

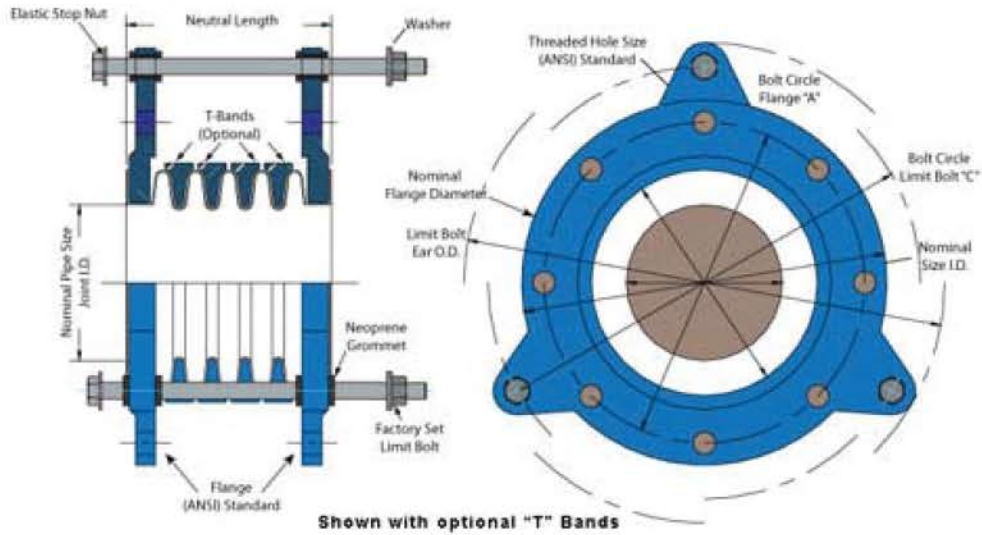


**H.S. WHITE**  
**CORPORATION**  
Marine and Industrial Specialists

# PTFE EXPANSION JOINTS TECHNICAL DATA



## Materials of Construction



### 112A & 112E, 113A & 113E, 115A & 115E

|                   |                 |
|-------------------|-----------------|
| Description       | 1"-12"          |
| Bellows           | PTFE T-62       |
| Flanges           | Ductile Iron    |
| Reinforcing Rings | Stainless Steel |
| Limit Bolts       | Carbon Steel    |
| Nuts              | Carbon Steel    |
| Grommets          | Neoprene        |
| Washers           | Carbon Steel    |

**Style 112A Sizes • Spring Rates • Temperatures • Vacuum • Weights**

**Movement Capabilities  
Based on Two Convolution Design<sup>1</sup>**



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      | Weight/lbs. |                         |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|-------------|-------------------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° |             | <sup>3</sup> Hg at Temp |
|                   |                           |                                   |                                   |                           |   |   |  |               |  |      |      |      |      |      |      |      |             |                         |
| 1.0               | 1.375                     | 0.250                             | .125                              | 7                         | 102   | 79  | 102  | 2.7           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 2                       |
| 1.25              | 1.375                     | 0.250                             | .125                              | 7                         | 60  | 135   | 396  | 2.2           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 5                       |
| 1.50              | 1.375                     | 0.250                             | .125                              | 7                         | 316   | 178   | 221  | 4.6           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 3                       |
| 2.00              | 1.563                     | 0.250                             | .125                              | 7                         | 506   | 297   | 237  | 7.0           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 7                       |
| 2.50              | 2.250                     | 0.313                             | .125                              | 7                         | 452   | 275   | 324  | 9.6           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 10                      |
| 3.00              | 2.250                     | 0.375                             | .188                              | 7                         | 641   | 316   | 315  | 15.9          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 10                      |
| 4.00              | 2.625                     | 0.500                             | .250                              | 7                         | 475   | 277   | 396  | 23.7          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @400°F  | 18                      |
| 5.00              | 3.250                     | 0.500                             | .250                              | 7                         | 435   | 435   | 316  | 33.1          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @400°F  | 24                      |
| 6.00              | 2.750                     | 0.500                             | .250                              | 7                         | 435   | 382   | 435  | 50.2          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @400°F  | 29                      |
| 8.00              | 4.00                      | 0.500                             | .250                              | 7                         | 445   | 386   | 475  | 83.4          | 164                                    | 150  | 129  | 112  | 100  | 87   | 73   | 60   | 29" @250°F  | 47                      |
| 10.00             | 5.250                     | 0.500                             | .250                              | 7                         | 752   | 594   | 574  | 108.3         | 164                                    | 150  | 129  | 112  | 100  | 87   | 73   | 60   | 29" @250°F  | 64                      |
| 12.00             | 6.000                     | 0.500                             | .250                              | 7                         | 1287  | 415   | 693  | 176.6         | 70                                     | 59   | 48   | 40   | 35   | 30   | 26   | 22   | 29.9" @75°F | 115                     |

