# Telescoping 

| Female (outer) | Nominal <br> Clearance |  | Male (inner) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | b | top | side | d | b |
| d | b | t | top |  |  |  |
| mm | mm | mm | mm | mm | mm | mm |

SQUARE HOLLOW SECTIONS

| 13 | 13 | 1.8 | No Section |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 15 | 15 | 1.8 | $\mathbf{y}$ Available |  |  |  |
| 20 | 20 | 1.6 | $\mathbf{1 . 8}$ | $\mathbf{1 . 8}$ | $\mathbf{1 5}$ | $\mathbf{1 5}$ |
| 25 | 25 | 1.6 | $\mathbf{1 . 8}$ | $\mathbf{1 . 8}$ | $\mathbf{2 0}$ | $\mathbf{2 0}$ |
| 25 | 25 | 2.0 | $\mathbf{1 . 0}$ | $\mathbf{1 . 0}$ | $\mathbf{2 0}$ | $\mathbf{2 0}$ |
| 25 | 25 | 2.5 | $\mathbf{0 . 0}$ | $\mathbf{0 . 0}$ | $\mathbf{2 0}$ | $\mathbf{2 0}$ |
| 30 | 30 | 1.6 | $\mathbf{1 . 8}$ | $\mathbf{1 . 8}$ | $\mathbf{2 5}$ | $\mathbf{2 5}$ |
| $\mathbf{3 0}$ | 30 | 2.0 | $\mathbf{1 . 0}$ | $\mathbf{1 . 0}$ | $\mathbf{2 5}$ | $\mathbf{2 5}$ |
| 35 | 35 | 1.6 | $\mathbf{1 . 8}$ | $\mathbf{1 . 8}$ | $\mathbf{3 0}$ | $\mathbf{3 0}$ |
| $\mathbf{3 5}$ | 35 | 2.0 | $\mathbf{1 . 0}$ | $\mathbf{1 . 0}$ | $\mathbf{3 0}$ | $\mathbf{3 0}$ |
| $\mathbf{3 5}$ | 35 | 2.5 | $\mathbf{0 . 0}$ | $\mathbf{0 . 0}$ | $\mathbf{3 0}$ | $\mathbf{3 0}$ |
| $\mathbf{3 5}$ | 35 | 3.0 | $\mathbf{4 . 0}$ | $\mathbf{4 . 0}$ | $\mathbf{2 5}$ | $\mathbf{2 5}$ |
| 40 | 40 | 1.6 | $\mathbf{1 . 8}$ | $\mathbf{1 . 8}$ | $\mathbf{3 5}$ | $\mathbf{3 5}$ |
| 40 | 40 | 2.0 | $\mathbf{1 . 0}$ | $\mathbf{1 . 0}$ | $\mathbf{3 5}$ | $\mathbf{3 5}$ |
| 40 | 40 | 2.5 | $\mathbf{0 . 0}$ | $\mathbf{0 . 0}$ | $\mathbf{3 5}$ | $\mathbf{3 5}$ |
| 40 | 40 | 3.0 | 4.0 | 4.0 | 30 | 30 |
| 40 | 40 | 4.0 | 2.0 | 2.0 | 30 | 30 |
| 50 | 50 | 1.6 | 6.8 | 6.8 | 40 | 40 |
| 50 | 50 | 2.0 | 6.0 | 6.0 | 40 | 40 |
| 50 | 50 | 2.5 | 5.0 | 5.0 | 40 | 40 |
| 50 | 50 | 3.0 | 4.0 | 4.0 | 40 | 40 |
| 50 | 50 | 4.0 | 2.0 | 2.0 | 40 | 40 |
| 50 | 50 | 5.0 | $\mathbf{0 . 0}$ | $\mathbf{0 . 0}$ | $\mathbf{4 0}$ | $\mathbf{4 0}$ |
| 65 | 65 | 1.6 | 11.8 | 11.8 | 50 | 50 |
| 65 | 65 | 2.0 | 11.0 | 11.0 | 50 | 50 |
| 65 | 65 | 2.5 | 10.0 | 10.0 | 50 | 50 |
| 65 | 65 | 3.0 | 9.0 | 9.0 | 50 | 50 |
| 65 | 65 | 4.0 | 7.0 | 7.0 | 50 | 50 |
| 65 | 65 | 5.0 | 5.0 | 5.0 | 50 | 50 |
| 65 | 65 | 6.0 | 3.0 | 3.0 | 50 | 50 |
| 75 | 75 | 2.0 | 6.0 | 6.0 | 65 | 65 |
| 75 | 75 | 2.5 | 5.0 | 5.0 | 65 | 65 |
| 75 | 75 | 3.0 | 4.0 | 4.0 | 65 | 65 |
| 75 | 75 | 3.5 | 3.0 | 3.0 | 65 | 65 |
| 75 | 75 | 4.0 | 2.0 | 2.0 | 65 | 65 |
| 75 | 75 | 5.0 | $\mathbf{0 . 0}$ | $\mathbf{0 . 0}$ | $\mathbf{6 5}$ | $\mathbf{6 5}$ |
| 75 | 75 | 6.0 | 13.0 | 13.0 | 50 | 50 |
|  |  |  |  |  |  |  |

