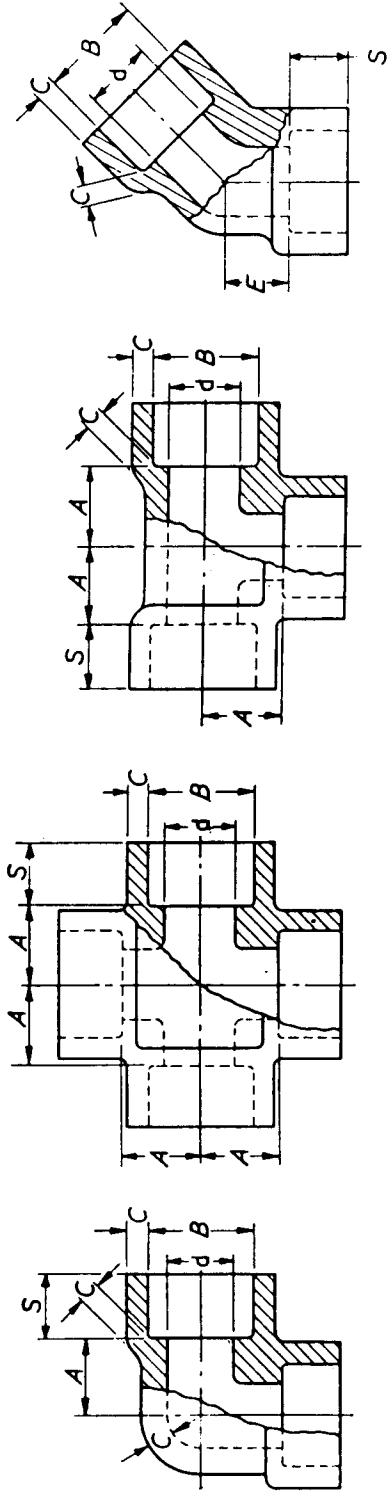
\* Thickness and outside diameters of swage nipples shall correspond to those of the appropriate nominal pipe size



### Screwed fittings. Dimensions of unions

| Nominal size   |      | 3000            |                                       |                                       |                                     |   |   |
|----------------|------|-----------------|---------------------------------------|---------------------------------------|-------------------------------------|---|---|
|                |      | End to end<br>A | Width A/F<br>union nut<br>(min.)<br>B | Height of<br>union nut<br>(min.)<br>C | Width A/F<br>of ends<br>(min.)<br>D | Thickness of<br>shoulder<br>(min.)<br>E | Length of<br>thread<br>(min.)<br>L <sub>1</sub> |
| in             | mm   | mm              | mm                                    | mm                                    | mm                                  | mm                                      | mm  |
| $\frac{1}{8}$  | (6)  | 40              | 32                                    | 16                                    | 17                                  | 3.2                                     | 6.70  |
| $\frac{1}{4}$  | (8)  | 43              | 32                                    | 18                                    | 19                                  | 3.2                                     | 10.21   |
| $\frac{3}{8}$  | (10) | 48              | 36                                    | 19                                    | 22                                  | 3.2                                     | 10.36   |
| $\frac{1}{2}$  | (15) | 51              | 43                                    | 21                                    | 30                                  | 4.0                                     | 13.56   |
| $\frac{3}{4}$  | (20) | 57              | 50                                    | 24                                    | 36                                  | 4.8                                     | 13.86   |
| 1              | (25) | 64              | 60                                    | 25                                    | 41                                  | 4.8                                     | 17.34   |
| $1\frac{1}{4}$ | (32) | 70              | 70                                    | 29                                    | 50                                  | 5.6                                     | 17.93   |
| $1\frac{1}{2}$ | (40) | 79              | 78                                    | 30                                    | 60                                  | 5.6                                     | 18.38   |
| 2              | (50) | 89              | 95                                    | 37                                    | 70                                  | 6.4                                     | 19.22   |
| $2\frac{1}{2}$ | (65) | 118             | 125                                   | 48                                    | 85                                  | 9.6                                     | 28.89   |
| 3              | (80) | 121             | 140                                   | 51                                    | 100                                 | 12.7                                    | 30.48   |

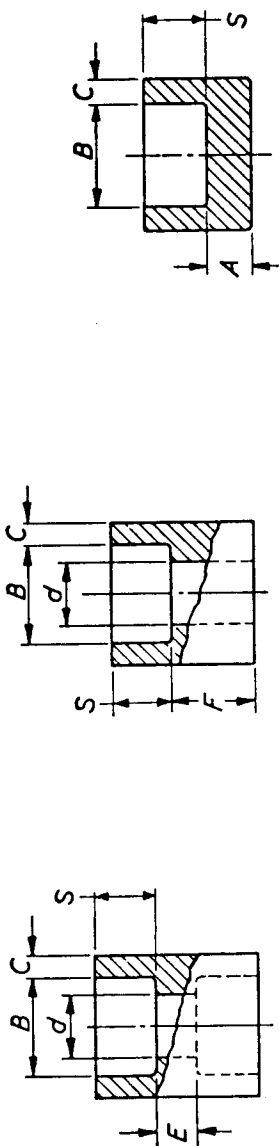
NOTE. Other external forms of nut and ends are permissible provided the minimum dimensions shown in this table are maintained.



Socket-welding fittings. Dimensions of 90° elbows, crosses, tees and 45° elbows

| Nominal size | Depth of socket (min.) S | Centre to bottom of socket A |      | Bore diameter of socket (min.) B | Socket wall thickness (min.) C |      | Bore diameter of fitting d* |      | Centre to bottom of socket for 45° elbows E |      |
|--------------|--------------------------|------------------------------|------|----------------------------------|--------------------------------|------|-----------------------------|------|---|------|
|              |                          | 3000                         | 6000 |                                  | 3000                           | 6000 | 3000                        | 6000 | 3000  | 6000 |
| in           | mm                       | mm                           | mm   | mm                               | mm                             | mm   | mm                          | mm   | mm  | mm   |
| ½            | (6)                      | 10                           | 11   | 10.7                             | 3.2                            | —    | 6.8                         | —    | 8   | —    |
| ¾            | (8)                      | 10                           | 11   | 14.1                             | 3.3                            | —    | 9.2                         | —    | 8   | —    |
| 1            | (10)                     | 10                           | 14   | 17.6                             | 3.5                            | —    | 12.5                        | —    | 8   | —    |
| 1½           | (15)                     | 10                           | 16   | 21.8                             | 4.1                            | 5.2  | 15.5                        | 11.8 | 11  | 13   |
| 2            | (20)                     | 13                           | 19   | 27.4                             | 4.3                            | 6.1  | 21.0                        | 15.5 | 13  | 14   |
| 2½           | (25)                     | 13                           | 22   | 34.1                             | 5.0                            | 7.0  | 26.5                        | 20.5 | 15  | 18   |
| 3            | (32)                     | 13                           | 27   | 42.9                             | 5.3                            | 7.0  | 35.0                        | 29.5 | 18  | 21   |
| 3½           | (40)                     | 13                           | 32   | 49.0                             | 5.6                            | 7.8  | 40.5                        | 34.0 | 21  | 26   |
| 4            | (50)                     | 16                           | 38   | 61.0                             | 6.1                            | 9.5  | 52.0                        | 43.0 | 26  | 29   |
| 5            | (65)                     | 16                           | 41   | 73.8                             | 7.7                            | 10.4 | 62.0                        | 54.0 | 29  | 32   |
| 6            | (80)                     | 16                           | 57   | 89.7                             | 8.3                            | 12.2 | 78.0                        | 67.0 | 32  | 41   |

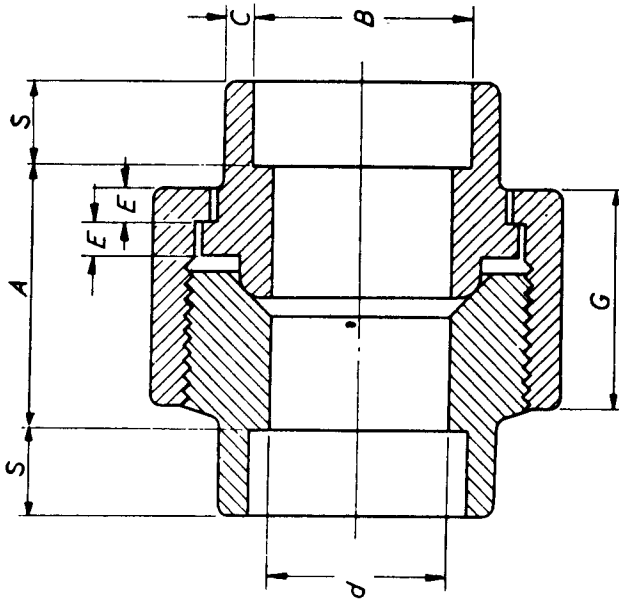
\* Bore diameter d corresponds to schedule 40 and schedule 160 pipe respectively.



Socket-welding fittings. Dimensions of couplings, half-couplings and caps

| Nominal size | Depth of socket (min.) S | Couplings distance between bottoms of sockets E | Half couplings distance between bottom of socket and opposite end F | Caps; wall thickness (min.) A |      | Bore diameter of socket (min.) B | Socket wall thickness C |      | Bore diameter of fitting d* |      |
|--------------|--------------------------|---|---|-------------------------------|------|----------------------------------|-------------------------|------|-----------------------------|------|
|              |                          |   |   | 3000                          | 6000 |                                  | 3000                    | 6000 | 3000                        | 6000 |
| 1/8          | 10                       | 6   | 16  | 4                             | mm   | 10.7                             | 3.2                     | mm   | 6.8                         | 6000 |
| 1/4          | 10                       | 6   | 16  | 7                             | —    | 14.1                             | 3.3                     | —    | 9.2                         | —    |
| 3/8          | 10                       | 6   | 17  | 7                             | —    | 17.6                             | 3.5                     | —    | 12.5                        | —    |
| 1/2          | 10                       | 10  | 22  | 8                             | 11   | 21.8                             | 4.1                     | 5.2  | 15.5                        | 11.8 |
| 3/4          | 13                       | 10  | 24  | 10                            | 13   | 27.4                             | 4.3                     | 6.1  | 21.0                        | 15.5 |
| 1            | 13                       | 13  | 29  | 11                            | 14   | 34.1                             | 5.0                     | 7.0  | 26.5                        | 20.5 |
| 1 1/4        | 13                       | 13  | 30  | 13                            | 18   | 42.9                             | 5.3                     | 7.0  | 35.0                        | 29.5 |
| 1 1/2        | 13                       | 13  | 32  | 14                            | 19   | 49.0                             | 5.6                     | 7.8  | 40.5                        | 34.0 |
| 2            | 16                       | 19  | 41  | 18                            | 24   | 61.0                             | 6.1                     | 9.5  | 52.0                        | 43.0 |
| 2 1/2        | 16                       | 19  | 43  | 21                            | 29   | 73.8                             | 7.7                     | 10.4 | 62.0                        | 54.0 |
| 3            | 16                       | 19  | 44  | 24                            | 34   | 89.7                             | 8.3                     | 12.2 | 78.0                        | 67.0 |

\* Bore d corresponds to schedule 40 and schedule 160 pipe respectively.



Socket-welding fittings. Dimensions of unions

| Nominal size   |      | 3000                     |  |                                   |                                |                              |                                |                           |                        |  |  |
|----------------|------|--------------------------|--|-----------------------------------|--------------------------------|------------------------------|--------------------------------|---------------------------|------------------------|--|--|
|                | mm   | Depth of socket (min.) S | Distance between bottoms of sockets (min.) A | Bore diameter of sockets (min.) B | Socket wall thickness (min.) C | Bore diameter of union $d^*$ | Thickness of shoulder (min.) E | Width A/F of nut (min.) F | Height of nut (min.) G |  |  |
| in             |      | mm                       | mm   | mm                                | mm                             | mm                           | mm                             | mm                        | mm                     |  |  |
| $\frac{1}{8}$  | (6)  | 10                       | 17   | 10.7                              | 3.2                            | 6.8                          | 3.2                            | 32                        | 16                     |  |  |
| $\frac{1}{4}$  | (8)  | 10                       | 17   | 14.1                              | 3.3                            | 9.2                          | 3.2                            | 32                        | 18                     |  |  |
| $\frac{3}{8}$  | (10) | 10                       | 17   | 17.6                              | 3.5                            | 12.5                         | 3.2                            | 36                        | 19                     |  |  |
| $\frac{1}{2}$  | (15) | 10                       | 18   | 21.8                              | 4.1                            | 15.5                         | 4.0                            | 41                        | 21                     |  |  |
| $\frac{3}{4}$  | (20) | 13                       | 20   | 27.4                              | 4.3                            | 21.0                         | 4.8                            | 50                        | 24                     |  |  |
| 1              | (25) | 13                       | 26   | 34.1                              | 5.0                            | 26.5                         | 4.8                            | 60                        | 25                     |  |  |
| $1\frac{1}{4}$ | (32) | 13                       | 28   | 42.9                              | 5.3                            | 35.0                         | 5.6                            | 70                        | 29                     |  |  |
| $1\frac{1}{2}$ | (40) | 13                       | 30   | 49.0                              | 5.6                            | 40.5                         | 5.6                            | 78                        | 30                     |  |  |
| 2              | (50) | 16                       | 36   | 61.0                              | 6.1                            | 52.0                         | 6.4                            | 95                        | 37                     |  |  |
| $2\frac{1}{2}$ | (65) | 16                       | 57   | 73.8                              | 7.7                            | 62.0                         | 9.6                            | 125                       | 48                     |  |  |
| 3              | (80) | 16                       | 70   | 89.7                              | 8.3                            | 78.0                         | 12.7                           | 140                       | 51                     |  |  |

\* Bore diameter  $d$  corresponds to schedule 40 pipe.

