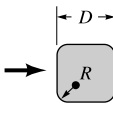

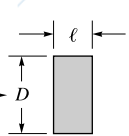
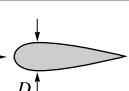
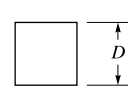

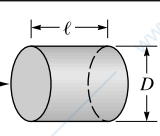


Shape	Reference area A ($b = \text{length}$)	Drag coefficient $C_D = \frac{\mathcal{D}}{\frac{1}{2}\rho U^2 A}$														
 Square rod with rounded corners	$A = bD$	<table border="1"> <tr> <th>R/D</th> <th>C_D</th> </tr> <tr> <td>0</td> <td>2.2</td> </tr> <tr> <td>0.02</td> <td>2.0</td> </tr> <tr> <td>0.17</td> <td>1.2</td> </tr> <tr> <td>0.33</td> <td>1.0</td> </tr> </table>	R/D	C_D	0	2.2	0.02	2.0	0.17	1.2	0.33	1.0				
R/D	C_D															
0	2.2															
0.02	2.0															
0.17	1.2															
0.33	1.0															
 Semicircular shell	$A = bD$	<table border="1"> <tr> <th>Direction</th> <th>C_D</th> </tr> <tr> <td>→</td> <td>2.3</td> </tr> <tr> <td>←</td> <td>1.1</td> </tr> </table>	Direction	C_D	→	2.3	←	1.1								
Direction	C_D															
→	2.3															
←	1.1															
 Rectangle	$A = bD$	<table border="1"> <tr> <th>l/D</th> <th>C_D</th> </tr> <tr> <td>≤ 0.1</td> <td>1.9</td> </tr> <tr> <td>0.5</td> <td>2.5</td> </tr> <tr> <td>0.65</td> <td>2.9</td> </tr> <tr> <td>1.0</td> <td>2.2</td> </tr> <tr> <td>2.0</td> <td>1.6</td> </tr> <tr> <td>3.0</td> <td>1.3</td> </tr> </table>	l/D	C_D	≤ 0.1	1.9	0.5	2.5	0.65	2.9	1.0	2.2	2.0	1.6	3.0	1.3
l/D	C_D															
≤ 0.1	1.9															
0.5	2.5															
0.65	2.9															
1.0	2.2															
2.0	1.6															
3.0	1.3															
 Streamlined strut	$A = bD$	0.12														
 Cube	$A = D^2$	1.05														
 Hollow hemisphere	$A = \frac{\pi}{4} D^2$	<table border="1"> <tr> <th>Direction</th> <th>C_D</th> </tr> <tr> <td>→</td> <td>1.42</td> </tr> <tr> <td>←</td> <td>0.38</td> </tr> </table>	Direction	C_D	→	1.42	←	0.38								
Direction	C_D															
→	1.42															
←	0.38															
 Circular rod parallel to flow	$A = \frac{\pi}{4} D^2$	<table border="1"> <tr> <th>l/D</th> <th>C_D</th> </tr> <tr> <td>0.5</td> <td>1.1</td> </tr> <tr> <td>1.0</td> <td>0.93</td> </tr> <tr> <td>2.0</td> <td>0.83</td> </tr> <tr> <td>4.0</td> <td>0.85</td> </tr> </table>	l/D	C_D	0.5	1.1	1.0	0.93	2.0	0.83	4.0	0.85				
l/D	C_D															
0.5	1.1															
1.0	0.93															
2.0	0.83															
4.0	0.85															


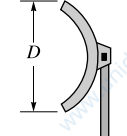

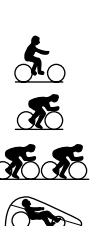
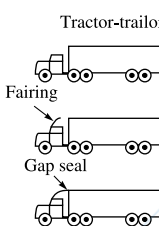

Shape	Reference area	Drag coefficient C_D												
 Parachute	Frontal area $A = \frac{\pi}{4} D^2$	1.4												
 Porous parabolic dish	Frontal area $A = \frac{\pi}{4} D^2$	<table border="1"> <tr> <th>Porosity</th> <th>0</th> <th>0.2</th> <th>0.5</th> </tr> <tr> <td>→</td> <td>1.42</td> <td>1.20</td> <td>0.82</td> </tr> <tr> <td>←</td> <td>0.95</td> <td>0.90</td> <td>0.80</td> </tr> </table> <p>Porosity = open area/total area</p>	Porosity	0	0.2	0.5	→	1.42	1.20	0.82	←	0.95	0.90	0.80
Porosity	0	0.2	0.5											
→	1.42	1.20	0.82											
←	0.95	0.90	0.80											
 Average person	Standing Sitting Crouching	$C_D A = 9 \text{ ft}^2$ $C_D A = 6 \text{ ft}^2$ $C_D A = 2.5 \text{ ft}^2$												
 Bikes	Upright commuter Racing Drafting Streamlined	$A = 5.5 \text{ ft}^2$ $A = 3.9 \text{ ft}^2$ $A = 3.9 \text{ ft}^2$ $A = 5.0 \text{ ft}^2$												
 Tractor-trailer trucks	Standard Fairing With fairing Gap seal With fairing and gap seal	Frontal area 0.96 Frontal area 0.76 Frontal area 0.70												
 Tree	Frontal area $U = 10 \text{ m/s}$ $U = 20 \text{ m/s}$ $U = 30 \text{ m/s}$	0.43 0.26 0.20												

Figure 14.18 Typical drag coefficients for objects of interest; $Re \geq 10^4$.