**\*\* Safety Shields are Recommended**

**Style 112E Sizes • Spring Rates • Temperatures • Vacuum • Weights**

**Movement Capabilities  
Based on Two Convolution Design<sup>1</sup>**



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      | Weight/lbs. |                         |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|-------------|-------------------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° |             | <sup>3</sup> Hg at Temp |
|                   |                           |                                   |                                   |                           |   |   |  |               |  |      |      |      |      |      |      |      |             |                         |
| 1.0               | 1.750                     | .344                              | .250                              | 16                        | 138   | 142   | 118  | 2.7           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 3                       |
| 1.50              | 1.813                     | .344                              | .250                              | 13                        | 237   | 198   | 237  | 4.6           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 4                       |
| 2.00              | 1.875                     | .344                              | .281                              | 12                        | 425   | 346   | 435  | 7.0           | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 7                       |
| 3.00              | 2.188                     | .406                              | .313                              | 10                        | 643   | 316   | 346  | 15.9          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @425°F  | 10                      |
| 4.00              | 2.281                     | .438                              | .313                              | 9                         | 356   | 277   | 623  | 23.7          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @400°F  | 17                      |
| 6.00              | 2.531                     | .469                              | .375                              | 7                         | 455   | 346   | 712  | 50.2          | 185                                    | 170  | 148  | 130  | 115  | 100  | 84   | 68   | 29" @400°F  | 27                      |
| 8.00              | 2.750                     | .531                              | .406                              | 6                         | 297   | 227   | 792  | 81.4          | 164                                    | 150  | 129  | 112  | 100  | 87   | 73   | 60   | 29" @250°F  | 35                      |
| 10.00             | 2.969                     | .563                              | .438                              | 5                         | 1152  | 861   | 990  | 108.3         | 164                                    | 150  | 129  | 112  | 100  | 87   | 73   | 60   | 29" @250°F  | 52                      |
| 12.00             | 3.094                     | .594                              | .469                              | 5                         | 376   | 237   | 990  | 175.8         | 70                                     | 59   | 48   | 40   | 35   | 30   | 26   | 22   | 29" @75°F   | 107                     |

## Style 113A Sizes • Spring Rates • Temperatures • Vacuum • Weights

**Movement Capabilities**  
Based on Three Convolution Design<sup>1</sup>



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      |                         |    | Weight/Lbs. |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|-------------------------|----|-------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° | <sup>3</sup> Hg at Temp |    |             |
| 1.0               | 1.750                     | .500                              | .250                              | 14                        | 188   | 81  | 95   | 2.8           | 138                                    | 126  | 107  | 90   | 115  | 64   | 53   | 45   | 29" @ 400°F             | 2  |             |
| 1.25              | 1.810                     | .500                              | .250                              | 14                        | 39  | 118   | 310  | 2.2           | 128                                    | 120  | 96   | 85   | 72   | 56   | 42   | 36   | 29" @ 400°F             | 5  |             |
| 1.50              | 2.000                     | .500                              | .250                              | 14                        | 83  | 65  | 106  | 5.0           | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 400°F             | 4  |             |
| 2.00              | 2.750                     | .750                              | .375                              | 14                        | 68  | 75  | 107  | 9.1           | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 400°F             | 8  |             |
| 2.50              | 3.188                     | .750                              | .375                              | 14                        | 90  | 96  | 158  | 11.4          | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 400°F             | 11 |             |
| 3.00              | 3.625                     | 1.000                             | .500                              | 14                        | 122   | 123   | 192  | 16.9          | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 400°F             | 13 |             |
| 4.00              | 3.625                     | 1.000                             | .500                              | 14                        | 217   | 153   | 261  | 25.4          | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 400°F             | 19 |             |
| 5.00              | 4.000                     | 1.000                             | .500                              | 14                        | 316   | 207   | 320  | 34.4          | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 300°F             | 25 |             |
| 6.00              | 4.000                     | 1.125                             | .563                              | 14                        | 286   | 185   | 263  | 50.2          | 138                                    | 126  | 107  | 90   | 72   | 64   | 53   | 45   | 29" @ 300°F             | 30 |             |
| 8.00              | 6.000                     | 1.125                             | .563                              | 14                        | 176   | 215   | 418  | 83.4          | 138                                    | 110  | 94   | 80   | 68   | 57   | 47   | 38   | 29" @ 125°F             | 48 |             |
| 10.00             | 7.000                     | 1.188                             | .500                              | 14                        | 415   | 525   | 848  | 128.5         | 82                                     | 70   | 64   | 52   | 46   | 39   | 34   | 30   | 19.0" @ 125°F           | 60 |             |
| 12.00             | 7.875                     | 1.188                             | .625                              | 14                        | 735   | 536   | 848  | 144.7         | 82                                     | 70   | 64   | 52   | 46   | 40   | 34   | 30   | 10.0" @ 125°F           | 77 |             |

**\*\* Safety Shields are Recommended**

## Style 113E Sizes • Spring Rates • Temperatures • Vacuum • Weights

**Movement Capabilities**  
Based on Three Convolution Design<sup>1</sup>



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      |                         |    | Weight/Lbs. |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|-------------------------|----|-------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° | <sup>3</sup> Hg at Temp |    |             |
| 1.0               | 2.313                     | 0.500                             | .375                              | 24                        | 128   | 128   | 257  | 2.8           | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 400°F             | 3  |             |
| 1.50              | 2.406                     | 0.531                             | .375                              | 20                        | 79  | 69  | 108  | 5.0           | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 400°F             | 5  |             |
| 2.00              | 2.500                     | 0.531                             | .406                              | 17                        | 69  | 79  | 158  | 9.1           | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 400°F             | 8  |             |
| 3.00              | 2.906                     | 0.625                             | .469                              | 15                        | 138   | 158   | 188  | 16.9          | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 400°F             | 14 |             |
| 4.00              | 3.063                     | 0.656                             | .500                              | 13                        | 217   | 158   | 188  | 25.4          | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 400°F             | 19 |             |
| 6.00              | 3.375                     | 0.719                             | .531                              | 10                        | 346   | 188   | 534  | 50.2          | 138                                    | 126  | 107  | 90   | 76   | 64   | 53   | 45   | 29" @ 300°F             | 30 |             |
| 8.00              | 3.656                     | 0.781                             | .594                              | 9                         | 445   | 168   | 742  | 81.4          | 120                                    | 110  | 94   | 80   | 67   | 57   | 47   | 38   | 29" @ 125°F             | 39 |             |