### Tolerances for socket-welding fittings

| Dimension   | Nominal size<br>in   | Tolerance<br>mm              |
|---|--|------------------------------|
| Centre to bottom of socket elbows, crosses and tees                   | $\frac{1}{8}$ and $\frac{1}{4}$<br>$\frac{3}{8}$ , $\frac{1}{2}$ and $\frac{3}{4}$<br>1, $1\frac{1}{4}$ , $1\frac{1}{2}$ and 2<br>$2\frac{1}{2}$ and 3 | ±0.8                         |
| Bottom of socket to opposite end in half-couplings and welding bosses |  | ±1.5                         |
| Bottom to bottom of sockets in couplings                              | $\frac{1}{8}$ and $\frac{1}{4}$<br>$\frac{3}{8}$ , $\frac{1}{2}$ and $\frac{3}{4}$<br>1, $1\frac{1}{4}$ , $1\frac{1}{2}$ and 2<br>$2\frac{1}{2}$ and 3 | ±2.0<br>±2.5                 |
| Bore diameter of sockets  | $\frac{1}{8}$ and $\frac{1}{4}$<br>$\frac{3}{8}$ , $\frac{1}{2}$ and $\frac{3}{4}$<br>1, $1\frac{1}{4}$ , $1\frac{1}{2}$ and 2<br>$2\frac{1}{2}$ and 3 | ±1.5<br>±3.0<br>±4.0<br>±5.0 |
| Bore diameter of fittings   | 2 and smaller<br><br>$2\frac{1}{2}$ and 3  | +0.3<br>-0.0<br>+0.4<br>-0.0 |
| Concentricity of bore   | all sizes  | ±0.4<br>±0.8                 |
| Alignment of axes   | all sizes  | ±0.8                         |
| Alignment of axes   | all sizes  | 1 in 200                     |

## Approx. weight of fittings in kgs.

| 3000 LBS<br>FILETTATI - THREADED                                  | 1/8       | 1/4                    | 3/8                    | 1/2                           | 3/4                                     | 1                             | 1 1/4 | 1 1/2 | 2     | 2 1/2 | 3     | 4     |
|---|-----------|------------------------|------------------------|-------------------------------|---|-------------------------------|-------|-------|-------|-------|-------|-------|
| Gomiti a 90° - 90° Elbows   | 0.09      | 0.14                   | 0.27                   | 0.40                          | 0.63                                    | 1.10                          | 1.22  | 2.35  | 3.30  | 5.50  | 9.00  | 17.50 |
| Gomiti a 45° - 45° Elbows   | 0.11      | 0.14                   | 0.25                   | 0.32                          | 0.51                                    | 0.85                          | 1.00  | 1.85  | 3.00  | 4.90  | 5.30  | 12.40 |
| Tee - Equal Tees  | 0.20      | 0.19                   | 0.39                   | 0.52                          | 0.83                                    | 1.38                          | 1.66  | 3.12  | 4.00  | 5.90  | 11.50 | 19.50 |
| Croci - Crosses   | 0.22      | 0.25                   | 0.44                   | 0.62                          | 0.96                                    | 1.52                          | 1.90  | 3.50  | 4.90  | 7.50  | 13.00 | 22.50 |
| Manicotti - Full Couplings  | 0.03      | 0.05                   | 0.06                   | 0.14                          | 0.20                                    | 0.40                          | 0.70  | 1.00  | 1.90  | 2.95  | 4.20  | 8.10  |
| Mezzi M. - Half Couplings   | 0.02      | 0.03                   | 0.05                   | 0.07                          | 0.10                                    | 0.20                          | 0.32  | 0.50  | 0.95  | 1.50  | 2.10  | 4.10  |
| Tappi F. - Caps   | 0.03      | 0.05                   | 0.06                   | 0.12                          | 0.19                                    | 0.35                          | 0.56  | 0.75  | 1.45  | 2.30  | 3.20  | 6.40  |
| Bocchettoni - Unions  | —         | 0.13                   | 0.20                   | 0.40                          | 0.50                                    | 1.00                          | 1.45  | 1.60  | 2.50  | —     | —     | —     |
| Nippli esag. - Hex. Nipples                                       | 0.025     | 0.030                  | 0.055                  | 0.085                         | 0.115                                   | 0.170                         | 0.285 | 0.340 | 0.545 | 1.115 | 1.710 | 5.00  |
| Tappi T.E. - Hex. H. Plugs  | 0.02      | 0.03                   | 0.05                   | 0.08                          | 0.15                                    | 0.25                          | 0.50  | 0.65  | 1.10  | 1.80  | 2.90  | 6.60  |
| Rid. M/F - Hex. Bushings  | —         | 0.02                   | 0.02                   | 0.04                          | 0.06                                    | 0.14                          | 0.32  | 0.38  | 0.60  | 1.00  | 1.60  | 3.50  |
| 90° Outlet  | 0.05      | 0.05                   | 0.09                   | 0.11                          | 0.16                                    | 0.28                          | 0.41  | 0.45  | 0.79  | 1.36  | 1.97  | 3.22  |
| 45° Outlet for long. radius                                       | —         | 0.23                   | 0.23                   | 0.29                          | 0.34                                    | 0.52                          | 0.86  | 1.20  | 2.38  | —     | —     | —     |
| 45° Outlet for lateral  | —         | 0.23                   | 0.23                   | 0.29                          | 0.34                                    | 0.52                          | 0.86  | 1.20  | 2.38  | —     | —     | —     |
| 3000 LBS<br>TASCA - SOCKET WELDING                                | 1/8       | 1/4                    | 3/8                    | 1/2                           | 3/4                                     | 1                             | 1 1/4 | 1 1/2 | 2     | 2 1/2 | 3     | 4     |
| Gomiti a 90° - 90° Elbows   | 0.08      | 0.09                   | 0.13                   | 0.25                          | 0.32                                    | 0.52                          | 0.86  | 1.12  | 1.80  | 2.60  | 4.80  | 15.00 |
| Gomiti a 45° - 45° Elbows   | 0.07      | 0.08                   | 0.13                   | 0.18                          | 0.30                                    | 0.45                          | 0.75  | 0.90  | 1.30  | 2.20  | 3.70  | 12.00 |
| Tee - Equal Tees  | 0.10      | 0.11                   | 0.16                   | 0.34                          | 0.41                                    | 0.65                          | 0.95  | 1.33  | 2.20  | 3.20  | 5.50  | 18.00 |
| Croci - Crosses   | 0.18      | 0.20                   | 0.25                   | 0.35                          | 0.48                                    | 0.80                          | 1.25  | 1.80  | 2.70  | 4.50  | 7.20  | 19.50 |
| Manicotti - Full Couplings  | 0.05      | 0.05                   | 0.10                   | 0.14                          | 0.20                                    | 0.30                          | 0.45  | 0.60  | 0.95  | 1.55  | 2.10  | 4.00  |
| Mezzi M. - Half Couplings   | 0.05      | 0.06                   | 0.11                   | 0.15                          | 0.21                                    | 0.35                          | 0.50  | 0.65  | 1.10  | 1.80  | 2.50  | 4.90  |
| Tappi femmina - Caps  | 0.03      | 0.06                   | 0.07                   | 0.14                          | 0.16                                    | 0.30                          | 0.45  | 0.55  | 1.00  | 1.50  | 2.65  | 4.50  |
| Bocchettoni - Unions  | —         | 0.20                   | 0.35                   | 0.40                          | 0.45                                    | 1.00                          | 1.30  | 1.70  | 3.00  | 4.57  | 6.50  | 12.80 |
| 90° Outlet  | 0.05      | 0.05                   | 0.09                   | 0.14                          | 0.15                                    | 0.27                          | 0.39  | 0.47  | 0.73  | 1.25  | 1.72  | 3.29  |
| 45° Outlet for long. radius                                       | —         | 0.23                   | 0.23                   | 0.29                          | 0.34                                    | 0.52                          | 0.86  | 1.20  | 2.38  | —     | —     | —     |
| 45° Outlet for lateral  | —         | 0.23                   | 0.23                   | 0.29                          | 0.34                                    | 0.52                          | 0.86  | 1.20  | 2.38  | —     | —     | —     |
| 90° Outlet Butt Welding   | 0.05      | 0.05                   | 0.07                   | 0.09                          | 0.14                                    | 0.21                          | 0.41  | 0.50  | 0.79  | 1.2   | 1.9   | 2.9   |
| 3000 LBS  | 1/4 x 1/8 | 1/2 x 1/8<br>1/2 x 1/4 | 3/4 x 1/4<br>3/4 x 1/2 | 1 x 1/4<br>1 x 1/2<br>1 x 3/4 | 1 1/2 x 1/2<br>1 1/2 x 3/4<br>1 1/2 x 1 | 2 x 3/4<br>2 x 1<br>2 x 1 1/2 |       |       |       |       |       |       |
| MANICOTTI RIDOTTI<br>REDUCING COUPLINGS<br>FILETTATI / THREADED   | 0.05      | 0.14                   | 0.20                   | 0.40                          | 1.00                                    | 1.90                          |       |       |       |       |       |       |
| NIPPLI A BOTTIGLIA<br>SWEDGE NIPPLES SCH. 80                      | —         | 0.08                   | 0.14                   | 0.14                          | 0.53                                    | 1.00                          |       |       |       |       |       |       |
| MANICOTTI RIDOTTI<br>REDUCING COUPLINGS<br>TASCA / SOCKET WELDING | 0.05      | 0.14                   | 0.20                   | 0.30                          | 0.60                                    | 0.95                          |       |       |       |       |       |       |
| NIPPLI DA TUBO<br>SEAMLESS PIPE NIPPLES<br>SCH. 80 - L. 100 mm    | 1/4       | 3/8                    | 1/2                    | 3/4                           | 1                                       | 1 1/4                         | 1 1/2 | 2     |       |       |       |       |
|   | 0.08      | 0.11                   | 0.16                   | 0.22                          | 0.32                                    | 0.45                          | 0.54  | 0.75  |       |       |       |       |

# **BRANCH OUTLETS**

**Product Information**

**Materials Table**

**Consolidation of Run Sizes**

**Dimensions and Weights**

**Burst Test Data**

**Quality System Certificate**



# DERIVAZIONI CON RINFORZO INTEGRALE INTEGRALLY REINFORCED BRANCH CONNECTIONS

## VIAR

### NORME COSTRUTTIVE

Le derivazioni VIAR vengono calcolate seguendo scrupolosamente le Norme che ne regolano la costruzione. Generalmente vengono seguite le A.N.S.I. B 31.1 (3, 4, 8) ma possono essere seguite altre Norme, a richiesta del Cliente.

Il dimensionamento, in generale, è anch'esso in accordo con le normative A.N.S.I. ed in particolare con le B 36.10 e B 36.19 per le dimensioni dei tubi; le B 16.25 per gli smussi per saldatura. Vengono seguite le B 16.11 per l'esecuzione delle tasche da saldare e le B 1.20.1 per le filettature. Anche in questi casi, sono possibili esecuzioni secondo Norme diverse (DIN, AFNOR, ecc.) se richieste dal Cliente.

In base ai vari Codici a cui la fornitura è riferita, potranno essere forniti calcoli e disegni, a richiesta, entro 15 giorni dal ricevimento ordini. Lo stesso per quanto riguarda i certificati dei materiali, che seguono, in linea di massima, le ASTM.

### DESIGN CODES

VIAR branch connections are designed fully in accordance with related Codes. Usually, ANSI B. 31 (3, 4, 8) are followed but on Customer's request, other Codes/Standards can be observed. Dimensions and finish are also meeting ANSI Std. B 36.10 and 19, for pipes, and B 16.25 for butt-welds. Socket dimensions and threads are in accordance with ANSI B 16.11 and B 1.20.1 respectively. Dimensions per DIN, AFNOR, etc. can be followed on special request.

For each Std./Code, verifications data and drawings can be available within 15 days from order reception as well as material certificates, generally to ASTM specs., provided a proper request is made, preferably on the enquiry stage.

### GAMMA DI PRODUZIONE

### PRODUCTION RANGE

VIAR  
WELD



... con estremità di uscita a saldare di testa. Generalmente secondo ANSI B 16.25, possono essere fornite con esecuzioni diverse.

... with butt-welding outlet end. Generally in accordance with ANSI B 16.25, other Std./Specs. can be followed.

