



**PIPES & TUBES**

# PRODUCT

## SEAMLESS AND WELDED PIPES AND TUBES.

### Standards:

|                                      |                                                    |
|--------------------------------------|----------------------------------------------------|
| ASTM A213/A213M<br>ASME SA213/SA213M | Ferritic and austenitic alloy steel seamless tubes |
| ASTM A268/A268M<br>ASME SA268/SA268M | Ferritic and martensitic seamless and welded tubes |
| ASTM A269/A269M                      | Austenitic seamless and welded tubes               |
| ASTM A312/A312M<br>ASME SA312/SA312M | Austenitic seamless and welded pipes               |
| ASTM A376/A376M<br>ASME SA376/SA376M | Austenitic seamless pipes for high temperature     |
| ASTM A789/A789M<br>ASME SA789/A789M  | Ferritic and austenitic seamless and welded tubes  |
| ASTM A790/A790M<br>ASME SA790/SA790M | Ferritic and austenitic seamless and welded pipes  |

### MATERIALS:

#### Austenitic Steel Grades:

**TP304 / TP304L / TP304H**  
**1.4301 / 1.4306 / 1.4948**

**TP310S / TP310H**  
**1.4845 / TP1.4335**

**TP316 / TP316L / TP316H / TP316Ti**  
**1.4401 / 1.4404 / 1.4918 / 1.4571**

**TP321 / TP321H**  
**1.4541 / 1.4941**

**TP347 / TP347H**  
**1.4550 / 1.4912**

**TP317 / TP317L**  
**1.4438 / 1.4466**

### MATERIALS:

#### Duplex Steel Grades:

**UNS S32304**  
**1.4362**

**UNS S31803**  
**1.4462**

**UNS S32750**  
**1.4410**

**UNS S32760**  
**1.4501**

### SIZES:

**Pipes**  
**1/8" to 48"**

**Tubes**  
**6mm to 101.60mm**



# Steel pipe - Dimensions and weights

## ANSI/ASME B36.19M

| Nominal<br>Pipe Size | OD     |       | Schedule 5S |      |        | Schedule 10S       |                   |                    | Schedule 40S       |                   |                    | Schedule 80S       |                    |                     |
|----------------------|--------|-------|-------------|------|--------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|--------------------|---------------------|
|                      | in     | mm    | in          | mm   | kg/m   | in                 | mm                | kg/m               | in                 | mm                | kg/m               | in                 | mm                 | kg/m                |
| 1/8                  | 0.405  | 10.3  | -           | -    | -      | 0.049              | 1.24              | 0.28               | 0.068              | 1.73              | 0.37               | 0.095              | 2.41               | 0.47                |
| 1/4                  | 0.540  | 13.7  | -           | -    | -      | 0.065              | 1.65              | 0.49               | 0.088              | 2.24              | 0.63               | 0.119              | 3.02               | 0.80                |
| 3/8                  | 0.675  | 17.1  | -           | -    | -      | 0.065              | 1.65              | 0.63               | 0.091              | 2.31              | 0.84               | 0.126              | 3.20               | 1.10                |
| 1/2                  | 0.840  | 21.3  | 0.065       | 1.65 | 0.80   | 0.083              | 2.11              | 1.00               | 0.109              | 2.77              | 1.27               | 0.147              | 3.73               | 1.62                |
| 3/4                  | 1.050  | 26.7  | 0.065       | 1.65 | 1.03   | 0.083              | 2.11              | 1.28               | 0.113              | 2.87              | 1.69               | 0.154              | 3.91               | 2.20                |
| 1                    | 1.315  | 33.4  | 0.065       | 1.65 | 1.30   | 0.109              | 2.77              | 2.09               | 0.133              | 3.38              | 2.50               | 0.179              | 4.55               | 3.24                |
| 1 1/4                | 1.660  | 42.2  | 0.065       | 1.65 | 1.65   | 0.109              | 2.77              | 2.70               | 0.140              | 3.56              | 3.39               | 0.191              | 4.85               | 4.47                |
| 1 1/2                | 1.900  | 48.3  | 0.065       | 1.65 | 1.91   | 0.109              | 2.77              | 3.11               | 0.145              | 3.68              | 4.05               | 0.200              | 5.08               | 5.41                |
| 2                    | 2.375  | 60.3  | 0.065       | 1.65 | 2.40   | 0.109              | 2.77              | 3.93               | 0.154              | 3.91              | 5.44               | 0.218              | 5.54               | 7.48                |