## Style 115A Sizes • Spring Rates • Temperatures • Vacuum • Weights

Movement Capabilities  
Based on Five Convolution Design<sup>1</sup>



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      | Weight/Lbs.  |                         |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|--------------|-------------------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° |              | <sup>3</sup> Hg at Temp |
| 1.0               | 3.000                     | 0.500                             | .500                              | 20                        | 29  | 43  | 21   | 2.7           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 425°F  | 2                       |
| 1.25              | 2.670                     | 0.394                             | .470                              | 20                        | 35  | 112   | 169  | 2.2           | 62                                     | 56   | 42   | 36   | 30   | 26   | 22   | 22   | 29" @ 425°F  | 5                       |
| 1.50              | 3.500                     | 0.750                             | .500                              | 20                        | 74  | 82  | 45   | 4.6           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 425°F  | 3                       |
| 2.00              | 4.000                     | 1.000                             | .500                              | 20                        | 59  | 46  | 49   | 7.0           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 425°F  | 7                       |
| 2.50              | 4.600                     | 0.980                             | .510                              | 20                        | 114   | 315   | 282  | 9.6           | 62                                     | 56   | 42   | 36   | 30   | 26   | 22   | 22   | 29" @ 425°F  | 10                      |
| 3.00              | 5.000                     | 1.000                             | .500                              | 20                        | 54  | 59  | 168  | 15.9          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 425°F  | 10                      |
| 4.00              | 5.250                     | 1.250                             | .625                              | 20                        | 71  | 59  | 79   | 23.7          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 400°F  | 18                      |
| 5.00              | 6.000                     | 1.250                             | .625                              | 20                        | 138   | 384   | 396  | 33.1          | 62                                     | 56   | 42   | 36   | 30   | 26   | 22   | 22   | 29" @ 400°F  | 24                      |
| 6.00              | 6.000                     | 1.250                             | .625                              | 20                        | 188   | 128   | 193  | 50.2          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | 29" @ 400°F  | 29                      |
| 8.00              | 8.000                     | 1.250                             | .625                              | 20                        | 300   | 384   | 452  | 83.4          | 48                                     | 42   | 34   | 30   | 26   | 22   | 22   | 22   | 29" @ 250°F  | 47                      |
| 10.00             | 8.750                     | 1.250                             | .625                              | 20                        | 453   | 384   | 452  | 108.3         | 48                                     | 42   | 34   | 30   | 26   | 22   | 22   | 22   | 29" @ 250°F  | 64                      |
| 12.00             | 9.000                     | 1.375                             | .688                              | 20                        | 523   | 440   | 452  | 176.6         | 48                                     | 42   | 34   | 30   | 26   | 22   | 22   | 22   | 29.9" @ 75°F | 115                     |

**\*\* Safety Shields are Recommended**

## Style 115E Sizes • Spring Rates • Temperatures • Vacuum • Weights

Movement Capabilities  
Based on Five Convolution Design<sup>1</sup>



| Nominal Size I.D. | Neutral Length<br>Inches. | ± Axial (Δx)<br>Movement<br>(1)IN | Lateral (Δy)<br>Movement<br>(1)IN | Angular Deflection<br>DEG | Spring Rate Capability <sup>2</sup>               |   |  | Thrust Factor | Pressure At Temperature<br>(PSIG) @ °F |      |      |      |      |      |      |      | Weight/Lbs.                                |                         |
|-------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------|---|---|--|---------------|--|------|------|------|------|------|------|------|--|-------------------------|
|                   |                           |                                   |                                   |                           | Compression<br>Spring Rate<br>LB <sub>2</sub> /IN | Extension<br>Spring Rate<br>LB <sub>2</sub> /IN | Lateral<br>Spring Rate <sup>2</sup><br>LB <sub>2</sub> /IN |               | 70°                                    | 100° | 150° | 200° | 250° | 300° | 350° | 400° |  | <sup>3</sup> Hg at Temp |
| 1.0               | 3.500                     | 0.844                             | .625                              | 39                        | 49  | 108   | 49   | 2.8           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   | Consult<br>Factory for<br>Vacuum<br>Rating | 3                       |
| 1.50              | 3.625                     | 0.875                             | .656                              | 32                        | 74  | 79  | 49   | 5.0           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   |  | 7                       |
| 2.00              | 3.750                     | 0.875                             | .656                              | 29                        | 59  | 49  | 49   | 9.1           | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   |  | 10                      |
| 3.00              | 4.375                     | 1.031                             | .781                              | 25                        | 54  | 59  | 168  | 16.9          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   |  | 16                      |
| 4.00              | 4.563                     | 1.094                             | .813                              | 21                        | 69  | 59  | 79   | 25.4          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   |  | 23                      |
| 6.00              | 5.031                     | 1.188                             | .906                              | 17                        | 188   | 128   | 193  | 50.2          | 72                                     | 61   | 46   | 40   | 34   | 29   | 27   | 24   |  | 34                      |