VIAR  
SOCK



... con estremità di uscita a tasca da saldare. Generalmente secondo ANSI B 16.11, possono essere fornite con esecuzioni diverse.

... with socket weld outlet end. Generally in accordance with ANSI B 16.11, other Std./Codes can be followed.

VIAR  
THRED



... con estremità di uscita filettata secondo ANSI B 1.20.1. Anche questo tipo di filettatura, a richiesta, può essere eseguito in conformità a norme diverse.

... with threaded outlet end. Generally in accordance with ANSI B 1.20.1, on request, other threading Specs. can be followed.

VIAR  
LAT



... È una derivazione da saldare a 45° su collettore diritto. Può essere fornita con estremità di uscita a saldare di testa, a tasca o filettata, secondo le Norme e le varianti dei particolari sopra descritti.

It is a branch to be welded on run/header at an angle of 45°. Available with outlet end B.W., socket or threaded in accordance with Std./Codes above mentioned.

VIAR  
EL



... È una derivazione che va montata su curve a 90°, con il suo asse in corrispondenza dell'asse di uscita della curva. Generalmente è predisposta per il montaggio su curve a largo raggio. Anche questo tipo prevede l'esecuzione dell'estremità di uscita B.W., a tasca o filettata.

It is a branch to be welded on a 90° Elbow (long radius). Available with outlet end B.W., socket or threaded as described for VIAR-LAT.

VIAR  
NIP



... È in pratica un VIAR-WELD con una estensione integrale. Questa esecuzione, oltre che comportare il risparmio di un nipplo e di una saldatura, conferisce al pezzo una resistenza alle sollecitazioni meccaniche, specie se cicliche, di gran lunga superiore all'esecuzione tradizionale.

It is practically a VIAR-WELD, carrying an extension on outlet side. This extension is integral and allows to save a pipe nipple and a weld. The fitting shape gives to branch connection the possibility to withstand higher mechanical stresses, especially when cyclic, than a traditional branch connection.

**INFORMAZIONI TECNICHE**

Le derivazioni con rinforzo integrale VIAR vengono usate in tutti quei casi in cui è necessario compensare la resistenza del tubo (o serbatoio) che è stata ridotta per effetto del foro praticato sullo stesso al fine di ottenere la derivazione.

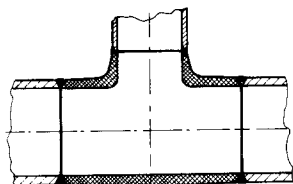
Diversi sono i sistemi adottati a tale scopo e qui sotto in parte illustrati. C'è il pezzo a "T" (1) che risulta la soluzione migliore, in assoluto, ma non è sempre di facile reperibilità e comunque di costo elevatissimo. C'è il tradizionale rinforzo a mezzo piatto sagomato (2) e l'uso della sella (3).

Questi due sistemi risultano più economici del pezzo a "T" ma non presentano i vantaggi che possono riscontrarsi in un VIAR-WELD (4).

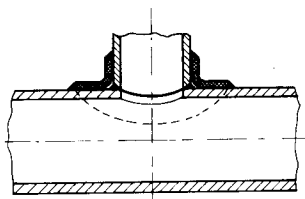
**TECHNICAL INFORMATIONS**

VIAR integrally reinforced branch connections are to be used where it is necessary to provide for a strength compensation, due to a hole made on pipe or header to obtain a branch. Many systems can be used to compensate the above mentioned strength reduction and shown here below. Fig. 1 represents a "T" fitting. This solution is absolutely the best, but its availability (sizes, thickness, material, etc.) is not so easy and its cost is quite high. Fig. 2 shows the traditional "pad" reinforcement, while Fig. 3 represents a "Saddle". These last two fittings result more economical than "T" but they don't show the technical advantages of a VIAR-WELD (Fig. 4).

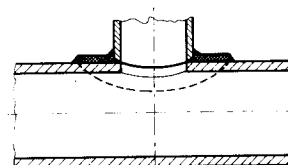
**COMPARAZIONE E VANTAGGI**



1) "T" a saldare  
Welding tee



2) Piatto di rinforzo  
Reinforcing pad

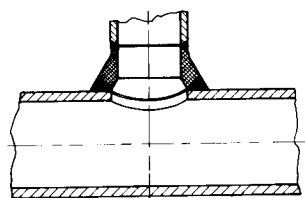


3) Sella di rinforzo  
Welding saddle

**COMPARISON AND ADVANTAGES**

Con l'uso dei VIAR-WELD:

- Si possono ottenere risparmi economici che arrivano all'85 ÷ 90% nei confronti del pezzo a "T", specie nel caso di grosse riduzioni.
- Si garantiscono le reintegrazioni dei rinforzi richiesti, al 100%.
- La transizione graduale degli spessori tra collettore e derivazione crea una buona distribuzione delle sollecitazioni e ciò garantisce una resistenza a fatica illimitata.
- facile da installare, garantisce un flusso di fluido pieno e regolare.

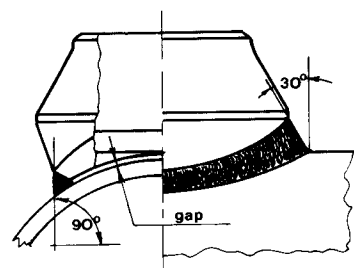


4) Raccordo con rinforzo integrale  
Integrally reinforced branch

Using a VIAR-WELD you can obtain:

- A reduction in cost installation up to 85 ÷ 90% if compared to a traditional "T", especially when high sizes reduction is involved.
- An 100% of area replacement as required by related Codes.
- A good stress distribution due to the gradual thickness transition from header to branch. This also improves the joint fatigue strength
- An easy installation and a good flow factor.

**SUGGERIMENTI PER L'INSTALLAZIONE**

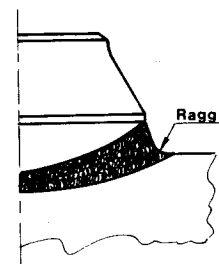


- 1) È opportuno provvedere al taglio del collettore dopo aver presentato sul posto il raccordo ed eseguita la tracciatura, seguendo il contorno interno.
- 2) Puntare il pezzo nei due lati trasversali e longitudinali ed eseguire i controlli dimensionali.

3) Provvedere alla saldatura con la prima passata di penetrazione. Proseguire quindi la saldatura normale, concentrando le passate nella zona longitudinale, che richiede maggior quantità di saldatura. Distribuire il numero delle passate al fine di poter eseguire le passate finali circonferenzialmente. L'ammontare della saldatura è determinato dagli smussi, ben marcati sul pezzo e dalle indicazioni delle figure qui a lato. Mantenendo una inclinazione della saldatura di circa 30° si garantisce il rimpiazzo dell'area di rinforzo, di cui la saldatura ne fa parte. Si può comunque tenere un angolo leggermente inferiore, purchè si provveda ad eseguire una discreta raggatura verso il collettore.

**INSTALLATION SUGGESTIONS**

- 1) Put the fitting on header, in the exact location and provide for marking the inside contour. Cut by torch and round off the hole inside edges.
- 2) Tack weld the fitting in longitudinal and transverse sides and check all dimensions.
- 3) Provide for the first penetration weld. Afterwards, normal welding can be done, taking into account the crotch section. This area requires more weld amount, so that welding passes will be distributed accordingly in order to perform the final cover pass, all around the fitting. The weld amount is positively designated by the welding bevels on fitting and as indicated in figures on side. Reinforcement area, for which the weld is part, is guaranteed by keeping the weld, at the crotch section, approximately at 30°. Lower angles can be maintained, provided a good weld radius is made.



**DISTANZA DI PENETRAZIONE**

Si avrà la vertenza, al momento della puntatura, di tenere il raccordo staccato dal collettore, di quel tanto necessario per poter effettuare la piena penetrazione.

La tabella qui sotto dà i valori suggeriti per tale distanza.

**ROOT "GAP"**

When the fitting is tack welded a certain distance from the header must be respected, to allow the first penetration weld. The chart below gives the suggested values.

| Derivaz. / Outlet size | 1/8 - 2     | 2 1/2 - 3 1/2 | 4 - 6       | 8 - 16       | 18 - 24      |
|------------------------|-------------|---------------|-------------|--------------|--------------|
| Root gap               | 1.6 - 1/16" | 2.38 - 3/32"  | 3.17 - 1/8" | 3.99 - 5/32" | 4.76 - 3/16" |

## COME ORDINARE UNA DERIVAZIONE VIAR

Al fine di ottenere il prodotto più valido ed evitare nello stesso tempo inutili aggravii economici, si consiglia:

- Precisare il tipo (VIAR-WELD, VIAR-SOCK, ecc.)
- Precisare i diametri della derivazione e del collettore.
- Qualora la derivazione entra nella gamma di quelle descritte nelle tabelle di pag. 6 a 12, è sufficiente indicare come descritto nella corrispondente tabella.
- Se gli spessori sia della derivazione che del collettore sono diversi (es. sched. 40, 80, 120 ecc.), vanno fatte le precisazioni in tal senso o vanno indicati i valori degli spessori.
- Il materiale va indicato, possibilmente secondo specifica ASTM.
- Se richiesto il calcolo di verifica, precisare il Codice da seguire e indicare, oltre che la pressione e la temperatura, anche le tolleranze di lavorazione ed il sovrametallo di corrosione ed eventuale fattori di progetto o simili, previsti dal Codice in questione.

## HOW TO ORDER A VIAR BRANCH CONNECTION

To obtain a proper fitting and to avoid undue economical charges, VIAR suggests:

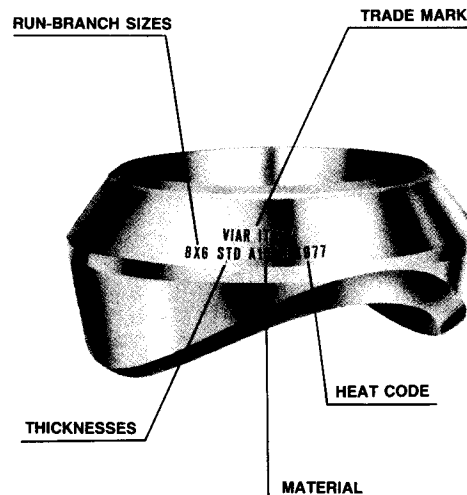
- Specify VIAR type (VIAR-WELD, VIAR-SOCK, etc.).
- Specify both run and outlet sizes.
- If the fitting is included in the range listed it is sufficient to specify thickness class
- If thicknesses are different (i.e. sched. 40, 80, etc.) both for run or branch, these must be clearly indicated.
- Specify the material (preferably to ASTM Specs).
- If calculation is required, specify the design Code and other data useful for verification as: pressure, temperature, mill tolerance, corrosion allowance and design limitation factors, if any.

## MARCATURA E IDENTIFICAZIONE

Ogni pezzo VIAR è contraddistinto dalla relativa marcatura, in accordo con le MSS-SP 25. A queste marcature possono venir aggiunte quelle indicate dal Cliente.

Le marcature sono eseguite in zona distante dalle saldature, cosicché l'identificazione del pezzo è possibile anche dopo che lo stesso è saldato in linea. Generalmente eseguite con punzoni normali, vengono usati punzoni arrotondati nei materiali in cui l'incisione del punzone potrebbe creare inizio di rottura.

Altri sistemi di marcatura possono venir adottati in casi particolari, su specifica richiesta.



## MARKING AND IDENTIFICATION

Each VIAR fitting is marked according to MSS. SP 25 Std. Further marking can be added upon Customer request.

Marking are located far from welding areas, so that fitting data are still identifiable once the same is welded on line. Marking is usually obtained by normal punches. Low stress/dotted line punches are used on materials susceptible to cracks due to sharp edges of normal punches.

Other marking criteria can be performed upon Customer request.

## CONTROLLO QUALITÀ

I prodotti VIAR sono garantiti sotto tutti gli aspetti.

Esiste un sistematico controllo delle materie prime, acquistate sempre presso Fornitori qualificati, controllo che comprova le caratteristiche fisico-chimiche del materiale.

In seguito all'accettazione, viene stabilito il codice di colata che sarà impresso indelebilmente sul pezzo e servirà alla sua rintracciabilità.

I controlli in processo e finale, garantiscono il rispetto delle dimensioni e comprendono i controlli inerenti al trattamento termico, alle durezza, ai controlli visivi ed NDE, quando richiesti.

Quando richiesto, il pezzo viene verificato secondo i Codici citati ed il suo dimensionamento garantito per le particolari condizioni di esercizio previste.

Quanto sopra, nel rispetto del Manuale di C.Q. e delle relative procedure.

## QUALITY CONTROL

VIAR products are guaranteed under all respect.

A systematic check of raw material, coming only from qualified Suppliers, assures the physical and mechanical characteristics in conformance with the related specifications.

When the material is accepted, an Heat Code is assigned (or the Heat N° itself) and this will follow the piece, permanently.

In process and final inspections are not limited to visual and dimensional checks, but include all other checks, specifically requested as: heat treatment, hardness, NDE, etc.

When requested, the fitting construction is verified in accordance with specified Codes and resulting dimensions makes the joint positively suitable for the foreseen service conditions.