| 2 1/2                | 2.875  | 73.0  | 0.083       | 2.11 | 3.69   | 0.120              | 3.05              | 5.26               | 0.203              | 5.16              | 8.63               | 0.276              | 7.01               | 11.41               |
| 3                    | 3.500  | 88.9  | 0.083       | 2.11 | 4.51   | 0.120              | 3.05              | 6.45               | 0.216              | 5.49              | 11.29              | 0.300              | 7.62               | 15.27               |
| 3 1/2                | 4.000  | 101.6 | 0.083       | 2.11 | 5.18   | 0.120              | 3.05              | 7.40               | 0.226              | 5.74              | 13.57              | 0.318              | 8.08               | 18.63               |
| 4                    | 4.500  | 114.3 | 0.083       | 2.11 | 5.84   | 0.120              | 3.05              | 8.36               | 0.237              | 6.02              | 16.07              | 0.337              | 8.56               | 22.32               |
| 5                    | 5.563  | 141.3 | 0.109       | 2.77 | 9.47   | 0.134              | 3.40              | 11.57              | 0.258              | 6.55              | 21.77              | 0.375              | 9.53               | 30.97               |
| 6                    | 6.625  | 168.3 | 0.109       | 2.77 | 11.32  | 0.134              | 3.40              | 13.84              | 0.280              | 7.11              | 28.26              | 0.432              | 10.97              | 42.56               |
| 8                    | 8.625  | 219.1 | 0.109       | 2.77 | 14.79  | 0.148              | 3.76              | 19.96              | 0.322              | 8.18              | 42.55              | 0.500              | 12.70              | 64.64               |
| 10                   | 10.750 | 273.1 | 0.134       | 3.40 | 22.63  | 0.165              | 4.19              | 27.78              | 0.365              | 9.27              | 60.31              | 0.500 <sup>2</sup> | 12.70 <sup>2</sup> | 96.01 <sup>2</sup>  |
| 12                   | 12.750 | 323.9 | 0.156       | 3.96 | 31.25  | 0.180              | 4.57              | 36.00              | 0.375 <sup>2</sup> | 9.53 <sup>2</sup> | 73.88 <sup>2</sup> | 0.500 <sup>2</sup> | 12.70 <sup>2</sup> | 132.08 <sup>2</sup> |
| 14                   | 14.000 | 355.6 | 0.156       | 3.96 | 34.36  | 0.188 <sup>2</sup> | 4.78 <sup>2</sup> | 41.30 <sup>2</sup> | -                  | -                 | -                  | -                  | -                  | -                   |
| 16                   | 16.000 | 406.4 | 0.165       | 4.19 | 41.56  | 0.188 <sup>2</sup> | 4.78 <sup>2</sup> | 47.29 <sup>2</sup> | -                  | -                 | -                  | -                  | -                  | -                   |
| 18                   | 18.000 | 457   | 0.165       | 4.19 | 46.81  | 0.188 <sup>2</sup> | 4.78 <sup>2</sup> | 53.26 <sup>2</sup> | -                  | -                 | -                  | -                  | -                  | -                   |
| 20                   | 20.000 | 508   | 0.188       | 4.78 | 59.25  | 0.218 <sup>2</sup> | 5.54 <sup>2</sup> | 68.61 <sup>2</sup> | -                  | -                 | -                  | -                  | -                  | -                   |
| 22                   | 22.000 | 559   | 0.188       | 4.78 | 65.24  | 0.218 <sup>2</sup> | 5.54 <sup>2</sup> | 75.53 <sup>2</sup> | -                  | -                 | -                  | -                  | -                  | -                   |
| 24                   | 24.000 | 610   | 0.218       | 5.54 | 82.47  | 0.250              | 6.35              | 94.45              | -                  | -                 | -                  | -                  | -                  | -                   |
| 30                   | 30.000 | 762   | 0.250       | 6.35 | 118.31 | 0.312              | 7.92              | 147.36             | -                  | -                 | -                  | -                  | -                  | -                   |

**Note:** Although the above specification is applicable to stainless steel, quoted weights are for carbon steel pipe and should be multiplied by 1.014 for austenitic and duplex steels, or by 0.985 for ferritic and martensitic steels.