# UNALON® Style 9500

## Design Movements

Movements as described are for axial compression and extension. For lateral movements, consult factory.

| UNALON® 9500 Movements-Bellows Corrugation Count/Number of Convolutions |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Size I.D. (in.)   | 4    |      | 5    |      | 6    |      | 7    |      | 8    |      | 9    |      | 10   |      | 11   |      | 12   |      |
|   | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  | EXT  | COM  |
| 1-1/2"  | 0.10 | 0.40 | 0.13 | 0.54 | 0.17 | 0.67 | 0.20 | 0.81 | 0.24 | 0.94 | 0.27 | 1.08 | 0.30 | 1.21 | 0.34 | 1.34 | 0.37 | 1.48 |
| 2"  | 0.10 | 0.39 | 0.13 | 0.52 | 0.16 | 0.66 | 0.20 | 0.79 | 0.23 | 0.92 | 0.26 | 1.05 | 0.30 | 1.18 | 0.33 | 1.31 | 0.36 | 1.44 |
| 3"  | 0.10 | 0.39 | 0.13 | 0.53 | 0.16 | 0.66 | 0.20 | 0.79 | 0.23 | 0.92 | 0.26 | 1.05 | 0.30 | 1.18 | 0.33 | 1.32 | 0.36 | 1.45 |
| 4"  | 0.11 | 0.42 | 0.14 | 0.56 | 0.18 | 0.70 | 0.21 | 0.84 | 0.25 | 0.98 | 0.28 | 1.12 | 0.32 | 1.26 | 0.35 | 1.40 | 0.39 | 1.54 |
| 6"  | 0.14 | 0.55 | 0.18 | 0.73 | 0.23 | 0.91 | 0.27 | 1.09 | 0.32 | 1.28 | 0.36 | 1.46 | 0.41 | 1.64 | 0.46 | 1.82 | 0.50 | 2.01 |
| 8"  | 0.14 | 0.55 | 0.18 | 0.73 | 0.23 | 0.91 | 0.27 | 1.10 | 0.32 | 1.28 | 0.37 | 1.46 | 0.41 | 1.65 | 0.46 | 1.83 | 0.50 | 2.01 |
| 10"   | 0.14 | 0.55 | 0.18 | 0.73 | 0.23 | 0.92 | 0.27 | 1.10 | 0.32 | 1.28 | 0.37 | 1.47 | 0.41 | 1.65 | 0.46 | 1.83 | 0.50 | 2.02 |
| 12"   | 0.17 | 0.67 | 0.22 | 0.90 | 0.28 | 1.12 | 0.34 | 1.34 | 0.39 | 1.57 | 0.45 | 1.79 | 0.50 | 2.02 | 0.56 | 2.24 | 0.62 | 2.46 |
| 14"   | 0.24 | 0.94 | 0.31 | 1.26 | 0.39 | 1.57 | 0.47 | 1.89 | 0.55 | 2.20 | 0.63 | 2.52 | 0.71 | 2.83 | 0.79 | 3.15 | 0.87 | 3.46 |
| 16"   | 0.21 | 0.85 | 0.28 | 1.14 | 0.36 | 1.42 | 0.43 | 1.71 | 0.50 | 1.99 | 0.57 | 2.28 | 0.64 | 2.56 | 0.71 | 2.85 | 0.78 | 3.13 |
| 18"   | 0.21 | 0.85 | 0.28 | 1.14 | 0.36 | 1.42 | 0.43 | 1.71 | 0.50 | 1.99 | 0.57 | 2.28 | 0.64 | 2.56 | 0.71 | 2.85 | 0.78 | 3.13 |
| 20"   | 0.23 | 0.91 | 0.30 | 1.22 | 0.38 | 1.52 | 0.46 | 1.83 | 0.53 | 2.13 | 0.61 | 2.44 | 0.69 | 2.74 | 0.76 | 3.05 | 0.84 | 3.35 |
| 24"   | 0.27 | 1.06 | 0.35 | 1.42 | 0.44 | 1.77 | 0.53 | 2.13 | 0.62 | 2.48 | 0.71 | 2.84 | 0.80 | 3.19 | 0.89 | 3.55 | 0.98 | 3.90 |