The above listed meets VIAR Q.C. Manual and Procedures requirements.

**MATERIALI**

La tabella qui sotto riporta un elenco di materiali che risultano di impiego più o meno corrente. Sono tutti riferiti alle specifiche ASTM, anche se, a richiesta, possono venir usati materiali riferiti a specifiche diverse.

**MATERIALS**

Chart below shows the types of material commonly used. Reference is made to ASTM Specifications but, on request, materials referred to different specifications can be used.

| MATERIALE<br>MATERIAL                                    | ASTM<br>Grado/Marca | COMPOSIZIONE CHIMICA<br>CHEM. COMPOSITION |           |          |          |           |                     |                    |                    |       | CARATT. MECCANICHE<br>MECH. PROPERTIES   |   |                                  |                                      |                           |
|--|---------------------|---|-----------|----------|----------|-----------|---------------------|--------------------|--------------------|-------|--|---|----------------------------------|--------------------------------------|---------------------------|
|  |                     | C<br>max                                  | Mn<br>max | P<br>max | S<br>max | Si<br>max | Ni                  | Cr                 | Mo                 | Altri | ROTT.<br>TENSILE<br>K.s.i.<br>MPa<br>min | SNERV.<br>YELD.<br>K.s.i.<br>MPa<br>min | ALLUNG.<br>ELONG.<br>2''%<br>min | STRIZ.<br>RED OF<br>AREA<br>%<br>min | DUREZZA<br>HARDNESS<br>HB |
| Acc. al Carb.<br>Carbon Stl.                             | A105                | .35                                       | .60/1.05  | .040     | .050     | .35       | .040 <sup>(1)</sup> | .30 <sup>(1)</sup> | .12 <sup>(1)</sup> | (1)   | 70<br>485                                | 36<br>250                               | 22                               | 30                                   | 137/187                   |
| Acc. Legati<br>Alloy steels                              | A182-F1             | .28                                       | .60/90    | .045     | .045     | .15/.35   | —                   | —                  | .44/.65            | —     | 70<br>485                                | 40<br>275                               | 25                               | 35                                   | 143/192                   |
|  | A182-F5a            | .25                                       | .60       | .040     | .030     | .50       | .50                 | 4.0/6.0            | .44/.65            | —     | 90<br>620                                | 65<br>450                               | 22                               | 50                                   | 143/217                   |
|  | A182-F9             | .15                                       | .30/.60   | .030     | .030     | .50/1.0   | —                   | 8.0/10.0           | .90/1.10           | —     | 85<br>590                                | 55<br>380                               | 20                               | 40                                   | 179/217                   |
|  | A182-F11            | .10/.20                                   | .30/.80   | .040     | .040     | .50/1.0   | —                   | 1.0/1.5            | .44/.65            | —     | 70<br>485                                | 40<br>275                               | 20                               | 30                                   | 143/207                   |
|  | A182-F22            | .15                                       | .30/.60   | .040     | .040     | .50       | —                   | 2.0/2.5            | .87/1.13           | —     | 75<br>515                                | 45<br>310                               | 20                               | 30                                   | 156/207                   |
| Acc. inox<br>Austenitic<br>S.S.                          | A182-F304           | .08                                       | 2.00      | .040     | .030     | 1.00      | 8.0/11.0            | 18.0/20.0          | —                  | —     | 75<br>520                                | 30<br>205                               | 30                               | 50                                   | —                         |
|  | A182-F304L          | .035                                      | 2.00      | .040     | .030     | 1.00      | 8.0/11.0            | 18.0/20.0          | —                  | —     | 70<br>485                                | 25<br>175                               | 30                               | 50                                   | —                         |
|  | A182-F316           | .08                                       | 2.00      | .040     | .030     | 1.00      | 10.0/14.0           | 16.0/18.0          | 2.0/3.0            | —     | 75<br>515                                | 30<br>205                               | 30                               | 50                                   | —                         |
|  | A182-F316L          | .035                                      | 2.00      | .040     | .030     | 1.00      | 10.0/15.0           | 16.0/18.0          | 2.0/3.0            | —     | 70<br>485                                | 25<br>175                               | 30                               | 50                                   | —                         |
|  | A182-F321           | .08                                       | 2.00      | .040     | .030     | 1.00      | 9.0/12.0            | 17.0 min           | —                  | (2)   | 75<br>515                                | 30<br>205                               | 30                               | 50                                   | —                         |
| Acc. per<br>bassa temp.<br>Low temp.<br>c.s.             | A350-LF2            | .30                                       | 1.35      | .035     | .04      | .15/.30   | —                   | —                  | —                  | —     | 70<br>485                                | 36<br>250                               | 22                               | 30                                   | (3)                       |
|  | A350-LF3            | .20                                       | .90       | .035     | .04      | .20/.35   | 3.25/3.75           | —                  | —                  | —     | 70<br>485                                | 37.5<br>260                             | 22                               | 35                                   | (4)                       |
| Acc. per<br>serv. alte<br>press.<br>H. pressures<br>c.s. | A694-F52            | .26                                       | 1.40      | .04      | .05      | .15/.35   | —                   | —                  | —                  | —     | 66<br>455                                | 52<br>360                               | 20                               | —                                    | —                         |
|  | A694-F56            | .26                                       | 1.40      | .04      | .05      | .15/.35   | —                   | —                  | —                  | —     | 68<br>470                                | 56<br>385                               | 20                               | —                                    | —                         |
|  | A694-F60            | .26                                       | 1.40      | .04      | .05      | .15/.35   | —                   | —                  | —                  | —     | 75<br>515                                | 60<br>415                               | 20                               | —                                    | —                         |
|  | A694-F65            | .26                                       | 1.40      | .04      | .05      | .15/.35   | —                   | —                  | —                  | —     | 77<br>530                                | 65<br>450                               | 20                               | —                                    | —                         |
| Monel 400  | B164<br>UNS-NO4400  | .3  | 2.0       | .024     | .024     | .50       | 63.0                | —                  | —                  | (5)   | 70<br>480                                | 25<br>170                               | 35                               | —                                    | 110/149<br>(a)            |
| Monel K500   | SAE-AMS<br>4676     | .25                                       | 1.5       | —        | .01      | 1.0       | 63.0                | —                  | —                  | (6)   | 90<br>620                                | 40<br>275                               | 25                               | —                                    | 140/185<br>(a)            |
| Inconel 600  | B166<br>UNS-NO6600  | .15                                       | 1.0       | —        | .015     | .50       | 72.0                | 14.0/17.0          | —                  | (7)   | 80<br>550                                | 35<br>240                               | 30                               | —                                    | 115/175<br>(a)            |
| Incoloy 800  | B408<br>UNS-NO8800  | .1  | 1.5       | —        | .015     | 1.0       | 30.0/35.0           | 19.0/23.0          | —                  | (8)   | 75<br>515                                | 30<br>205                               | 30                               | —                                    | 117/188<br>(a)            |
| Incoloy 825  | B425<br>UNS-NO8825  | .05                                       | 1.0       | —        | .03      | .5        | 38.0/46.0           | 19.5/23.5          | 2.5/3.5            | (9)   | 100<br>690                               | 47<br>324                               | 45                               | —                                    | (a)                       |
| Hastelloy<br>C 276                                       | B574<br>UNS-N10276  | 0.1                                       | 1.0       | .04      | .03      | .08       | resto               | 14.5/16.5          | 15.0/17.0          | (10)  | 100<br>690                               | 41<br>283                               | 40                               | —                                    | (a)                       |
| Cu-Ni 90-10  | (B-402)             | .05                                       | 1.0       | .02      | .02      | —         | 9.0/11.0            | —                  | —                  | (11)  | 40<br>275                                | 15<br>105                               | 30                               | —                                    | —                         |

- 1) Elementi ammessi nella percentuale indicata assieme a: Cu ≤ 0.40, Va ≤ 0.03, Nb ≥ 0.02  
Allowed elements as maximum value together with Cu ≤ 0.40, Va ≤ 0.03, Ng ≤ 0.02
- 2) Contenuto di Titanio ≥ 5 volte il C. ma non superiore a 0.70%  
Titanium content ≥ 5 times the C. but not more than 0.70%
- 3) Resilienza a -50 °F (-45.6 °C) su provetta a "V", media di 3 provette 20 J (min 1 prov. 16 J)  
Impact value at minus 50 °F on 10x10, "V" notch specimen, average 20 J (min 1 spec. 16 J)
- 4) Resilienza a -150 °F (-101.1 °C) su provetta a "V", media di 3 provette 20 J (min 1 prov. 16 J)  
Impact value at minus 150 °F on 10x10, "V" notch specimen, average 20 J (min 1 spec. 16 J)
- 5) In più (moreover) Fe ≤ 2.5% - Cu = 28.0 ÷ 34.0%
- 6) In più (moreover) Fe ≤ 2.0% - Cu = 28.0 ÷ 34.0% - AL = 2.0 ÷ 4.0% - Ti = 0.25 ÷ 1.0%

- 7) In più (moreover) Cu ≤ 0.5% - Fe = 6.0 ÷ 10.0% - Nella percentuale di Ni è incluso il Co (Ni includes Co)
  - 8) In più (moreover) Cu ≤ 0.75% - AL = 0.15 ÷ 0.60% - Ti = 0.15 ÷ 0.60 - Fe ≥ 39.5
  - 9) In più (moreover) Fe min = 22.0% - Cu = 1.5 ÷ 3.0% - Ti = 0.6 ÷ 1.2% - AL ≤ 0.2
  - 10) In più (moreover) Co ≤ 2.5% - W = 3.0 ÷ 4.5 - Fe = 4.0 ÷ 7.0 - V ≤ 0.35
  - 11) In più (moreover) Cu = resto - Fe = 1.0 ÷ 1.8 - Zn ≤ 0.50 - Pb ≤ 0.02
- (a) Caratteristiche meccaniche corrispondenti al materiale ricotto  
Mechanical properties referred to material in annealed conditions.

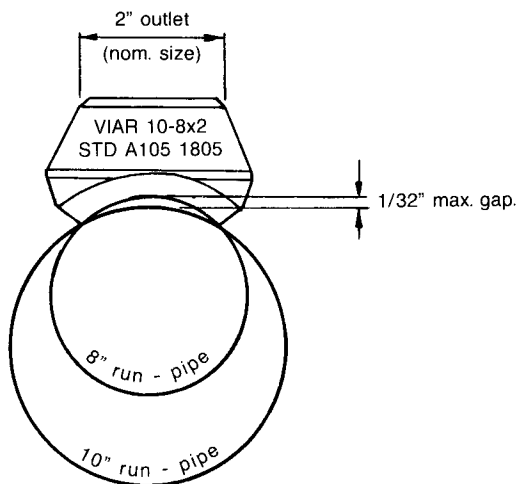
# UNIFICAZIONE DIAMETRI COLLETTORI

## RUN SIZES CONSOLIDATION

La VIAR ha unificato le raggiature delle sue derivazioni per poterle usare su diversi diametri di collettore, pur garantendo un gioco massimo di 0,8 mm. sull'uniformità della distanza di penetrazione. Ciò al fine di non rendere necessarie modifiche alle normali procedure di saldatura. Detta unificazione contribuisce in modo positivo alla riduzione dello stock di magazzino.

Ogni derivazione porta la marcatura, oltre che del suo diametro, anche quella dei collettori, come da tabella.

- Per collettori superiori ai 36" va usato il tipo piano.
- Per diametri nominali superiori ai 4" va eseguita, in linea di massima, una raggiatura per ogni diametro di collettore.



VIAR provided to unify outlets radius in order to allow the use of same fitting on different run pipe sizes.

The above, keeping into account a max. gap of 0.8 mm, with respect to the uniformity of normal root gap, to avoid undue changes of welding procedures. Besides this, a positive warehouse stock reduction is obtained.

Each fitting is marked with its nominal size and the range of run sizes on which it can be welded.