# Steel pipe - Dimensions and weights

## ANSI/ASME B36.10M

| Nominal<br>Pipe Size | OD     |       | Schedule 10 |      |        | Schedule 20 |       |        | Schedule 30 |       |        | Schedule 40 |       |        |
|----------------------|--------|-------|-------------|------|--------|-------------|-------|--------|-------------|-------|--------|-------------|-------|--------|
|                      | in     | mm    | in          | mm   | kg/m   | in          | mm    | kg/m   | in          | mm    | kg/m   | in          | mm    | kg/m   |
| 1/8                  | 0.405  | 10.3  | -           | -    | -      | -           | -     | -      | 0.057       | 1.45  | 0.32   | 0.068       | 1.73  | 0.37   |
| 1/4                  | 0.540  | 13.7  | -           | -    | -      | -           | -     | -      | 0.073       | 1.85  | 0.54   | 0.088       | 2.24  | 0.63   |
| 3/8                  | 0.675  | 17.1  | -           | -    | -      | -           | -     | -      | 0.073       | 1.85  | 0.70   | 0.091       | 2.31  | 0.84   |
| 1/2                  | 0.840  | 21.3  | -           | -    | -      | -           | -     | -      | 0.095       | 2.41  | 1.12   | 0.109       | 2.77  | 1.27   |
| 3/4                  | 1.050  | 26.7  | -           | -    | -      | -           | -     | -      | 0.095       | 2.41  | 1.44   | 0.113       | 2.87  | 1.69   |
| 1                    | 1.315  | 33.4  | -           | -    | -      | -           | -     | -      | 0.114       | 2.90  | 2.18   | 0.133       | 3.38  | 2.50   |
| 1 <sup>1/4</sup>     | 1.660  | 42.2  | -           | -    | -      | -           | -     | -      | 0.117       | 2.97  | 2.87   | 0.140       | 3.56  | 3.39   |
| 1 <sup>1/2</sup>     | 1.900  | 48.3  | -           | -    | -      | -           | -     | -      | 0.125       | 3.18  | 3.53   | 0.145       | 3.68  | 4.05   |
| 2                    | 2.375  | 60.3  | -           | -    | -      | -           | -     | -      | 0.125       | 3.18  | 4.48   | 0.154       | 3.91  | 5.44   |
| 2 <sup>1/2</sup>     | 2.875  | 73.0  | -           | -    | -      | -           | -     | -      | 0.188       | 4.78  | 8.04   | 0.203       | 5.16  | 8.63   |
| 3                    | 3.500  | 88.9  | -           | -    | -      | -           | -     | -      | 0.188       | 4.78  | 9.92   | 0.216       | 5.49  | 11.29  |
| 3 <sup>1/2</sup>     | 4.000  | 101.6 | -           | -    | -      | -           | -     | -      | 0.188       | 4.78  | 11.41  | 0.226       | 5.74  | 13.57  |
| 4                    | 4.500  | 114.3 | -           | -    | -      | -           | -     | -      | 0.188       | 4.78  | 12.91  | 0.237       | 6.02  | 16.07  |
| 5                    | 5.563  | 141.3 | -           | -    | -      | -           | -     | -      | -           | -     | -      | 0.258       | 6.55  | 21.77  |
| 6                    | 6.625  | 168.3 | -           | -    | -      | -           | -     | -      | -           | -     | -      | 0.280       | 7.11  | 28.26  |
| 8                    | 8.625  | 219.1 | -           | -    | -      | 0.250       | 6.35  | 33.31  | 0.277       | 7.04  | 36.81  | 0.322       | 8.18  | 42.55  |
| 10                   | 10.750 | 273.0 | -           | -    | -      | 0.250       | 6.35  | 41.77  | 0.307       | 7.80  | 51.03  | 0.365       | 9.27  | 60.31  |
| 12                   | 12.750 | 323.8 | -           | -    | -      | 0.250       | 6.35  | 49.73  | 0.330       | 8.38  | 65.20  | 0.406       | 10.31 | 79.73  |
| 14                   | 14.000 | 355.6 | 0.250       | 6.35 | 54.69  | 0.312       | 7.92  | 67.90  | 0.375       | 9.53  | 81.33  | 0.438       | 11.13 | 94.55  |
| 16                   | 16.000 | 406.4 | 0.250       | 6.35 | 62.64  | 0.312       | 7.92  | 77.83  | 0.375       | 9.53  | 93.27  | 0.500       | 12.70 | 123.30 |
| 18                   | 18.000 | 457   | 0.250       | 6.35 | 70.57  | 0.312       | 7.92  | 87.71  | 0.438       | 11.13 | 122.38 | 0.562       | 14.27 | 155.80 |
| 20                   | 20.000 | 508   | 0.250       | 6.35 | 78.55  | 0.375       | 9.53  | 117.15 | 0.500       | 12.70 | 155.12 | 0.594       | 15.09 | 183.42 |
| 22                   | 22.000 | 559   | 0.250       | 6.35 | 86.54  | 0.375       | 9.53  | 129.13 | 0.500       | 12.70 | 171.09 | -           | -     | -      |
| 24                   | 24.000 | 610   | 0.250       | 6.35 | 94.53  | 0.375       | 9.53  | 141.12 | 0.562       | 14.27 | 209.64 | 0.688       | 17.48 | 255.41 |
| 26                   | 26.000 | 660   | 0.312       | 7.92 | 127.36 | 0.500       | 12.70 | 202.72 | -           | -     | -      | -           | -     | -      |
| 28                   | 28.000 | 711   | 0.312       | 7.92 | 137.32 | 0.500       | 12.70 | 218.69 | 0.625       | 15.88 | 271.21 | -           | -     | -      |
| 30                   | 30.000 | 762   | 0.312       | 7.92 | 147.28 | 0.500       | 12.70 | 234.67 | 0.625       | 15.88 | 292.18 | -           | -     | -      |
| 32                   | 32.000 | 813   | 0.312       | 7.92 | 157.24 | 0.500       | 12.70 | 250.64 | 0.625       | 15.88 | 312.15 | 0.688       | 17.48 | 342.91 |
| 34                   | 34.000 | 864   | 0.312       | 7.92 | 167.20 | 0.500       | 12.70 | 266.61 | 0.625       | 15.88 | 332.12 | 0.688       | 17.48 | 364.90 |
| 36                   | 36.000 | 914   | 0.312       | 7.92 | 176.96 | 0.500       | 12.70 | 282.27 | 0.625       | 15.88 | 351.70 | 0.750       | 19.05 | 420.42 |
| 38                   | 38.000 | 965   | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |
| 40                   | 40.000 | 1016  | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |
| 42                   | 42.000 | 1067  | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |
| 44                   | 44.000 | 1118  | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |
| 46                   | 46.000 | 1168  | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |
| 48                   | 48.000 | 1219  | -           | -    | -      | -           | -     | -      | -           | -     | -      | -           | -     | -      |