Note: Axial extension may be increased by reducing compression, consult factory

| 9500 Face-to-Face Dimensions |         |         |         |         |         |         |          |          |          |  |
|------------------------------|---------|---------|---------|---------|---------|---------|----------|----------|----------|--|
| Size N.D. In.                | 4 Conv. | 5 Conv. | 6 Conv. | 7 Conv. | 8 Conv. | 9 Conv. | 10 Conv. | 11 Conv. | 12 Conv. |  |
| 1-1/2"                       | 4       | 4.5     | 5       | 5.5     | 6       | 6.5     | 7        | 7.5      | 8        |  |
| 2"                           | 4       | 4.5     | 5       | 5.5     | 6       | 6.5     | 7        | 7.5      | 8        |  |
| 3"                           | 4.75    | 5.3125  | 5.875   | 6.4375  | 7       | 7.5625  | 8.125    | 8.6875   | 9.25     |  |
| 4"                           | 5.125   | 5.75    | 6.375   | 7       | 7.625   | 8.25    | 8.875    | 9.5      | 10.125   |  |
| 6"                           | 5.75    | 6.5     | 7.25    | 8       | 8.75    | 9.5     | 10.25    | 11       | 11.75    |  |
| 8"                           | 6.5     | 7.3125  | 8.125   | 8.9375  | 9.75    | 10.563  | 11.375   | 12.1875  | 13       |  |
| 10"                          | 7       | 7.875   | 8.75    | 9.625   | 10.5    | 11.375  | 12.25    | 13.125   | 14       |  |
| 12"                          | 7.75    | 8.75    | 9.75    | 10.75   | 11.75   | 12.75   | 13.75    | 14.75    | 15.75    |  |
| 14"                          | 8.75    | 9.9375  | 11.125  | 12.313  | 13.5    | 14.688  | 15.875   | 17.063   | 18.25    |  |
| 16"                          | 9.25    | 10.5    | 11.75   | 13      | 14.25   | 15.5    | 16.75    | 18       | 19.25    |  |
| 18"                          | 9.75    | 11      | 12.25   | 13.5    | 14.75   | 16      | 17.25    | 18.5     | 19.75    |  |
| 20"                          | 10.5    | 11.875  | 13.25   | 14.625  | 16      | 17.375  | 18.75    | 20.125   | 21.5     |  |
| 24"                          | 11.25   | 12.688  | 14.125  | 15.563  | 17      | 18.438  | 19.875   | 21.313   | 22.75    |  |

Note: Standard face-to-face dimensions as shown. Other dimensions available on request, consult factory

### \*Deflection Force/Spring Rate

Consult factory

**WARNINGS:** Safety shields must be used at all times in hazardous services to protect against serious personal injury in the event of expansion joint failure. Liner sleeves must be used in abrasive service or where sharp-edged solids are or may be present.

## Construction Details—Styles 150, 200, 200XL and 1000

### Tube

The tube is a single-molded PTFE leakproof lining extending flange to flange. The outside of the PTFE tube is etched to adhere to the elastomeric overlay.

### Carcass

This is a high strength woven polyester or Kevlar® reinforcing fabric between the PTFE tube and the cover.

### Steel Reinforcements

These are the chemically treated solid round endless rings or high tensile strength helical wire embedded in the carcass. The steel reinforcement provides additional strength for pressure and vacuum service.

### Cover

This is the exterior elastomeric overlay designed to protect the carcass from external elements.

### Options

Flow liners are available in PTFE, metallic, or elastomeric type.

### Special Constructions

Hinged, gimbal and dual. (consult factory)

| Temperature Limits for Continuous Service |               |                     |
|---|---------------|---------------------|
| Series                                    | Temperature F | Elastomeric Cover   |
| 150                                       | 250           | Neoprene or Nitrile |
| 200                                       | 250           | Neoprene or Nitrile |
| 200XL                                     | 250           | Neoprene or Nitrile |
| 150 HT                                    | 300           | Butyl or EPDM       |
| 200 HT                                    | 300           | Butyl or EPDM       |
| 200XL/HT                                  | 300           | Butyl or EPDM       |
| 150 V                                     | 400           | Viton®              |
| 200 V                                     | 400           | Viton®              |
| 200 XL/V                                  | 400           | Viton®              |

# DURA-PERM PTFE Lined Spool Type Expansion Joint

H.S. White does not use marginal constructions which reduce safety factors and cause pressure reductions with slight operating temperature increases.