- For run sizes over 36", the flat type is used.
- For outlet sizes over 4", usually a specific radius is required for each run size.

| STANDARD WEIGHT & EXTRA STRONG VIAR WELD - 3000 lbs - VIAR-THRED e SOCK |             |             |             |             |             |         |         |         |       |       |       |       |       |
|---|-------------|-------------|-------------|-------------|-------------|---------|---------|---------|-------|-------|-------|-------|-------|
| Outlet size   |             |             |             |             |             |         |         |         |       |       |       |       |       |
|   | 1/8         | 1/4         | 3/8         | 1/2         | 3/4         | 1       | 1 1/4   | 1 1/2   | 2     | 2 1/2 | 3     | 3 1/2 | 4     |
| Run sizes   | 3/8         | 3/8         | 1/2         | 1/2         | 3/4         | 1       | 1 1/4   | 1 1/2   | 2     | 2 1/2 | 3     | 3 1/2 | 4     |
|   | 1/2         | 1/2         | 1-3/4       | 3/4         | 1           | 1 1/4   | 1 1/2   | 2       | 2 1/2 | 3     | 3 1/2 | 4     | 5     |
|   | 1-3/4       | 1-3/4       | 2 1/2-1 1/4 | 1           | 1 1/2-1 1/4 | 1 1/2   | 2       | 2 1/2   | 3     | 3 1/2 | 4     | 5     | 6     |
|   | 2 1/2-1 1/4 | 2 1/2-1 1/4 | 36-3        | 1 1/2-1 1/4 | 2 1/2-2     | 2       | 2 1/2   | 3       | 4     | 4     | 5     | 6     | 8     |
|   | 36-3        | 36-3        | —           | 2 1/2-2     | 5-3         | 2 1/2   | 3 1/2-3 | 4-3 1/2 | 5     | 5     | 6     | 8     | 10    |
|   | —           | —           | —           | 8-3         | 12-6        | 3 1/2-3 | 5-4     | 6-5     | 6     | 6     | 8     | 10    | 14-12 |
|   | —           | —           | —           | 36-10       | 36-14       | 5-4     | 8-6     | 12-8    | 10-8  | 8     | 10    | 14-12 | 20-16 |
|   | —           | —           | —           | —           | —           | 10-6    | 18-10   | 24-14   | 18-12 | 12-10 | 14-12 | 20-16 | 36-24 |
|   | —           | —           | —           | —           | —           | 36-12   | 36-20   | 36-26   | 36-20 | 18-14 | 20-16 | 36-24 | —     |
| —   | —           | —           | —           | —           | —           | —       | —       | —       | 36-20 | 36-24 | —     | —     |       |

| SCH. 160 & DOUBLE EXTRA STRONG - VIAR WELD |           |         |         |             |         |         | 6000 lbs VIAR THRED & SOCK |             |             |         |         |       |
|--|-----------|---------|---------|-------------|---------|---------|----------------------------|-------------|-------------|---------|---------|-------|
| Outlet size                                |           |         |         |             |         |         | Outlet size                |             |             |         |         |       |
|  | 1/2       | 3/4     | 1       | 1 1/4       | 1 1/2   | 2       | 1/2                        | 3/4         | 1           | 1 1/4   | 1 1/2   | 2     |
| Run sizes                                  | 1/2       | 1-3/4   | 1       | 1 1/2-1 1/4 | 1 1/2   | 2       | 1-3/4                      | 1           | 1 1/2-1 1/4 | 1 1/2   | 2       | 2 1/2 |
|  | 1 1/4-3/4 | 2-1 1/4 | 2-1 1/4 | 2 1/2-2     | 2 1/2-2 | 2 1/2   | 2-1 1/4                    | 2 1/2-1 1/4 | 2 1/2-2     | 2 1/2-2 | 2 1/2   | 3     |
|  | 36-1 1/2  | 6-2 1/2 | 10-3    | 10-3        | 3 1/2-3 | 3 1/2-3 | 6-2 1/2                    | 10-3        | 10-3        | 3 1/2-3 | 3 1/2-3 | 4     |
|  | —         | 36-8    | 36-12   | 36-12       | 8-4     | 5-4     | 36-8                       | 36-12       | 36-12       | 8-4     | 5-4     | 5     |
|  | —         | —       | —       | —           | 20-10   | 8-6     | —                          | —           | —           | 20-10   | 8-6     | 6     |
|  | —         | —       | —       | —           | 36-24   | 18-10   | —                          | —           | —           | 36-24   | 18-10   | 10-8  |
|  | —         | —       | —       | —           | —       | 36-20   | —                          | —           | —           | —       | 36-20   | 20-12 |
| —  | —         | —       | —       | —           | —       | —       | —                          | —           | —           | —       | 36-24   |       |

| STANDARD - EXTRA STRONG - 3000 lbs - VIAR NIP |         |         |         |         |         | SCH 160 - DOUBLE EXTRA STRONG - 6000 lbs - VIAR NIP |          |         |       |       |
|---|---------|---------|---------|---------|---------|---|----------|---------|-------|-------|
| Outlet size                                   |         |         |         |         |         | Outlet size   |          |         |       |       |
|   | 1/2     | 3/4     | 1       | 1 1/2   | 2       | 1/2   | 3/4      | 1       | 1 1/2 | 2     |
| Run sizes                                     | 6-1 1/2 | 3-1 1/2 | 1 1/2   | 2       | 3       | 36-1 1/2  | 36-1 1/2 | 4-1 1/2 | 4-2   | 4-3   |
|   | 36-8    | 36-4    | 2 1/2-2 | 3 1/2-3 | 4-3 1/2 | —   | —        | 36-6    | 36-6  | 8-5   |
|   | —       | —       | 5-3     | 5-4     | 6-5     | —   | —        | —       | —     | 36-10 |
|   | —       | —       | 36-6    | 12-6    | 12-8    | —   | —        | —       | —     | —     |
|   | —       | —       | —       | 36-14   | 36-14   | —   | —        | —       | —     | —     |

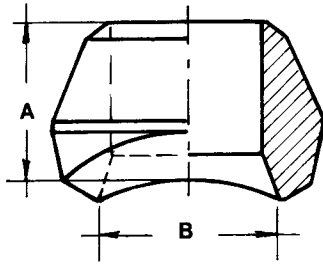
| STD. WT - X.STRONG - 3000 lbs - VIAR EL |            |           |      | SCH 160 - XX.STRONG - 6000 lbs - VIAR EL |             |       |
|---|------------|-----------|------|--|-------------|-------|
| Outlet size                             |            |           |      | Outlet size                              |             |       |
|   | 1/4 ÷ 3/4  | 1 ÷ 1 1/2 | 2    | 1/4 ÷ 1/2                                | 3/4 ÷ 1 1/4 | 1 1/2 |
| Run sizes                               | 36 ÷ 1 1/4 | 36-2      | 36-3 | 36-1 1/4                                 | 36-2        | 36-3  |

| STD. WT - X.STRONG - 3000 lbs - VIAR LAT |             |             |           |       | SCH 160 - XXS - 6000 lbs - VIAR LAT |             |             |       |
|--|-------------|-------------|-----------|-------|-------------------------------------|-------------|-------------|-------|
| Outlet size                              |             |             |           |       | Outlet size                         |             |             |       |
|  | 1/4 ÷ 1/2   | 3/4         | 1 ÷ 1 1/2 | 2     | 1/4 ÷ 3/8                           | 1/2         | 3/4 ÷ 1 1/4 | 1 1/2 |
| Run sizes                                | 2 1/2-1 1/4 | 1 1/2-1 1/4 | 2 1/2-2   | 5-4   | 2 1/2-1 1/4                         | 1 1/2-1 1/4 | 2 1/2-2     | 5-4   |
|  | 12-3        | 5-2         | 5-3       | 8-6   | 12-3                                | 5-2         | 5-3         | 8-6   |
|  | —           | 12-6        | 12-6      | 12-10 | —                                   | 12-6        | 12-6        | 12-10 |

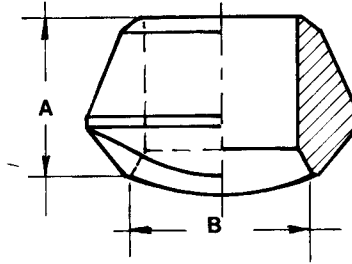
# VIAR-WELD STANDARD WEIGHT

DERIVAZIONE RIDOTTA

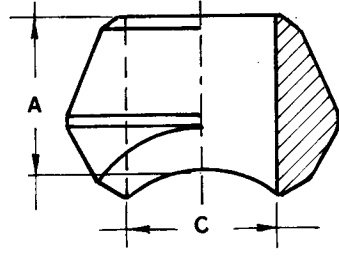


REDUCING SIZE

DERIVAZIONE UGUALE



FULL SIZE



| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |                  |          |                      | FULL SIZE |         |                      |
|------------------------|---------------|---------|------------------|----------|----------------------|-----------|---------|----------------------|
|                        | A             |         | B <sup>(1)</sup> |          | PESO<br>WEIGHT<br>Kg | C         |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm               | inch     |                      | mm        | inch    |                      |
| 1/8                    | 16            | 5/8     | 16               | 5/8      | 0.04                 | —         | —       | —                    |
| 1/4                    | 16            | 5/8     | 16               | 5/8      | 0.04                 | —         | —       | —                    |
| 3/8                    | 19            | 3/4     | 19               | 3/4      | 0.07                 | —         | —       | —                    |
| 1/2                    | 19            | 3/4     | 24               | 15/16    | 0.08                 | 16        | 5/8     | 0.07                 |
| 3/4                    | 22            | 7/8     | 30               | 13/16    | 0.12                 | 20.5      | 13/16   | 0.12                 |
| 1                      | 27            | 11/16   | 36.5             | 17/16    | 0.22                 | 26        | 11/32   | 0.18                 |
| 1 1/4                  | 32            | 1 1/4   | 44.5             | 1 3/4    | 0.36                 | 35        | 1 3/8   | 0.32                 |
| 1 1/2                  | 33.5          | 15/16   | 51               | 2        | 0.45                 | 41        | 1 5/8   | 0.36                 |
| 2                      | 38            | 1 1/2   | 65               | 29/16    | 0.80                 | 52.5      | 2 1/16  | 0.70                 |
| 2 1/2                  | 41.5          | 1 5/8   | 76               | 3        | 1.15                 | 62        | 2 7/16  | 1.10                 |
| 3                      | 44.5          | 1 3/4   | 93.5             | 3 1/16   | 1.80                 | 78        | 3 1/16  | 1.70                 |
| 3 1/2                  | 47.5          | 1 7/8   | 101.5            | 4        | 2.50                 | 90.5      | 3 9/16  | 2.25                 |
| 4                      | 51            | 2       | 120.5            | 4 3/4    | 2.90                 | 101.5     | 4       | 3.05                 |
| 5                      | 57            | 2 1/4   | 141              | 5 9/16   | 4.60                 | 128.5     | 5 1/16  | 4.85                 |
| 6                      | 60.5          | 2 3/8   | 170              | 6 1/16   | 7.0                  | 154       | 6 1/16  | 7.50                 |
| 8                      | 70            | 2 3/4   | 220.5            | 8 1/16   | 12.0                 | 201.5     | 7 15/16 | 12.7                 |
| 10                     | 78            | 3 1/16  | 274.5            | 10 13/16 | 19.5                 | 254       | 10      | 20.0                 |
| 12                     | 85.5          | 3 3/8   | 325.5            | 12 13/16 | 26.7                 | 304.5     | 12      | 29.4                 |
| 14                     | 89            | 3 1/2   | 357              | 14 1/16  | 29.9                 | 336.5     | 13 1/4  | 31.8                 |
| 16                     | 93.5          | 3 11/16 | 408              | 16 1/16  | 34.0                 | 387.5     | 15 1/4  | 41.7                 |
| 18                     | 101.5         | 4       | 459              | 18 1/16  | 44.0                 | 438       | 17 1/4  | 56.7                 |
| 20                     | 114.5         | 4 1/2   | 510              | 20 1/16  | 53.5                 | 489       | 19 1/4  | 79.3                 |
| 24                     | 124           | 4 7/8   | 611              | 24 1/16  | 99.7                 | 590.5     | 23 1/4  | 127                  |

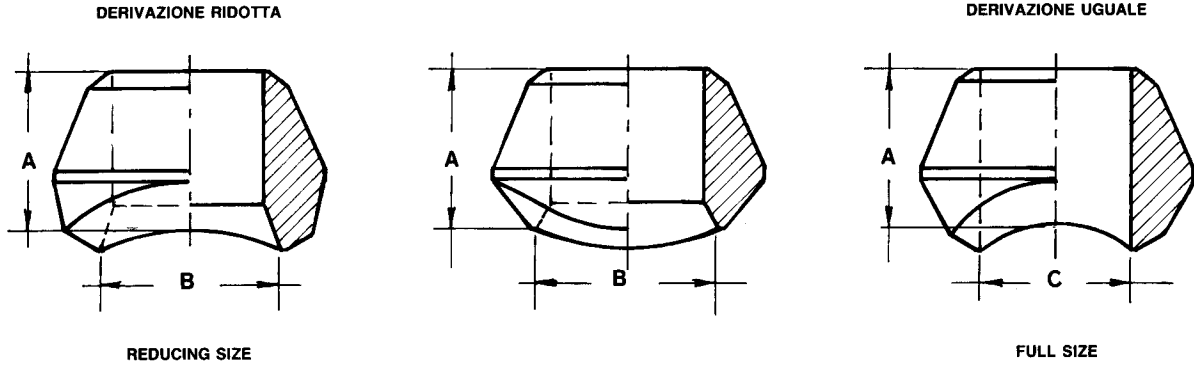
1) Stessa dimensione per derivazioni ridotte e uguali.

— Fino a 10", incluso, i pezzi sono uguali per Std. WT e Sch. 40 - Per 12" e oltre lo sch. 40 prevede spessori superiori. - Pezzi disponibili a richiesta.

1) Same dimension for reducing and full size.

— Up to and including 10" - dimensions are the same for St. WT and Sch 40 out-lets. For 12" and over, sch. 40 requires thicker walls. Fitting available, on request.