**Note:** The above specification is applicable to all steel pipe including stainless steel. Quoted weights are for carbon steel pipe and should be multiplied by 1.014 for austenitic and duplex steels, or by 0.985 for ferritic and martensitic steels.



**Steel pipe - Dimensions and weights**  
**ANSI/ASME B36.10M**

| Nominal<br>Pipe Size | OD     |       | Schedule (STD) |      |        | Schedule 60 |       |        | Extra Strong (XS) |       |        | Schedule 80 |       |        |
|----------------------|--------|-------|----------------|------|--------|-------------|-------|--------|-------------------|-------|--------|-------------|-------|--------|
|                      | in     | mm    | in             | mm   | kg/m   | in          | mm    | kg/m   | in                | mm    | kg/m   | in          | mm    | kg/m   |
| 1/8                  | 0.405  | 10.3  | 0.068          | 1.73 | 0.37   | -           | -     | -      | 0.095             | 2.41  | 0.47   | 0.095       | 2.41  | 0.47   |
| 1/4                  | 0.540  | 13.7  | 0.088          | 2.24 | 0.63   | -           | -     | -      | 0.119             | 3.02  | 0.80   | 0.119       | 3.02  | 0.80   |
| 3/8                  | 0.675  | 17.1  | 0.091          | 2.31 | 0.84   | -           | -     | -      | 0.126             | 3.20  | 1.10   | 0.126       | 3.20  | 1.10   |
| 1/2                  | 0.840  | 21.3  | 0.109          | 2.77 | 1.27   | -           | -     | -      | 0.147             | 3.73  | 1.62   | 0.147       | 3.73  | 1.62   |
| 3/4                  | 1.050  | 26.7  | 0.113          | 2.87 | 1.69   | -           | -     | -      | 0.154             | 3.91  | 2.20   | 0.154       | 3.91  | 2.20   |
| 1                    | 1.315  | 33.4  | 0.133          | 3.38 | 2.50   | -           | -     | -      | 0.179             | 4.55  | 3.24   | 0.179       | 4.55  | 3.24   |
| 1 <sup>1/4</sup>     | 1.660  | 42.2  | 0.140          | 3.56 | 3.39   | -           | -     | -      | 0.191             | 4.85  | 4.47   | 0.191       | 4.85  | 4.47   |
| 1 <sup>1/2</sup>     | 1.900  | 48.3  | 0.145          | 3.68 | 4.05   | -           | -     | -      | 0.200             | 5.08  | 5.41   | 0.200       | 5.08  | 5.41   |
| 2                    | 2.375  | 60.3  | 0.154          | 3.91 | 5.44   | -           | -     | -      | 0.218             | 5.54  | 7.48   | 0.218       | 5.54  | 7.48   |
| 2 <sup>1/2</sup>     | 2.875  | 73.0  | 0.203          | 5.16 | 8.63   | -           | -     | -      | 0.276             | 7.01  | 11.41  | 0.276       | 7.01  | 11.41  |
| 3                    | 3.500  | 88.9  | 0.216          | 5.49 | 11.29  | -           | -     | -      | 0.300             | 7.62  | 15.27  | 0.300       | 7.62  | 15.27  |
| 3 <sup>1/2</sup>     | 4.000  | 101.6 | 0.226          | 5.74 | 13.57  | -           | -     | -      | 0.318             | 8.08  | 18.63  | 0.318       | 8.08  | 18.63  |
| 4                    | 4.500  | 114.3 | 0.237          | 6.02 | 16.07  | -           | -     | -      | 0.337             | 8.56  | 22.32  | 0.337       | 8.56  | 22.32  |
| 5                    | 5.563  | 141.3 | 0.258          | 6.55 | 21.77  | -           | -     | -      | 0.375             | 9.53  | 30.97  | 0.375       | 9.53  | 30.97  |
| 6                    | 6.625  | 168.3 | 0.280          | 7.11 | 28.26  | -           | -     | -      | 0.432             | 10.97 | 42.56  | 0.432       | 10.97 | 42.56  |
| 8                    | 8.625  | 219.1 | 0.322          | 8.18 | 42.55  | 0.406       | 10.31 | 53.08  | 0.500             | 12.70 | 64.64  | 0.500       | 12.70 | 64.64  |