## Dimensions for DURA-PERM PTFE/FEP-Lined Style 1000 Expansion Joints

| Joint Size N.D.     | Face-to-Face   | Flange O.D.                | Bolt Circle Dia.           | No. of Bolts   | Bolt Hole Dia.          | Retaining Ring I.D.        | A-Flange Thickness<br>B-Body Thickness<br>C-Internal Arch Height<br>D-Arch Width<br>E-Arch Thickness |                            |                         |                         |                         | Style 1000 Max. PSI | Movements               |                   |                    | Weights           |                      |                    |
|---------------------|----------------|----------------------------|----------------------------|----------------|-------------------------|----------------------------|--|----------------------------|-------------------------|-------------------------|-------------------------|---------------------|-------------------------|-------------------|--------------------|-------------------|----------------------|--------------------|
|                     |                |                            |                            |                |                         |                            | A  | B                          | C                       | D                       | E                       |                     | Axial Compression       | Axial Extension   | Lateral Deflection | Joint Weight/lbs. | Retaining Rings/lbs. | Control Units Lbs. |
| 1/2<br>3/4<br>1     | 6<br>6<br>6    | 3-1/2<br>3-7/8<br>4-1/4    | 2-3/8<br>2-3/4<br>3-1/8    | 4<br>4<br>4    | 9/16<br>9/16<br>5/8     | 1-1/4<br>1-5/8<br>1-7/8    | 1/2<br>1/2<br>9/16   | 7/8<br>7/8<br>7/8          | 1<br>1<br>1             | 1-3/4<br>1-3/4<br>1-3/4 | 3/8<br>3/8<br>3/8       | 225<br>225<br>225   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 3/4<br>3/4<br>3/4  | 1<br>1.5<br>2     | 1.5<br>2<br>2.25     | 6<br>6<br>6        |
| 1-1/4<br>1-1/2<br>2 | 6<br>6<br>6    | 4-5/8<br>5<br>6            | 3-1/2<br>3-7/8<br>4-3/4    | 4<br>4<br>4    | 5/8<br>5/8<br>3/4       | 2-1/8<br>2-3/8<br>3-1/8    | 9/16<br>9/16<br>9/16   | 7/8<br>7/8<br>29/32        | 1-1/8<br>1-1/8<br>1-1/4 | 1-3/4<br>1-3/4<br>1-3/4 | 7/16<br>7/16<br>1/2     | 225<br>225<br>225   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 3/4<br>3/4<br>3/4  | 2.5<br>3<br>4     | 2.5<br>3<br>4        | 6<br>6<br>7        |
| 2-1/2<br>3<br>4     | 6<br>6<br>6    | 7<br>7-1/2<br>9            | 5-1/2<br>6<br>7-1/2        | 4<br>4<br>8    | 3/4<br>3/4<br>3/4       | 4-1/8<br>4-5/8<br>5-7/8    | 9/16<br>9/16<br>9/16   | 29/32<br>29/32<br>7/8      | 1-1/4<br>1-1/4<br>1-1/4 | 1-3/4<br>1-3/4<br>1-3/4 | 1/2<br>1/2<br>1/2       | 225<br>225<br>225   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 3/4<br>3/4<br>3/4  | 4.5<br>5.5<br>8   | 5.5<br>6<br>7.5      | 7<br>7<br>8        |
| 5<br>6<br>8         | 6<br>6<br>6    | 10<br>11<br>13-1/2         | 8-1/2<br>9-1/2<br>11-3/4   | 8<br>8<br>8    | 7/8<br>7/8<br>7/8       | 6-7/8<br>7-7/8<br>9-7/8    | 9/16<br>5/8<br>3/4   | 7/8<br>1<br>1              | 1-1/4<br>1-1/4<br>1-1/2 | 1-3/4<br>1-3/4<br>1-3/4 | 1/2<br>1/2<br>5/8       | 225<br>225<br>225   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 3/4<br>1<br>1      | 9<br>11<br>15     | 8<br>9<br>12         | 8<br>9<br>12       |
| 10<br>12<br>14      | 8<br>8<br>8    | 16<br>19<br>21             | 14-1/4<br>17<br>18-3/4     | 12<br>12<br>12 | 1<br>1<br>1-1/8         | 12-1/8<br>14-1/2<br>16-1/2 | 3/4<br>3/4<br>7/8  | 1-5/32<br>1-5/32<br>1-5/32 | 1-1/2<br>1-1/2<br>2     | 1-3/4<br>1-3/4<br>1-3/4 | 11/16<br>11/16<br>3/4   | 225<br>225<br>225   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 1<br>1<br>1        | 23<br>34<br>40    | 16<br>22<br>25       | 16<br>16<br>20     |
| 16<br>18<br>20      | 8<br>8<br>8    | 23-1/2<br>25<br>27-1/2     | 21-1/4<br>22-3/4<br>25     | 16<br>16<br>20 | 1-1/8<br>1-1/4<br>1-1/4 | 18-1/2<br>20-1/2<br>22-5/8 | 7/8<br>7/8<br>1  | 1-5/32<br>1-5/32<br>1-5/32 | 2<br>2<br>2             | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>25/32     | 160<br>160<br>130   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>3/4<br>3/4 | 1<br>1<br>1        | 47<br>56<br>67    | 27<br>29<br>35       | 20<br>21<br>21     |
| 22<br>24<br>26      | 10<br>10<br>10 | 29-1/2<br>32<br>34-1/4     | 27-1/4<br>29-1/2<br>31-3/4 | 20<br>20<br>24 | 1-3/8<br>1-3/8<br>1-3/8 | 24-5/8<br>26-5/8<br>28-7/8 | 1<br>1<br>1  | 1-5/32<br>1-5/32<br>1-3/16 | 2<br>2<br>2-1/4         | 1-3/4<br>1-3/4<br>1-3/4 | 25/32<br>25/32<br>13/16 | 130<br>130<br>110   | 1-3/4<br>1-3/4<br>1-3/4 | 3/4<br>1<br>1     | 1<br>1<br>1        | 70<br>79<br>100   | 44<br>46<br>50       | 32<br>32<br>32     |
| 28<br>30<br>34      | 10<br>10<br>10 | 36-1/2<br>38-3/4<br>43-3/4 | 34<br>36<br>40-1/2         | 28<br>28<br>32 | 1-3/8<br>1-3/8<br>1-5/8 | 30-7/8<br>32-7/8<br>37     | 1<br>1<br>1  | 1-3/16<br>1-3/16<br>1-3/16 | 2-1/4<br>2-1/4<br>2-1/4 | 1-3/4<br>1-3/4<br>1-3/4 | 13/16<br>13/16<br>13/16 | 110<br>95<br>95     | 1-3/4<br>1-3/4<br>1-3/4 | 1<br>1<br>1       | 1<br>1<br>1        | 102<br>117<br>122 | 55<br>58<br>91       | 32<br>32<br>43     |
| 36<br>40<br>42      | 10<br>10<br>12 | 46<br>50-3/4<br>53         | 42-3/4<br>47-1/4<br>49-1/2 | 32<br>36<br>36 | 1-5/8<br>1-5/8<br>1-5/8 | 39<br>43<br>45-1/4         | 1<br>1<br>1-3/16   | 1-3/16<br>1-3/16<br>1-1/4  | 2-1/4<br>2-1/4<br>2-1/2 | 2-1/4<br>2-1/4<br>2-1/4 | 13/16<br>13/16<br>29/32 | 90<br>90<br>90      | 2-1/4<br>2-1/4<br>2-1/4 | 1<br>1<br>1       | 1<br>1<br>1        | 143<br>173<br>193 | 99<br>108<br>110     | 43<br>43<br>44     |
| 44<br>48            | 12<br>12       | 55-1/4<br>59-1/2           | 51-3/4<br>56               | 40<br>44       | 1-3/4<br>1-5/8          | 47-1/4<br>51-1/4           | 1-3/16<br>1-3/16   | 1-1/4<br>1-1/4             | 2-1/2<br>2-1/2          | 2-1/4<br>2-1/4          | 29/32<br>29/32          | 90<br>90            | 2-1/4<br>2-1/4          | 1<br>1            | 1<br>1             | 198<br>211        | 136<br>154           | 44<br>87           |