# VIAR-WELD EXTRA STRONG



| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |                  |          |                      | FULL SIZE |         |                      |
|------------------------|---------------|---------|------------------|----------|----------------------|-----------|---------|----------------------|
|                        | A             |         | B <sup>(1)</sup> |          | PESO<br>WEIGHT<br>Kg | C         |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm               | inch     |                      | mm        | inch    |                      |
| 1/8                    | 16            | 5/8     | 16               | 5/8      | 0.04                 | —         | —       | —                    |
| 1/4                    | 16            | 5/8     | 16               | 5/8      | 0.04                 | —         | —       | —                    |
| 3/8                    | 19            | 3/4     | 19               | 3/4      | 0.07                 | —         | —       | —                    |
| 1/2                    | 19            | 3/4     | 24               | 15/16    | 0.09                 | 14        | 9/16    | 0.07                 |
| 3/4                    | 22            | 7/8     | 30               | 1.3/16   | 0.14                 | 19        | 3/4     | 0.12                 |
| 1                      | 27            | 11/16   | 36.5             | 1.7/16   | 0.21                 | 24        | 15/16   | 0.18                 |
| 1 1/4                  | 32            | 1 1/4   | 44.5             | 1.3/4    | 0.40                 | 32        | 1 1/4   | 0.32                 |
| 1 1/2                  | 33.5          | 15/16   | 51               | 2        | 0.50                 | 38        | 1 1/2   | 0.40                 |
| 2                      | 38            | 1 1/2   | 65               | 29/16    | 0.79                 | 49        | 1 15/16 | 0.72                 |
| 2 1/2                  | 41.5          | 15/8    | 76               | 3        | 1.18                 | 59        | 25/16   | 1.13                 |
| 3                      | 44.5          | 13/4    | 93.5             | 3 11/16  | 1.85                 | 73.5      | 27/8    | 1.85                 |
| 3 1/2                  | 47.5          | 17/8    | 101.5            | 4        | 2.54                 | 85        | 35/16   | 2.30                 |
| 4                      | 51            | 2       | 120.5            | 4 3/4    | 2.90                 | 97        | 3 13/16 | 3.40                 |
| 5                      | 57            | 2 1/4   | 141              | 59/16    | 4.70                 | 122       | 4 13/16 | 5.00                 |
| 6                      | 78            | 3 1/16  | 170              | 6 11/16  | 10.4                 | 146       | 5 3/4   | 10.4                 |
| 8                      | 87.5          | 37/16   | 220.5            | 8 11/16  | 20.4                 | 193.5     | 7 5/8   | 21.0                 |
| 10                     | 93.5          | 3 11/16 | 265              | 107/16   | 24.8                 | 247.5     | 9 3/4   | 25.4                 |
| 12                     | 100           | 3 15/16 | 316              | 127/16   | 35.0                 | 298.5     | 11 3/4  | 35.0                 |
| 14                     | 105           | 4 1/8   | 351              | 13 13/16 | 37.7                 | 330       | 13      | 39.0                 |
| 16                     | 113           | 47/16   | 402              | 15 13/16 | 46.2                 | 381       | 15      | 52.0                 |
| 18                     | 119           | 4 11/16 | 452              | 17 13/16 | 58.9                 | 432       | 17      | 59.0                 |
| 20                     | 127           | 5       | 503              | 19 13/16 | 71.5                 | 482.5     | 19      | 84.7                 |
| 24                     | 140           | 5 1/2   | 605              | 23 13/16 | 141                  | 584       | 23      | 146                  |

1) Stessa dimensione per derivazioni ridotte e uguali.

— Fino a 8", incluso, i pezzi sono uguali per XS e Sch. 80 - Per 10" e oltre, lo sch. 80 prevede spessori superiori - Pezzi disponibili a richiesta.

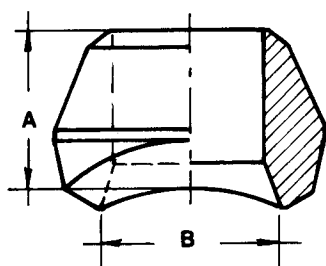
1) Same dimension for reducing and full size.

— Up to and including 8" - dimensions are the same for XS and Sch 80 out-lets. For 10" and over, sch. 80 requires thicker walls. Fitting available, on request.

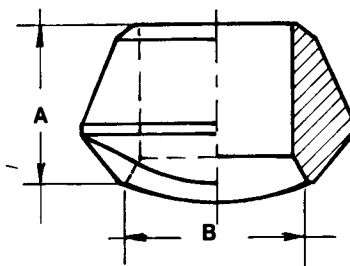
# VIAR-WELD

## SCH. 160 & DOUBLE EXTRA STRONG

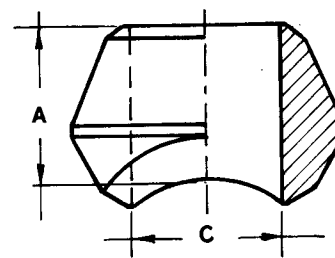
DERIVAZIONE RIDOTTA



REDUCING SIZE



DERIVAZIONE UGUALE



FULL SIZE

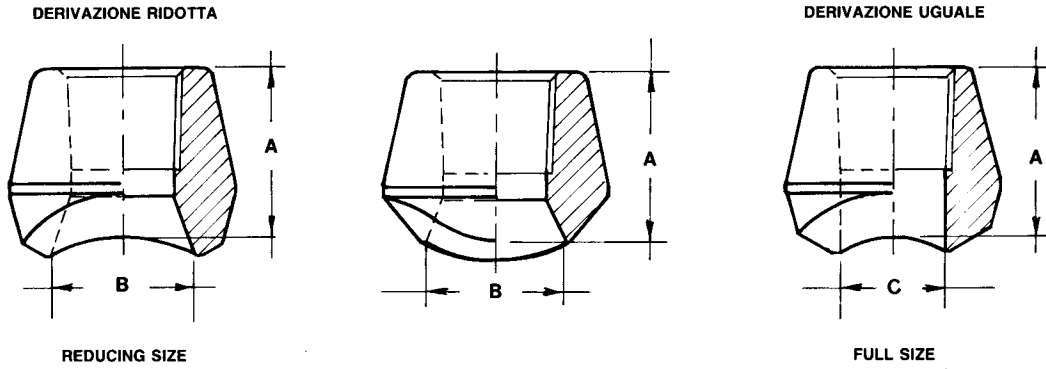
| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE   |         |      |         |                      | FULL SIZE |         |                      |
|------------------------|---|---------|------|---------|----------------------|-----------|---------|----------------------|
|                        | A   |         | B    |         | PESO<br>WEIGHT<br>Kg | C*        |         | PESO<br>WEIGHT<br>Kg |
|                        | mm  | inch    | mm   | inch    |                      | mm        | inch    |                      |
| 1/2                    | 28.5  | 1 1/8   | 14   | 9/16    | 0.15                 | 11.5      | 7/16    | 0.15                 |
| 3/4                    | 31.5  | 1 1/4   | 19   | 3/4     | 0.32                 | 15.5      | 5/8     | 0.32                 |
| 1                      | 38  | 1 1/2   | 25.5 | 1       | 0.38                 | 21        | 13/16   | 0.38                 |
| 1 1/4                  | 44.5  | 1 3/4   | 33.5 | 15/16   | 0.55                 | 29.5      | 13/16   | 0.60                 |
| 1 1/2                  | 51  | 2       | 38   | 1 1/2   | 0.80                 | 34        | 15/16   | 0.85                 |
| 2                      | 55.5  | 2 3/16  | 43   | 1 11/16 | 0.97                 | 43        | 1 11/16 | 1.00                 |
| 2 1/2                  | 62  | 2 7/16  | 54   | 2 1/8   | 1.55                 | 54        | 2 1/8   | 1.70                 |
| 3                      | 73  | 2 7/8   | 73   | 2 7/8   | 2.85                 | 66.5      | 2 5/8   | 2.95                 |
| 4                      | 84  | 3 5/16  | 98.5 | 3 7/8   | 4.75                 | 87        | 3 7/16  | 4.95                 |
| 5                      | 93.5  | 3 11/16 | 122  | 4 13/16 | 6.50                 | 109.5     | 4 5/16  | 6.80                 |
| 6                      | 105   | 4 1/8   | 146  | 5 3/4   | 12.7                 | 132       | 5 3/16  | 13.7                 |
| 8                      | <b>Dimensioni fornibili a richiesta</b><br><i>Dimensions available on request</i> |         |      |         |                      |           |         |                      |
| 10                     |   |         |      |         |                      |           |         |                      |
| 12                     |   |         |      |         |                      |           |         |                      |
| 14                     |   |         |      |         |                      |           |         |                      |
| 16                     |   |         |      |         |                      |           |         |                      |

\*) Applicabile a derivazioni e collettori Sch. 160. Per spessori XXS, la dimensione "C" varia in conformità ai valori relativi.  
 — I diametri di derivazione segnati in tabella sono validi per collettori sch. 160 e XXS. Per diametri 8" e oltre precisare sempre lo spessore del collettore.

\*) Suitable for sch. 160 run pipe. For XXS pipes, dimension "C" varies to meet in valve of values.  
 — Out-let sizes listed in the chart are suitable for sch. 160 and XXS run pipes. For 8" out-let and over, always specify run pipe thickness.



# VIAR-THRED



## 3000 lbs

| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |       |         |                      | FULL SIZE |         |                      |
|------------------------|---------------|---------|-------|---------|----------------------|-----------|---------|----------------------|
|                        | A             |         | B     |         | PESO<br>WEIGHT<br>Kg | C*        |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm    | inch    |                      | mm        | inch    |                      |
| 1/8                    | 19            | 3/4     | 16    | 5/8     | 0.06                 | —         | —       | —                    |
| 1/4                    | 19            | 3/4     | 16    | 5/8     | 0.06                 | —         | —       | —                    |
| 3/8                    | 20.5          | 13/16   | 19    | 3/4     | 0.09                 | —         | —       | —                    |
| 1/2                    | 25.5          | 1       | 24    | 15/16   | 0.11                 | 14        | 9/16    | 0.12                 |
| 3/4                    | 27            | 1 1/16  | 30    | 1 3/16  | 0.17                 | 19        | 3/4     | 0.19                 |
| 1                      | 33.5          | 1 5/16  | 36.5  | 1 7/16  | 0.29                 | 24        | 15/16   | 0.31                 |
| 1 1/4                  | 33.5          | 1 5/16  | 44.5  | 1 3/4   | 0.41                 | 32        | 1 1/4   | 0.45                 |
| 1 1/2                  | 35            | 1 3/8   | 51    | 2       | 0.46                 | 38        | 1 1/2   | 0.50                 |
| 2                      | 38            | 1 1/2   | 65    | 2 9/16  | 0.80                 | 49        | 1 15/16 | 0.87                 |
| 2 1/2                  | 46            | 1 13/16 | 76    | 3       | 1.40                 | 59        | 2 5/16  | 1.50                 |
| 3                      | 51            | 2       | 93.5  | 3 11/16 | 2.00                 | 73.5      | 2 7/8   | 2.15                 |
| 3 1/2                  | 54            | 2 1/8   | 101.5 | 4       | 2.60                 | 85        | 3 5/16  | 2.85                 |
| 4                      | 57            | 2 1/4   | 120.5 | 4 3/4   | 3.35                 | 97        | 3 13/16 | 3.60                 |

\*) Applicabili a collettori Std. weight & Extra Strong.

\*) Suitable for Std. Wt & XS pun pipes.

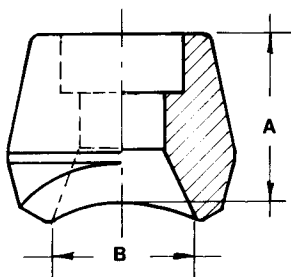
## 6000 lbs

| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |      |         |                      |
|------------------------|---------------|---------|------|---------|----------------------|
|                        | A             |         | B    |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm   | inch    |                      |
| 1/4                    | 28.5          | 1 1/8   | 14   | 9/16    | 0.20                 |
| 3/8                    | 28.5          | 1 1/8   | 14   | 9/16    | 0.20                 |
| 1/2                    | 31.5          | 1 1/4   | 19   | 3/4     | 0.30                 |
| 3/4                    | 36.5          | 1 7/16  | 25.5 | 1       | 0.50                 |
| 1                      | 39.5          | 1 9/16  | 33.5 | 1 5/16  | 0.90                 |
| 1 1/4                  | 39.5          | 1 9/16  | 38   | 1 1/2   | 0.85                 |
| 1 1/2                  | 43            | 1 11/16 | 49   | 1 15/16 | 1.45                 |
| 2                      | 52.5          | 2 1/16  | 59   | 2 5/16  | 2.75                 |

Disponibili solo per derivazioni ridotte  
Available only for reducing size outlet.