| 10                   | 10.750 | 273.0 | 0.365          | 9.27 | 60.31  | 0.500       | 12.70 | 81.55  | 0.500             | 12.70 | 81.55  | 0.594       | 15.09 | 96.01  |
| 12                   | 12.750 | 323.8 | 0.375          | 9.53 | 73.88  | 0.562       | 14.27 | 108.96 | 0.500             | 12.70 | 97.46  | 0.688       | 17.48 | 132.08 |
| 14                   | 14.000 | 355.6 | 0.375          | 9.53 | 81.33  | 0.594       | 15.09 | 126.71 | 0.500             | 12.70 | 107.39 | 0.750       | 19.05 | 158.10 |
| 16                   | 16.000 | 406.4 | 0.375          | 9.53 | 93.27  | 0.656       | 16.66 | 160.12 | 0.500             | 12.70 | 123.30 | 0.844       | 21.44 | 203.53 |
| 18                   | 18.000 | 457   | 0.375          | 9.53 | 105.16 | 0.750       | 19.05 | 205.74 | 0.500             | 12.70 | 139.15 | 0.938       | 23.83 | 254.55 |
| 20                   | 20.000 | 508   | 0.375          | 9.53 | 117.15 | 0.812       | 20.62 | 247.83 | 0.500             | 12.70 | 155.12 | 1.031       | 26.19 | 311.17 |
| 22                   | 22.000 | 559   | 0.375          | 9.53 | 129.13 | 0.875       | 22.23 | 294.25 | 0.500             | 12.70 | 171.09 | 1.125       | 28.58 | 373.83 |
| 24                   | 24.000 | 610   | 0.375          | 9.53 | 141.12 | 0.969       | 24.61 | 355.26 | 0.500             | 12.70 | 187.06 | 1.219       | 30.96 | 442.08 |
| 26                   | 26.000 | 660   | 0.375          | 9.53 | 152.87 | -           | -     | -      | 0.500             | 12.70 | 202.72 | -           | -     | -      |
| 28                   | 28.000 | 711   | 0.375          | 9.53 | 164.85 | -           | -     | -      | 0.500             | 12.70 | 218.69 | -           | -     | -      |
| 30                   | 30.000 | 762   | 0.375          | 9.53 | 176.84 | -           | -     | -      | 0.500             | 12.70 | 234.67 | -           | -     | -      |
| 32                   | 32.000 | 813   | 0.375          | 9.53 | 188.82 | -           | -     | -      | 0.500             | 12.70 | 250.64 | -           | -     | -      |
| 34                   | 34.000 | 864   | 0.375          | 9.53 | 200.31 | -           | -     | -      | 0.500             | 12.70 | 266.61 | -           | -     | -      |
| 36                   | 36.000 | 914   | 0.375          | 9.53 | 212.56 | -           | -     | -      | 0.500             | 12.70 | 282.27 | -           | -     | -      |
| 38                   | 38.000 | 965   | 0.375          | 9.53 | 224.54 | -           | -     | -      | 0.500             | 12.70 | 298.24 | -           | -     | -      |
| 40                   | 40.000 | 1016  | 0.375          | 9.53 | 236.53 | -           | -     | -      | 0.500             | 12.70 | 314.22 | -           | -     | -      |
| 42                   | 42.000 | 1067  | 0.375          | 9.53 | 248.52 | -           | -     | -      | 0.500             | 12.70 | 330.19 | -           | -     | -      |
| 44                   | 44.000 | 1118  | 0.375          | 9.53 | 260.50 | -           | -     | -      | 0.500             | 12.70 | 346.16 | -           | -     | -      |
| 46                   | 46.000 | 1168  | 0.375          | 9.53 | 272.25 | -           | -     | -      | 0.500             | 12.70 | 351.82 | -           | -     | -      |
| 48                   | 48.000 | 1219  | 0.375          | 9.53 | 284.24 | -           | -     | -      | 0.500             | 12.70 | 377.79 | -           | -     | -      |