# PTFE/Flexible Rubber Pipe Connectors


“Super-Quiet” Styles 3150 (150 psi WP) and 3250 (250 psi WP) sound absorbers are built with molded rubber flanged ends with bolt holes that accommodate standard steel flanges. Available with or without helical wire reinforcement. Special tubes can be made to meet unique requirements for either suction or discharge.



| Specify Flexible Connectors |           |       |
|-----------------------------|-----------|-------|
| Style 3150                  | 150# W.P. | 180°F |
| Style 3250                  | 250# W.P. | 180°F |
| Style 3150 HT               | 150# W.P. | 250°F |
| Style 3250 HT               | 250# W.P. | 250°F |

**IMPORTANT: Vibration and Sound Absorbers are not designed to accommodate the movement in a piping system caused by temperature change or other conditions. See Spool-Type Expansion Joints for such applications.**

**PTFE Lined serpent Hose**



Combines the advantages of lightweight yet durable rubber hose with PTFE's unsurpassed resistance to virtually all chemicals except molten Alkali metals such as Potassium, Lithium, and radium, as well as Fluorochemicals.

Serpent PTFE lined hose is an excellent choice for transfer service of acids, ester, acetone, aromatic hydrocarbons, organic chemicals and alcohols. UNAFLEX® hose is steam cleanable for short durations and is excellent for food handling services.

**Percentage of Reduction of Vibration Input with Frequency and Pressure as Compared to Steel Pipe**

| Center Freq. Hz | 8" I.D. x 24" F-F Vibration Joint |         |         |
|-----------------|-----------------------------------|---------|---------|
|                 | 10 psig                           | 50 psig | 80 psig |
| 440             | 87%                               | 91%     | 93%     |
| 68              | 95%                               | 96%     | 99%     |
| 125             | 98%                               | 99%     | 99%     |
| 250             | 96%                               | 97%     | 99%     |
| 500             | 91%                               | 93%     | 94%     |
| 1000            | 82%                               | 91%     | 96%     |
| 2000            | 99%                               | 99%     | 99%     |
| 4000            | 99%                               | 99%     | 99%     |
| 8000            | 97%                               | 97%     | 98%     |

EXAMPLE: If a steel piping system had a major vibration frequency of 1,000 HZ at 50 PSIG and 8" rubber expansion joint was installed in the pipeline, the percentage of reduction of vibration would be 96%. Above data taken from the Fluid Sealing Association Handbook.

| Style 3150 (Conforms to ANSI 150# Drilling) |              |           |                 |             |              |                       |            |             | Style 3250 (Conforms to ANSI 300# Drilling) |             |              |                       |            |             |
|---|--------------|-----------|-----------------|-------------|--------------|-----------------------|------------|-------------|---|-------------|--------------|-----------------------|------------|-------------|
| Joint Size N.D. (in.)                       | Face-to-Face |           | Ring I.D. (in.) | Flange      |              | Bolt Cir. Diam. (in.) | Bolt Holes |             | Ring I.D. (in.)                             | Flange      |              | Bolt Cir. Diam. (in.) | Bolt Holes |             |
|   | Min (in.)    | Max (in.) |                 | Diam. (in.) | Thick. (in.) |                       | No.        | Diam. (in.) |   | Diam. (in.) | Thick. (in.) |                       | No.        | Diam. (in.) |
| 1-1/2                                       | 12           | 24        | 2-7/8           | 5           | 11/16        | 3-7/8                 | 4          | 5/8         | 2-7/8                                       | 6-1/8       | 23/32        | 4-1/2                 | 4          | 7/8         |
| 2   | 12           | 24        | 3-5/8           | 6           | 11/16        | 4-3/4                 | 4          | 3/4         | 3-5/8                                       | 6-1/2       | 23/32        | 5                     | 8          | 3/4         |
| 3   | 12           | 36        | 4-5/8           | 7-1/2       | 27/32        | 6                     | 4          | 3/4         | 4-5/8                                       | 8-1/4       | 27/32        | 6-5/8                 | 8          | 7/8         |
| 4   | 12           | 36        | 5-7/8           | 9           | 27/32        | 7-1/2                 | 4          | 3/4         | 5-7/8                                       | 10          | 7/8          | 7-7/8                 | 8          | 7/8         |
| 5   | 12           | 36        | 6-7/8           | 10          | 15/16        | 8-1/2                 | 8          | 7/8         | 6-7/8                                       | 11          | 15/16        | 9-1/4                 | 8          | 7/8         |
| 6   | 18           | 36        | 7-7/8           | 11          | 31/32        | 9-1/2                 | 8          | 7/8         | 7-7/8                                       | 12-1/2      | 15/16        | 10-5/8                | 12         | 7/8         |
| 8   | 24           | 48        | 9-7/8           | 13-1/2      | 31/32        | 11-3/4                | 8          | 7/8         | 9-7/8                                       | 15          | 1-1/16       | 13                    | 12         | 1           |
| 10  | 24           | 48        | 12-1/8          | 16          | 1-3/16       | 14-1/4                | 12         | 1           | 12-1/8                                      | 17-1/2      | 1-11/32      | 15-1/4                | 16         | 1-1/8       |
| 12  | 24           | 48        | 14-1/2          | 19          | 1-7/32       | 17                    | 12         | 1           | 14-1/2                                      | 20-1/2      | 1-11/32      | 17-3/4                | 16         | 1-1/4       |