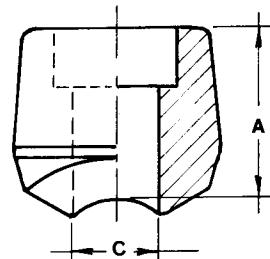
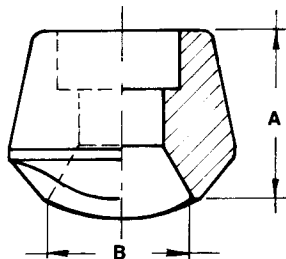
# VIAR-SOCK

DERIVAZIONE RIDOTTA



REDUCING SIZE

DERIVAZIONE UGUALE



FULL SIZE

## 3000 lbs

| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |       |         |                      | FULL SIZE |         |                      |
|------------------------|---------------|---------|-------|---------|----------------------|-----------|---------|----------------------|
|                        | A             |         | B     |         | PESO<br>WEIGHT<br>Kg | C*        |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm    | inch    |                      | mm        | inch    |                      |
| 1/8                    | 19            | 3/4     | 16    | 5/8     | 0.06                 | —         | —       | —                    |
| 1/4                    | 19            | 3/4     | 16    | 5/8     | 0.06                 | —         | —       | —                    |
| 3/8                    | 20.5          | 13/16   | 19    | 3/4     | 0.09                 | —         | —       | —                    |
| 1/2                    | 25.5          | 1       | 24    | 15/16   | 0.11                 | 14        | 9/16    | 0.12                 |
| 3/4                    | 27            | 1 1/16  | 30    | 13/16   | 0.17                 | 19        | 3/4     | 0.19                 |
| 1                      | 33.5          | 15/16   | 36.5  | 17/16   | 0.29                 | 24        | 15/16   | 0.31                 |
| 1 1/4                  | 33.5          | 15/16   | 44.5  | 13/4    | 0.41                 | 32        | 1 1/4   | 0.45                 |
| 1 1/2                  | 35            | 13/8    | 51    | 2       | 0.46                 | 38        | 1 1/2   | 0.50                 |
| 2                      | 38            | 1 1/2   | 65    | 29/16   | 0.80                 | 49        | 1 15/16 | 0.87                 |
| 2 1/2                  | 46            | 1 13/16 | 76    | 3       | 1.40                 | 59        | 25/16   | 1.50                 |
| 3                      | 51            | 2       | 93.5  | 3 11/16 | 2.00                 | 73.5      | 27/8    | 2.15                 |
| 3 1/2                  | 54            | 2 1/8   | 101.5 | 4       | 2.60                 | 85        | 35/16   | 2.80                 |
| 4                      | 57            | 2 1/4   | 120.5 | 4 3/4   | 3.30                 | 97        | 3 13/16 | 3.50                 |

\*) Applicabili a collettori Std. weight & Extra Strong.

\*) Suitable for Std. Wt & XS pun pipes.

## 6000 lbs<sup>(1)</sup>

| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |      |         |                      |
|------------------------|---------------|---------|------|---------|----------------------|
|                        | A             |         | B    |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm   | inch    |                      |
| 1/4                    | 28.5          | 1 1/8   | 14   | 9/16    | 0.20                 |
| 3/8                    | 28.5          | 1 1/8   | 14   | 9/16    | 0.20                 |
| 1/2                    | 31.5          | 1 1/4   | 19   | 3/4     | 0.30                 |
| 3/4                    | 36.5          | 17/16   | 25.5 | 1       | 0.50                 |
| 1                      | 39.5          | 19/16   | 33.5 | 15/16   | 0.90                 |
| 1 1/4                  | 39.5          | 19/16   | 38   | 1 1/2   | 0.85                 |
| 1 1/2                  | 43            | 1 11/16 | 49   | 1 15/16 | 1.45                 |
| 2                      | 52.5          | 2 1/16  | 59   | 25/16   | 2.75                 |

1) Foro raccordo secondo tubo sch. 160 - 2) Disponibili solo per derivazioni ridotte.

1) Fitting hole to suit sch. 160 pipe. - 2) Available only for reducing size out-let.

## 9000 lbs

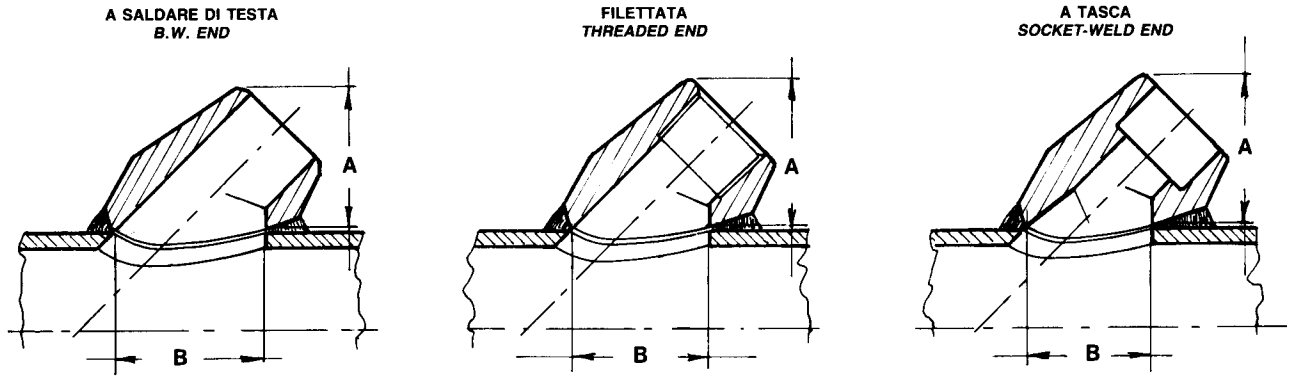
| DIM. NOM.<br>NOM. SIZE | REDUCING SIZE |         |      |         |                      |
|------------------------|---------------|---------|------|---------|----------------------|
|                        | A             |         | B    |         | PESO<br>WEIGHT<br>Kg |
|                        | mm            | inch    | mm   | inch    |                      |
| 1/2                    | 31.5          | 1 1/4   | 19   | 3/4     | 0.32                 |
| 3/4                    | 36.5          | 17/16   | 25.5 | 1       | 0.55                 |
| 1                      | 39.5          | 19/16   | 33.5 | 15/16   | 0.95                 |
| 1 1/2                  | 43            | 1 11/16 | 49   | 1 15/16 | 1.50                 |
| 2                      | 52.5          | 2 1/16  | 59   | 25/16   | 2.90                 |

1) Foro raccordo secondo tubo XXS. - 2) Disponibili solo per derivazioni ridotte.

1) Fitting hole to suit XXS pipe. - 2) Available only for reducing size out-let.

# VIAR-LAT

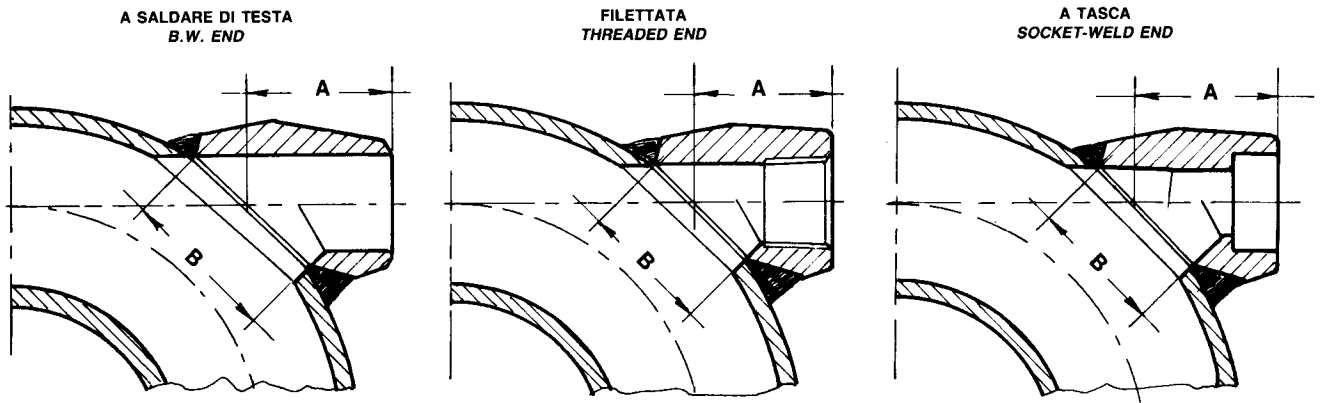
## DERIVAZIONI RIDOTTE / REDUCING SIZES



| DIAM. NOM.<br>NOM. SIZE | 3000 lbs - STD-WT & EXTRA STRONG <sup>(1)</sup>  |         |      |         |                      | 6000 lbs - SCH. 160 & DOUBLE EXTRA STRONG <sup>(1)</sup>                                     |        |      |       |                      |
|-------------------------|--|---------|------|---------|----------------------|--|--------|------|-------|----------------------|
|                         | A  |         | B    |         | Peso<br>Weight<br>Kg | A  |        | B    |       | Peso<br>Weight<br>Kg |
|                         | mm   | inch    | mm   | inch    |                      | mm   | inch   | mm   | inch  |                      |
| 1/4                     | 39.5   | 19/16   | 36.5 | 17/16   | 0.23                 | 39.5   | 19/16  | 36.5 | 17/16 | 0.35                 |
| 3/8                     | 39.5   | 19/16   | 36.5 | 17/16   | 0.23                 | 39.5   | 19/16  | 36.5 | 17/16 | 0.35                 |
| 1/2                     | 39.5   | 19/16   | 36.5 | 17/16   | 0.30                 | 46   | 113/16 | 44.5 | 13/4  | 0.40                 |
| 3/4                     | 46   | 113/16  | 41   | 15/8    | 0.35                 | 54   | 21/8   | 54   | 21/8  | 0.67                 |
| 1                       | 56   | 23/16   | 51   | 2       | 0.53                 | 63.5   | 21/2   | 66.5 | 25/8  | 1.00                 |
| 1 1/4                   | 63.5   | 2 1/2   | 66.5 | 25/8    | 0.86                 | 70   | 23/4   | 76   | 3     | 1.32                 |
| 1 1/2                   | 71   | 2 13/16 | 73   | 27/8    | 1.20                 | 85.5   | 33/8   | 105  | 4 1/8 | 2.80                 |
| 2                       | 92   | 3 5/8   | 96   | 3 13/16 | 2.40                 | 95   | 3 3/4  | 111  | 4 3/8 | 3.60                 |
| 2 1/2<br>to 10          | Fornibili, a richiesta, nella sola versione BW<br>Available, on request, as butt-welding end |         |      |         |                      | Fornibili, a richiesta, nella sola versione BW<br>Available, on request, as butt-welding end |        |      |       |                      |

# VIAR-EL

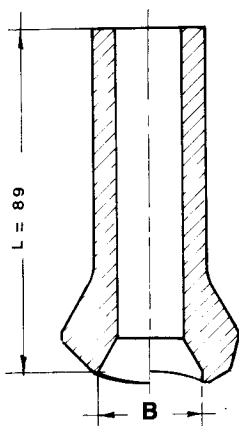
## DERIVAZIONI RIDOTTE / REDUCING SIZES



| DIAM. NOM.<br>NOM. SIZE | 3000 lbs - STD-WT & EXTRA STRONG <sup>(1)</sup>  |       |       |         |                      | 6000 lbs - SCH. 160 & DOUBLE EXTRA STRONG <sup>(1)</sup>                                     |         |       |         |                      |
|-------------------------|--|-------|-------|---------|----------------------|--|---------|-------|---------|----------------------|
|                         | A  |       | B     |         | Peso<br>Weight<br>Kg | A  |         | B     |         | Peso<br>Weight<br>Kg |
|                         | mm   | inch  | mm    | inch    |                      | mm   | inch    | mm    | inch    |                      |
| 1/4                     | 41   | 15/8  | 38    | 1 1/2   | 0.23                 | 41   | 15/8    | 38    | 1 1/2   | 0.35                 |
| 3/8                     | 41   | 15/8  | 38    | 1 1/2   | 0.23                 | 41   | 15/8    | 38    | 1 1/2   | 0.35                 |
| 1/2                     | 41   | 15/8  | 38    | 1 1/2   | 0.30                 | 47.5   | 17/8    | 43    | 1 11/16 | 0.40                 |
| 3/4                     | 47.5   | 17/8  | 43    | 1 11/16 | 0.35                 | 57   | 2 1/4   | 57    | 2 1/4   | 0.67                 |
| 1                       | 57   | 2 1/4 | 57    | 2 1/4   | 0.53                 | 63.5   | 2 1/2   | 73    | 2 7/8   | 1.00                 |
| 1 1/4                   | 63.5   | 2 1/2 | 73    | 2 7/8   | 0.86                 | 68   | 2 11/16 | 79.5  | 3 1/8   | 1.32                 |
| 1 1/2                   | 70   | 2 3/4 | 79.5  | 3 1/8   | 1.20                 | 82.5   | 3 1/4   | 106.5 | 4 3/16  | 2.80                 |
| 2                       | 82.5   | 3 1/4 | 106.5 | 4 3/16  | 2.40                 | 101.5  | 4       | 114.5 | 4 1/2   | 3.60                 |
| 2 1/2<br>to 10          | Fornibili, a richiesta, nella sola versione BW<br>Available, on request, as butt-welding end |       |       |         |                      | Fornibili, a richiesta, nella sola versione BW<br>Available, on request, as butt-welding end |         |       |         |                      |

1) Disponibili solo per riduzioni da 2 ÷ 3 diametri in sù.  
1) Available only for reduction rate of 2 ÷ 3 pipe size and over.