**Note:** The above specification is applicable to all steel pipe including stainless steel. Quoted weights are for carbon steel pipe and should be multiplied by 1.014 for austenitic and duplex steels, or by 0.985 for ferritic and martensitic steels.

## Steel pipe - Dimensions and weights

### ANSI/ASME B36.10M

| Nominal          | OD     |       | Schedule 100 |       |        | Schedule 120 |       |        | Schedule 140 |       |        | Schedule 160 |       |        |
|------------------|--------|-------|--------------|-------|--------|--------------|-------|--------|--------------|-------|--------|--------------|-------|--------|
| Pipe Size        | in     | mm    | in           | mm    | kg/m   | in           | mm    | kg/m   | in           | mm    | kg/m   | in           | mm    | kg/m   |
| 1/2              | 0.840  | 21.3  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.188        | 4.78  | 1.95   |
| 3/4              | 1.050  | 26.7  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.219        | 5.56  | 2.90   |
| 1                | 1.315  | 33.4  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.250        | 6.35  | 4.24   |
| 1 <sup>1/4</sup> | 1.660  | 42.2  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.250        | 6.35  | 5.61   |
| 1 <sup>1/2</sup> | 1.900  | 48.3  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.281        | 7.14  | 7.25   |
| 2                | 2.375  | 60.3  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.344        | 8.74  | 11.11  |
| 2 <sup>1/2</sup> | 2.875  | 73.0  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.375        | 9.53  | 14.92  |
| 3                | 3.500  | 88.9  | -            | -     | -      | -            | -     | -      | -            | -     | -      | 0.438        | 11.13 | 21.35  |
| 3 <sup>1/2</sup> | 4.000  | 101.6 | -            | -     | -      | -            | -     | -      | -            | -     | -      | -            | -     | -      |
| 4                | 4.500  | 114.3 | -            | -     | -      | 0.438        | 11.13 | 28.32  | -            | -     | -      | 0.531        | 13.49 | 33.54  |
| 5                | 5.563  | 141.3 | -            | -     | -      | 0.500        | 12.70 | 40.28  | -            | -     | -      | 0.625        | 15.88 | 49.11  |
| 6                | 6.625  | 168.3 | -            | -     | -      | 0.562        | 14.27 | 54.20  | -            | -     | -      | 0.719        | 18.26 | 67.56  |
| 8                | 8.625  | 219.1 | 0.594        | 15.09 | 75.92  | 0.719        | 18.26 | 90.44  | 0.812        | 20.62 | 100.92 | 0.906        | 23.01 | 111.27 |
| 10               | 10.750 | 273.0 | 0.719        | 18.26 | 114.75 | 0.844        | 21.44 | 133.06 | 1.000        | 25.40 | 155.15 | 1.125        | 28.58 | 172.33 |
| 12               | 12.750 | 323.8 | 0.844        | 21.44 | 159.91 | 1.000        | 25.40 | 186.97 | 1.125        | 28.58 | 208.14 | 1.312        | 33.32 | 238.76 |
| 14               | 14.000 | 355.6 | 0.938        | 23.83 | 194.96 | 1.094        | 27.79 | 224.65 | 1.250        | 31.75 | 253.56 | 1.406        | 35.71 | 281.70 |
| 16               | 16.000 | 406.4 | 1.031        | 26.19 | 245.56 | 1.219        | 30.96 | 286.64 | 1.438        | 36.53 | 333.19 | 1.594        | 40.49 | 365.35 |
| 18               | 18.000 | 457   | 1.156        | 29.36 | 309.62 | 1.375        | 34.93 | 363.56 | 1.562        | 39.67 | 408.26 | 1.781        | 45.24 | 459.37 |
| 20               | 20.000 | 508   | 1.281        | 32.54 | 381.53 | 1.500        | 38.10 | 441.49 | 1.750        | 44.45 | 508.11 | 1.969        | 50.01 | 564.81 |
| 22               | 22.000 | 559   | 1.375        | 34.93 | 451.42 | 1.625        | 41.28 | 527.02 | 1.875        | 47.63 | 600.63 | 2.125        | 53.98 | 672.26 |
| 24               | 24.000 | 610   | 1.531        | 38.89 | 547.71 | 1.812        | 46.02 | 640.03 | 2.062        | 52.37 | 720.15 | 2.344        | 59.54 | 808.22 |