## NOTE

RHS is not a precision tube and all dimensions shown in the chart, although in accordance with the specifications, may vary marginally within the tolerance bands permitted.
Sizes shown in bold print are sizes that provide a clearance of less than 2.0 mm . The internal weld bead and variation in corner radii between sections will need to be considered when closer fits are indicated. Where telescoping over some length is desired, additional allowance may be needed for straightness. For tight fits it is recommended that some form of testing be carried out prior to committing material.
HOW TO USE THIS CHART

1. Select the appropriate table for the type of hollow section required. Select the size of female (or outside) member closest to your requirements for the left hand column.
2. Depending on the application select the clearance required between the two members. Members may need to slide freely inside each other, or be locked with a pin, spot welded or fixed with wedges. This means, in some cases, a 'sloppy' fit may be suitable, while for others the tightest fit possible may be more appropriate.

| Female (outer) |  |  | Nominal Clearance |  | Male (inner) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{gathered} \mathrm{d} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{b} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{t} \\ \mathrm{~mm} \end{gathered}$ | top mm | side <br> mm | $\begin{gathered} \mathrm{d} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{b} \\ \mathrm{~mm} \end{gathered}$ |
| 89 | 89 | 3.5 | 7.0 | 7.0 | 75 | 75 |
| 89 | 89 | 5.0 | 4.0 | 4.0 | 75 | 75 |
| 89 | 89 | 6.0 | 2.0 | 2.0 | 75 | 75 |
| 90 | 90 | 2.0 | 11.0 | 11.0 | 75 | 75 |
| 90 | 90 | 2.5 | 10.0 | 10.0 | 75 | 75 |
| 100 | 100 | 2.0 | 6.0 | 6.0 | 90 | 90 |
| 100 | 100 | 2.5 | 5.0 | 5.0 | 90 | 90 |
| 100 | 100 | 3.0 | 4.0 | 4.0 | 90 | 90 |
| 100 | 100 | 4.0 | 2.0 | 2.0 | 90 | 90 |
| 100 | 100 | 5.0 | 0.0 | 0.0 | 90 | 90 |
| 100 | 100 | 6.0 | 13.0 | 13.0 | 75 | 75 |
| 100 | 100 | 9.0 | 7.0 | 7.0 | 75 | 75 |
| 125 | 125 | 4.0 | 17.0 | 17.0 | 100 | 100 |
| 125 | 125 | 5.0 | 15.0 | 15.0 | 100 | 100 |
| 125 | 125 | 6.0 | 13.0 | 13.0 | 100 | 100 |
| 125 | 125 | 9.0 | 7.0 | 7.0 | 100 | 100 |
| 150 | 150 | 5.0 | 15.0 | 15.0 | 125 | 125 |
| 150 | 150 | 6.0 | 13.0 | 13.0 | 125 | 125 |
| 150 | 150 | 9.0 | 7.0 | 7.0 | 125 | 125 |
| 200 | 200 | 5.0 | 40.0 | 40.0 | 150 | 150 |
| 200 | 200 | 6.0 | 38.0 | 38.0 | 150 | 150 |
| 200 | 200 | 9.0 | 32.0 | 32.0 | 150 | 150 |
| 250 | 250 | 6.0 | 38.0 | 38.0 | 200 | 200 |
| 250 | 250 | 9.0 | 32.0 | 32.0 | 200 | 200 |

## RECTANGULAR HOLLOW SECTIONS

$50 \quad 20 \quad 16$

| 50 | 20 | 2.0 | No Section <br> Available |  |  |  |  |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | :---: |
| 50 | 20 | 2.5 |  |  |  |  |  |
| 50 | 20 | 3.0 |  |  |  |  |  |
| 50 | 25 | 1.6 |  | No Section |  |  |  |
| 50 | 25 | 2.0 | Available |  |  |  |  |
| 50 | 25 | 2.5 |  |  |  |  |  |
| 50 | 25 | 3.0 |  | 60 | 25 |  |  |
| 65 | 35 | 2.0 | 11.0 | 6.0 | 50 |  |  |
| 65 | 35 | 2.5 | 10.0 | 5.0 | 50 | 25 |  |
| 65 | 35 | 3.0 | 9.0 | 4.0 | 50 | 25 |  |
| 65 | 35 | 4.0 | 7.0 | 2.0 | 50 | 25 |  |
| 75 | 25 | 1.6 | 21.8 | $\mathbf{1 . 8}$ | $\mathbf{5 0}$ | $\mathbf{2 0}$ |  |
| 75 | 25 | 2.0 | 21.0 | $\mathbf{1 . 0}$ | $\mathbf{5 0}$ | $\mathbf{2 0}$ |  |
| 75 | 25 | 2.5 | 20.0 | $\mathbf{0 . 0}$ | $\mathbf{5 0}$ | $\mathbf{2 0}$ |  |