# VIAR-NIP



È un raccordo particolarmente indicato per tutte quelle derivazioni che richiedono, immediatamente dopo l'uscita dal collettore, l'installazione di una valvola, uno strumento di misura, ecc.  
L'impiego di detto raccordo risulta valido quando sono presenti forti vibrazioni, sollecitazioni cicliche, che possono provocare, nel tempo, rotture per fatica.  
Risulta valido anche dal lato economico in quanto non richiede l'uso del nipplo e soprattutto evita l'esecuzione di una saldatura con relativi esami non distruttivi (NDE).

*The use of this fitting is particularly indicated where a valve, gauge or similar, need to be installed in a branch connection, quite close to the header.*

*Fitting design suggests its use where line vibrations, cyclic stresses, etc., may result in fatigue fracture. It is also suggested from an economical point of view as, for the same application, a pipe nipple and a weld is avoided with consequent NDE inspection.*

## Estremità filettata, piana, B.W. - Threaded, SW, BW end

| DIAM. NOM.<br>NOM SIZE | 3000 lbs |        |                      | 6000 lbs |         |                      |
|------------------------|----------|--------|----------------------|----------|---------|----------------------|
|                        | B        |        | Peso<br>Weight<br>Kg | B        |         | Peso<br>Weight<br>Kg |
|                        | mm       | inch   |                      | mm       | inch    |                      |
| 1/4                    | 16       | 5/8    | 0.20                 | —        | —       | —                    |
| 3/8                    | 19       | 3/4    | 0.23                 | —        | —       | —                    |
| 1/2                    | 24       | 15/16  | 0.25                 | 14       | 9/16    | 0.25                 |
| 3/4                    | 30       | 13/16  | 0.40                 | 19       | 3/4     | 0.50                 |
| 1                      | 36.5     | 17/16  | 0.65                 | 25.5     | 1       | 0.70                 |
| 1 1/4                  | 44.5     | 1 3/4  | 0.75                 | 33.5     | 1 5/16  | 0.88                 |
| 1 1/2                  | 50.8     | 2      | 0.95                 | 38       | 1 1/2   | 1.15                 |
| 2                      | 65       | 2 9/16 | 1.45                 | 43       | 1 11/16 | 1.50                 |

1) La dimensione "L", è uguale per tutti i diametri. Eseguibili, a richiesta, con lunghezze fino a 6 1/2" (165 mm).

— Lo spessore della porzione di nipplo per la CI 3000 è pari allo Sch. 80; per la CI 6000 è pari allo Sch. 160. Disponibili, a richiesta, anche con spessore XXS.

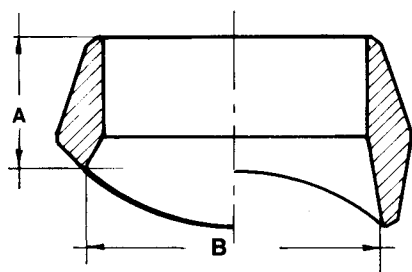
1) "L" dimension is the same for all sizes. Available, on request, with lengths up to 6 1/2" (165 mm).

— Nipple portion thickness for 3000 lb is related to Sch. 80 pipe; for 6000 lb, the reference is made to Sch. 160. Available, on request, with XXS thk.

## VIAR-LW

Sono derivazioni aventi le stesse caratteristiche dei VIAR-WELD e sono impiegate su linee di leggero spessore. Da usarsi normalmente con tubi sch. 5 o 10 (5 S o 10 S nel caso degli inox), hanno le dimensioni A e B pressochè uguali ai corrispondenti raccordi Std. Wt., ma un diametro esterno più piccolo e di conseguenza gli smussi di saldatura. Ciò comporta una riduzione della quantità di saldatura che può variare dal 50 al 70%, riducendo, di conseguenza il loro costo di installazione. Disponibili da 2" a 12", sono fattibili, a richiesta, nella gamma dei diametri inferiori e superiori.

*Same as VIAR-WELD, these fittings are used on light weight pipes, sched. 5 and 10 (5 S and 10 S for S.S. pipes). A and B dimensions correspond to Std. Wt. fittings but the outside diameter is smaller. Consequently, the weld bevels result smaller and a reduction of weld amount varying from 50 to 70%. Their installation cost is then proportionally contained. Available from 2" to 12", on request, lower or higher outlet sizes can be manufactured.*



## VIAR HW

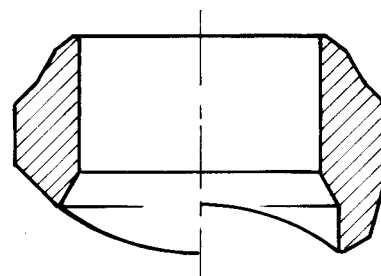
Sono derivazioni da usarsi prevalentemente nei casi in cui le condizioni di esercizio richiedono tubi di grosso spessore. Il loro dimensionamento e la loro forma si scostano da quelle tradizionali dei VIAR-WELD e ciò per poter utilizzare al massimo le aree di rinforzo, in rapporto agli spessori del collettore. Il tutto, tenendo in considerazione l'ammontare delle saldature, che in questi casi sarebbe enorme. Costruiti normalmente per collettori aventi spessori da mm 22 (7/8") ed oltre, i diametri nominali iniziano da 3".

*This type of fitting is to be used when service condition requires heavy wall pipes/headers.*

*The shape is slightly different than the traditional VIAR-WELD in order to utilize at best the available replacement area resulting from header thickness.*

*The above takes into consideration the weld amount that results fairly contained*

*Manufactured to match header thicknesses of 7/8" and over, outlet sizes starts from 3".*





Certificate No. MIL930277

# DET NORSKE VERITAS

Sheet 1 of 2

## INSPECTION CERTIFICATE

-----  
MANUFACTURER: VIAR S.R.L. VIA L.DA VINCI,9 - 21044 CAVARIA (VA)

SUBJECT : BURST TESTS OF No.4 VIAR - WELDS

SITE OF TEST: O.M.R. - BORGONOVO VT. (PC) ITALY.  
-----

Messers Viar was visited on the 31st May, 1993 for the purpose of witnessing burst tests of No. 4 Viar-Weld pieces as described on table 1.

The scope of the tests was to demonstrate that the design calculation adopted by "Viar" was in conformity with the applicable code and in accordance with "Viar" standard production.

The Viar-Weld joints are welded with the appropriate temporary tubes and cups and were submitted to hydrostatic test pressure since the relevant break.

All materials of components were checked by writer, and material certificates were reviewed at the beginning of the construction, visual check of edge preparation prior to welding is carried out and relevant WPS documents are also examined.

The relevant calculation designed issued by Viar were in accordance with the following codes:  
ANSI B.31.1, B.31.3, B.31.4 and B.31.8

The hydrostatic pressure tests were considered according to ANSI B.16.9.

The equipment used for hydrostatic pressure tests was "pump type SC-pump" suitable for a range of max. 1500kg/cmq.

It is agreed that save as provided herein Det Norske Veritas, its subsidiaries, bodies, officers, directors, employees and agents shall have no liability for any loss, damage or expense directly or indirectly by their receipt or negligence, breach of warranty, or any other act, omission or error by them, including gross negligence or willful misconduct by any such person with the exception of gross negligence or willful misconduct by the governing bodies or senior executive officers of Det Norske Veritas. This agrees regardless of whether the loss, damage or expense has affected anyone with whom Det Norske Veritas has a contract or a third party who has relied on disclosure made or information given by or on behalf of Det Norske Veritas. However, if any person uses the services of Det Norske Veritas or its subsidiaries or relies on any disclosure made or information given by or on behalf of them and in consequence suffers a loss, damage or expense proved to be due to their negligence, omission or default, then Det Norske Veritas will pay by way of compensation to such person a sum representing his proved loss. In the event Det Norske Veritas or its subsidiaries may be held liable in accordance with the conditions above, the amount of compensation shall under no circumstances exceed the amount of the fee, if any, payable for that particular service, inspection, advice or information. It limits no circumstances whatsoever shall the individual or individuals who have personally caused the loss, damage or expense be held liable. In the event that any provision in this section shall be invalid under the law of any jurisdiction, the validity of the remaining provisions shall not in any way be affected.



# DET NORSKE VERITAS

The result obtained are shown on table "1".  
The pressure gauge used for checking the hydrostatic test pressure have been initially calibrated by means of a master gauge manufactured by Budenberg serial No 18374.  
Calibrated date July, 1992 expiry date July, 1993.  
The result obtained of burst tests and the type of breaks and their position of 4 components is shown on table 1 and also in Viar Hydro test certificates (attached).

TABLE 1 - VIAR-WELD JOINT LIST

| SIZE OF JOINT       | MINIMUM DESIGN VALUE (MPA) | PRESSURE BROKEN VALUE (MPA) | GAUGE VALUE IN KG/CMQ | BROKEN AREA                       | SKETCH POSITION                  |
|---------------------|----------------------------|-----------------------------|-----------------------|-----------------------------------|----------------------------------|
| 8"X4"SCH XS/XS      | 52,70                      | 60,79                       | 620                   | ON PIPE 8"UNDER"VIAR WELD"JOINT   | SEE VIAR HYDRO TEST CERTIFIC ATE |
| 8"X4"SCH 160/160    | 98,2                       | 110,80                      | 1130                  | ON PIPE 8"UNDER VIAR WELD JOINT   | SEE VIAR HYDRO TEST CERTIFIC ATE |
| 12"X6" SCH 80/XS    | 52,78                      | 58,83                       | 600                   | ON PIPE 12" UNDER VIAR WELD JOINT | SEE VIAR HYDRO TEST CERTIFIC ATE |
| 16"X10" SCH STD/STD | 22,30                      | 24,31                       | 248                   | ON PIPE 16"UNDER VIAR WELD JOINT  | SEE VIAR HYDRO TEST CERTIFIC ATE |

NOTE: Considering that the above burst tests were conducted in order to verify the Viar-Weld trend, after visual examination we checked that no fracture appeared on Viar-Weld components and on relevant welded area.

Agrate Brianza  
4th June, 1993

D. Bagnoli  
Surveyor to  Italia S.r.l.



It is agreed that save as provided below Det Norske Veritas, its subsidiaries, agents, officers, directors, employees and agents shall have no liability for any loss, damage or expense directly caused or indirectly by their negligence, breach of warranty or any other act, omission or error by them, including gross negligence or willful misconduct by any such person with the exception of gross negligence or willful misconduct by the governing bodies or senior executive officers of Det Norske Veritas. This applies regardless of whether the loss, damage or expense has resulted from any act, omission or error by or on behalf of Det Norske Veritas or its subsidiaries or from any contract made or information given by or on behalf of Det Norske Veritas or its subsidiaries. It is further agreed that Det Norske Veritas and its subsidiaries shall not be liable for any loss, damage or expense caused or indirectly by their negligence, breach of warranty or any other act, omission or error by them, including gross negligence or willful misconduct by any such person with the exception of gross negligence or willful misconduct by the governing bodies or senior executive officers of Det Norske Veritas. In the event Det Norske Veritas or its subsidiaries may be held liable in accordance with the provisions above, the amount of compensation shall under no circumstances exceed the amount of the fee, if any, charged for that particular service, contract, advice or information. A United Kingdom jurisdiction clause shall apply to the provisions above, the amount of compensation shall under no circumstances exceed the amount of the fee, if any, charged for that particular service, contract, advice or information. In the event that any provision in this certificate shall be made under the law of any jurisdiction, the validity of the remaining provisions shall in any way be affected.



# SINCERT



Certificate No. CSQ3630-037-IT

CERTIFICAZIONE

## DET NORSKE VERITAS

# QUALITY SYSTEM CERTIFICATE

*Si attesta che  
This is to certify that*

*IL SISTEMA QUALITA' DI  
THE QUALITY MANAGEMENT SYSTEM OF*

*VIAR MECCANICA S.r.l.  
CAVARIA (VA)*

*E' CONFORME AI REQUISITI DELLA NORMATIVA  
HAS BEEN FOUND TO CONFORM TO QUALITY SYSTEM STANDARD*

*UNI EN 29001 (ISO 9001)*

*Questa certificazione è valida per il seguente campo applicativo:  
This certificate is valid for the following product/service ranges:*

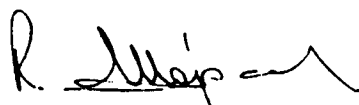
*Progettazione, Produzione e Vendita di Derivazioni con Rinforzo  
Integrale da Acciaio Forgiato: 1/4" to 24"*

*Design and Production of Integrally Reinforced Branch  
Connection: 1/4" to 24"*

*Questo certificato è valido fino al:  
This certificate is valid until:*

*1995.11.19*

*1992.12.15 - Agrate Brianza (MI)*

  
R. Majocchi

  
L. Omodeo Zorini

MANAGEMENT REPRESENTATIVE

QUALITY AUDITOR

*This Certificate is to be accompanied by a detailed periodical audit plan, specifying conditions for maintenance of validity of this Certificate*

## NOTES



## NOTES