**Note:** Although the above specification is applicable to stainless steel, quoted weights are for carbon steel pipe and should be multiplied by 1.014 for austenitic and duplex steels, or by 0.985 for ferritic and martensitic steels.





## ASTM SPECIFICATION & TOLERANCE FOR TUBING & PIPING

| Specification                                                              | Allowable Outside Diameter Variation in mm                |       |       | Allowable Wall Thickness Variation                        |        | Exact Length Tolerance in mm      |       | Testing                                                                                                              |
|----------------------------------------------------------------------------|-----------------------------------------------------------|-------|-------|-----------------------------------------------------------|--------|-----------------------------------|-------|----------------------------------------------------------------------------------------------------------------------|
| ASTM-A213<br>Seamless Boiler Superheater and Heat Exchanger Tubes          | Nominal Diameter                                          | Over  | Under | %Over                                                     | %Under | Over                              | Under | Flattening Test<br>Tension Test<br>Flare Test<br>Hardness Test<br>100%<br>Hydrostatic test<br>Refer to<br>ASTM A-450 |
|                                                                            | Under 25.4                                                | .1016 | .1016 | +20                                                       | -0     | 3.175                             | 0     |                                                                                                                      |
|                                                                            | 25.4-38.1 incl                                            | .1524 | .1524 | +22                                                       | -0     | 3.175                             | 0     |                                                                                                                      |
|                                                                            | 38.1-50.8 excl                                            | .2032 | .2032 | +22                                                       | -0     | 3.176                             | 0     |                                                                                                                      |
|                                                                            | 50.8-63.5 excl                                            | .254  | .254  | +22                                                       | -0     | 4.46                              | 0     |                                                                                                                      |
|                                                                            | 63.5-76.2 excl                                            | .3048 | .3048 | +22                                                       | -0     | 4.76                              | 0     |                                                                                                                      |
|                                                                            | 76.2-101.6 incl                                           | .381  | .381  | +22                                                       | -0     | 4.76                              | 0     |                                                                                                                      |
| ASTM-A249<br>Welded Boiler Superheater, Heat Exchanger And Condenser Tubes | Under 25.4                                                | .1016 | .1016 | +10                                                       | -10    | 3.175                             | 0     | Tension Test<br>Flattening Test                                                                                      |
|                                                                            | 25.4-38.1 incl                                            | .1524 | .1524 | +10                                                       | -10    | 3.175                             | 0     |                                                                                                                      |
|                                                                            | 38.1-50.8 Excl                                            | .2032 | .2032 | +10                                                       | -10    | 3.175                             | 0     |                                                                                                                      |
|                                                                            | 50.0-63.5 excl                                            | .254  | .254  | +10                                                       | -10    | 4.762                             | 0     | Flange Test<br>Reverse Bend Test<br>Hardness Test<br>100%<br>Hydrostatic Test<br>Refer to<br>ASTM A-450              |
|                                                                            | 63.5-76.2 excl                                            | .3848 | .3048 | +10                                                       | -10    | 4.762                             | 0     |                                                                                                                      |
|                                                                            | 76.2-101.6 incl                                           | .381  | .381  | +10                                                       | -10    | 4.762                             | 0     |                                                                                                                      |
|                                                                            | Minimum Wall tubes<br><br>+ 18% 0 available<br>On request |       |       |                                                           |        |                                   |       |                                                                                                                      |
| ASTM-A269<br><br>Seamless & Welded Tubing for General Service              | Untp 12.7                                                 | .13   | .13   | +15                                                       | -15    | 3.2                               | 0     | Flare Test<br>(Seamless Only)<br>Flange Test<br>(Welded Only)                                                        |
|                                                                            | 12.7-38.1 excl                                            | .13   | .13   | +10                                                       | -10    | 3.2                               | 0     |                                                                                                                      |
|                                                                            | 38.1-88.9 excl                                            | .25   | .25   | +10                                                       | -10    | 4.8                               | 0     | Hardness Test                                                                                                        |
|                                                                            | 88.9-139.7 excl                                           | .38   | .38   | +10                                                       | -10    | 4.8                               | 0     | Reverse Flattening Test                                                                                              |
|                                                                            | 139.7-203.2 excl                                          | .76   | .76   | +10                                                       | -10    | 4.8                               | 0     | (Welded only)<br>100%<br>Hydrostatic Test<br>Refer to<br>ASTM-A269                                                   |
|                                                                            |                                                           |       |       |                                                           |        |                                   |       |                                                                                                                      |
| ASTM-A270<br><br>Seamless & Welded Sanitary Tubing                         | 25.4                                                      | .05   | .20   | +10.0                                                     | -10.0  | 3.2                               | 0     | Reverse flattening Test<br>100%<br>Hydrostatic Test                                                                  |
|                                                                            | 38.1                                                      | 0.5   | .20   | +10.0                                                     | -10.0  | 3.2                               | 0     |                                                                                                                      |
|                                                                            | 50.8                                                      | .05   | .28   | +10.0                                                     | -10.0  | 3.2                               | 0     | External' polish on all tubes<br>Refer to<br>ASTM A-270                                                              |
|                                                                            | 60.5                                                      | .05   | .28   | +10.0                                                     | -10.0  | 3.2                               | 0     |                                                                                                                      |
|                                                                            | 76.2                                                      | .08   | .30   | +10.0                                                     | -10.0  | 3.2                               | 0     |                                                                                                                      |
|                                                                            | 101.6                                                     | .08   | .38   | +10.0                                                     | -10.0  | 4.8                               | 0     |                                                                                                                      |
| ASTM-A312<br>Seemless & Welded pipe                                        | 3.175-38.1 incl                                           | .4    | .79   | Minimum Wall<br>12.5% under nominal wall<br><br>Specified |        | 6.4                               | 0     | Tension Test<br>Flattening Test<br>100% Hydrostatic Test<br>Refer to<br>ASTM A-530                                   |
|                                                                            | 38.1-1016 incl                                            | .79   | .79   |                                                           |        | 6.4                               | 0     |                                                                                                                      |
|                                                                            | 101.6-203.2 incl                                          | 1.59  | .79   |                                                           |        | 6.4                               | 0     |                                                                                                                      |
|                                                                            |                                                           |       |       |                                                           |        | (Normally Random Lengths ordered) |       |                                                                                                                      |
| ASTM A-358<br>Welded pipe                                                  | 219.08-750mm                                              | +0.5% |       | -0.3                                                      |        | 6.0                               |       | Refer to<br>ASTM A-530                                                                                               |