3. Having selected the most suitable clearance for your application, take the appropriate size of the male (inner) section from the right hand column, eg:

## $\begin{array}{ccc}\text { Female Section } & \text { Clearance } & \text { Male Section } \\ \text { (outer) } & \text { mm } & \text { (inner) } \\ 75 \times 75 \times 3.0 & 4.0 \times 4.0 & 65 \times 65\end{array}$ <br> $4.0 \times 4.0$

Note that clearance is total available difference between member dimensions, not the gap on both sides.
4. Where two telescoping sections are being used, thickness should be similar and will be determined by normal structural requirements. If a third section is to be used, consideration of both clearance and thickness within the size list available may be required.
5. RHS has the obvious advantage that its shape prevents rotation of the sections. When pipe is used it may need to be fixed against twisting by welding or bolting.
6. Press Fit. For short pieces with no need for separation or sliding an interference fit can be achieved using the available ductility of the steel.

| Female (outer) |  |  | Nominal Clearance |  | Male (inner) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{gathered} \mathrm{d} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{b} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{t} \\ \mathrm{~mm} \end{gathered}$ | top <br> mm | side <br> mm | $\begin{gathered} \mathrm{d} \\ \mathrm{~mm} \end{gathered}$ | $\begin{gathered} \mathrm{b} \\ \mathrm{~mm} \end{gathered}$ |
| 75 | 50 | 1.6 | 6.8 | 11.8 | 65 | 35 |
| 75 | 50 | 2.0 | 6.0 | 11.0 | 65 | 35 |
| 75 | 50 | 2.5 | 5.0 | 10.0 | 65 | 35 |
| 75 | 50 | 3.0 | 4.0 | 9.0 | 65 | 35 |
| 75 | 50 | 4.0 | 2.0 | 7.0 | 65 | 35 |
| 75 | 50 | 5.0 | 0.0 | 5.0 | 65 | 35 |
| 75 | 50 | 6.0 | 13.0 | 13.0 | 50 | 25 |
| 100 | 50 | 1.6 | 21.8 | 21.8 | 75 | 25 |
| 100 | 50 | 2.0 | 21.0 | 21.0 | 75 | 25 |
| 100 | 50 | 2.5 | 20.0 | 20.0 | 75 | 25 |
| 100 | 50 | 3.0 | 19.0 | 19.0 | 75 | 25 |
| 100 | 50 | 3.5 | 18.0 | 18.0 | 75 | 25 |
| 100 | 50 | 4.0 | 17.0 | 17.0 | 75 | 25 |
| 100 | 50 | 5.0 | 15.0 | 15.0 | 75 | 25 |
| 100 | 50 | 6.0 | 13.0 | 13.0 | 75 | 25 |
| 100 | 50 | 1.6 | 31.8 | 11.8 | 65 | 35 |
| 100 | 50 | 2.0 | 31.0 | 11.0 | 65 | 35 |
| 100 | 50 | 2.5 | 30.0 | 10.0 | 65 | 35 |
| 100 | 50 | 3.0 | 29.0 | 9.0 | 65 | 35 |
| 100 | 50 | 3.5 | 28.0 | 8.0 | 65 | 35 |
| 100 | 50 | 4.0 | 27.0 | 7.0 | 65 | 35 |
| 100 | 50 | 5.0 | 25.0 | 5.0 | 65 | 35 |
| 100 | 50 | 6.0 | 23.0 | 3.0 | 65 | 35 |
| 125 | 75 | 2.0 | 21.0 | 21.0 | 100 | 50 |
| 125 | 75 | 2.5 | 20.0 | 20.0 | 100 | 50 |
| 125 | 75 | 3.0 | 19.0 | 19.0 | 100 | 50 |
| 125 | 75 | 4.0 | 17.0 | 17.0 | 100 | 50 |
| 125 | 75 | 5.0 | 15.0 | 15.0 | 100 | 50 |
| 125 | 75 | 6.0 | 13.0 | 13.0 | 100 | 50 |
| 150 | 100 | 4.0 | 17.0 | 17.0 | 125 | 75 |
| 150 | 100 | 5.0 | 15.0 | 15.0 | 125 | 75 |
| 150 | 100 | 6.0 | 13.0 | 13.0 | 125 | 75 |
| 150 | 100 | 9.0 | 7.0 | 7.0 | 125 | 75 |
| 200 | 100 | 4.0 | 42.0 | 42.0 | 150 | 50 |
| 200 | 100 | 5.0 | 40.0 | 40.0 | 150 | 50 |
| 200 | 100 | 6.0 | 38.0 | 38.0 | 150 | 50 |
| 200 | 100 | 9.0 | 32.0 | 32.0 | 150 | 50 |
| 250 | 150 | 5.0 | 40.0 | 40.0 | 200 | 100 |
| 250 | 150 | 6.0 | 38.0 | 38.0 | 200 | 100 |
| 250 | 150 | 9.0 | 32.0 | 32.0 | 200 | 100 |