# PTFE/Flexible Rubber Pipe Connector Construction Features

## Tube

Smooth, non-stick PTFE or FEP tube.

## Carcass

Rubber, reinforced with spirals of yarn and double spiral helix wire for maximum flexibility.

## Cover

Standard Neoprene or EPDM for abrasion, weather and ozone resistance. Also pin pricked to allow for slight permeation through the outer cover if it should occur.

## Lengths

Standard in 50 or 60 foot lengths. Shorter lengths available with built-in integral duck and rubber flanges with beaded ends where all wetted surfaces are PTFE.

## Temperature Resistance

Up to 350°F with EPDM, up to 400°F with Viton® and Kevlar® reinforcement. Pressure ratings must be reduced as temperatures increase over 212°F.

## Sizes

Serpent PTFE lined Rubber Hose is available in a wide range of sizes including large bore capacity up through 48" ID contact factory with your requirements.

## Fittings

Capabilities to build a duck and rubber flange or beading end into the hose which allows the PTFE liner to extend up the face of the flange or beaded end. These are tough durable fittings which have unique properties. Stainless steel swaged fittings are also available.

**Specifications for UNA-CHEM S-250 Series**

| Part Number | Size ID (in.) | Size Nominal (in.) | Working Pressure (psi) | Minimum Burst Pressure (psi) | Minimum Rec. Bend Radius (in.) | Approx. Weight per Food (lbs.) | Vacuum Rating In. (Hg) |
|-------------|---------------|--------------------|------------------------|------------------------------|--------------------------------|--------------------------------|------------------------|
| S-250-50    | 1/2           | 1.04               | 200                    | 2400                         | 3                              | 0.47                           | 30                     |
| S-250-75    | 3/4           | 1.29               | 200                    | 2400                         | 6                              | 0.60                           | 30                     |
| S-250-100   | 1             | 1.54               | 200                    | 2400                         | 9                              | 0.73                           | 30                     |
| S-250-125   | 1-1/4         | 1.8                | 200                    | 2000                         | 11                             | 0.90                           | 30                     |
| S-250-150   | 1-1/2         | 2.05               | 200                    | 1800                         | 12                             | 1.04                           | 30                     |
| S-250-200   | 2             | 2.55               | 200                    | 1500                         | 16                             | 1.32                           | 30                     |
| S-250-300   | 3             | 3.64               | 200                    | 900                          | 30                             | 2.00                           | 30                     |
| S-250-400z  | 4             | 4.68               | 200                    | 700                          | 40                             | 3.08                           | 30                     |

## PTFE Lined Metal Pump Connectors

UNALON® Series 8000 PTFE combines the corrosion resistance of PTFE with the pressure and safety characteristics of stainless steel, corrugated hose and braid available with standard, metric or special flanges. Units can also be provided with floating flanges to facilitate installation. For environmentally corrosive applications, these units can also be provided with vulcanized elastomeric coverings on the outer braid. Lengths up to 50' available.



**Flanged Metal Pump Connector Specifications**

| Part Number<br>TFE | Flange IPS and<br>Nom. Hose I.D.<br>(in.) | Overall Length<br>(in.) | Max Working<br>Press.@ Room<br>Temp (psi) | Approx. Wt. (lbs.)<br>Per Unit |
|--------------------|---|-------------------------|---|--------------------------------|
| 8202               | 2-1/2                                     | 9                       | 250                                       | 16                             |
| 8003               | 3   | 9                       | 250                                       | 19                             |
| 8203               | 3-1/2                                     | 9                       | 200                                       | 23                             |
| 8004               | 4   | 9                       | 200                                       | 19                             |
| 8005               | 6   | 11                      | 200                                       | 32                             |
| 8006               | 6   | 11                      | 200                                       | 40                             |
| 8008               | 8   | 12                      | 200                                       | 62                             |
| 8010               | 10  | 13                      | 150                                       | 101                            |
| 8012               | 12  | 14                      | 125                                       | 153                            |
| 8014               | 14  | 14                      | 100                                       | 200                            |