Note
Sizes where clearance is shown as 0.0 will generally require press fit.

## Telescoping



| Female (outer) |  |  | Male (inner) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DN | Size Quality | $\mathrm{d}_{0}$ | t | DN | Size <br> $d_{0}$ | Minimum Clearance mm |
| 65 | Extra Light | 76.1 | $\times$ | 50 | 60.3 | 9.8 |
|  | Galtube |  | 2.6 | 50 | 60.3 | 9.2 |
|  | Light |  | 3.2 | 50 | 60.3 | 8.0 |
|  | Medium |  | 3.6 | 50 | 60.3 | 7.2 |
|  | Heavy |  | 4.5 | 50 | 60.3 | 5.4 |
|  | Extra Heavy |  | 5.9 | 50 | 60.3 | 2.6 |
| 80 | Light | 88.9 | $\times$ | 65 | 76.1 | 4.8 |
|  | Medium |  | 4.0 | 65 | 76.1 | 3.2 |
|  | Heavy |  | 5.0 | 65 | 76.1 | 1.2 |
|  | Extra Heavy |  | 5.9 | 50 | 60.3 | 15.3 |
| 90 | Extra Light | 101.6 | $\times$ | 80 | 88.9 | 5.6 |
|  | Light |  | 3.2 | 80 | 88.9 | 4.4 |
|  | Medium |  | 4.0 | 80 | 88.9 | 2.8 |
|  | Heavy |  | 5.0 | 80 | 88.9 | 0.8 |
| 100 | Extra Light | 114.3 | $\times$ | 90 | 101.6 | 4.1 |
|  | Light |  | 3.6 | 90 | 101.6 | 3.3 |
|  | Medium |  | 4.5 | 90 | 101.6 | 1.5 |
|  | Heavy |  | 5.4 | 80 | 88.9 | 12.6 |
| 125 | Extra Light | 139.7 | $\times$ | 100 | 114.3 | 16.9 |
|  | Light |  | 3.5 | 100 | 114.3 | 15.9 |
|  | Medium |  | 5.0 | 100 | 114.3 | 12.9 |
|  | Heavy |  | 5.4 | 100 | 114.3 | 12.1 |
| 150 | Light | 165.1 | $\times$ | 125 | 139.7 | 15.4 |
|  | Medium |  | 5.0 | 125 | 139.7 | 12.4 |
|  | Heavy |  | 5.4 | 125 | 139.7 | 11.6 |

NOTE
Clearance $=\left(\right.$ AS1163 Min $\left.d_{0}-2 t\right)-\left(\right.$ AS1163 Max $\left.d_{0}\right)$
CHS is not a precision tube and all dimensions shown in the chart, although in accordance with the specifications, may vary marginally within the tolerance bands permitted.

## Sizes shown in bold print are sizes that provide

 a clearance of less than 2.0 mm . The internal weld bead will need to be considered when closer fits are indicated. Where telescoping over some length is desired, additional allowance may be needed for straightness. For tight fits it is recommended that some form of testing be carried out prior to committing material.HOW TO USE THIS CHART

1. Select the size of female (or outer) member closest to your requirements from the left hand column.
2. Depending on the application select the clearance required between the two members

Members may need to slide freely inside each other, or be locked with a pin, spot welded or fixed with wedges. This means, in some cases, a 'sloppy' fit may be suitable, while for others the tightest fit possible may be more appropriate. (See Note 6 Press Fit).
3. Having selected the most suitable clearance for your application, take the appropriate size of the male (inner) section from the centre column, eg:

## Female Section Male Section Clearance (outer) 76.1×5.9 <br> (inner) <br> 60.3 <br> mm

Note that clearance is total available difference between member dimensions, not the gap on both sides.
4. Where two telescoping sections are being used, thickness should be similar and will be determined by normal structural requirements. If a third sections is the be used, consideration of both clearance and thickness within the size list available may be required.

5. Pipe may need to be fixed against twisting by welding or bolting.
6. Press Fit. For short pieces with no need for separation or sliding an interference fit can be achieved using the available ductility of the steel.