# CHEMICAL COMPOSITION

| Grade                       | Tube Standard    | C         | Si      | Mn     | P       | S       | Ni          | Cr          | Mo        | Others                    |
|-----------------------------|------------------|-----------|---------|--------|---------|---------|-------------|-------------|-----------|---------------------------|
| Austenitic stainless steels |                  |           |         |        |         |         |             |             |           |                           |
| TP 304                      | A269, A213, A312 | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 8.00-11.00  | 18.00-20.00 | -         | -                         |
| TP304L                      | A269, A213, A312 | < 0.035   | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 8.00-13.00  | 18.00-20.00 | -         | -                         |
| TP304N                      | A213, A312       | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 8.00-11.00  | 18.00-20.00 | -         | N 0.10-0.16               |
| TP304LN                     | A269, A213, A312 | < 0.035   | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 8.00-11.00  | 18.00-20.00 | -         | N 0.10-0.16               |
| TP304H                      | A213, A312       | 0.04-0.10 | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 8.00-11.00  | 18.00-20.00 | -         | -                         |
| TP 316                      | A269, A213, A312 | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-14.00 | 16.00-18.00 | 2.00-3.00 | -                         |
| TP 316L                     | A269, A213, A312 | < 0.035   | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 10.00-15.00 | 16.00-18.00 | 2.00-3.00 | -                         |
| TP 316N                     | A213, A312       | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-14.00 | 16.00-18.00 | 2.00-3.00 | N 0.10-0.16               |
| TP 316LN                    | A269, A213, A312 | < 0.035   | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-14.00 | 16.00-18.00 | 2.00-3.00 | N 0.10-0.16               |
| TP 316Ti                    | A213, A312       | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 10.00-14.00 | 16.00-18.00 | 2.00-3.00 | Ti 5(C+N)-0.70            |
| TP 316H                     | A213, A312       | 0.04-0.10 | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-14.00 | 16.00-18.00 | 2.00-3.00 | -                         |
| TP 321                      | A269, A213, A312 | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 9.00-13.00  | 17.00-20.00 | -         | Ti > 5xC, max 0.60%       |
| TP 321H                     | A213, A312       | 0.04-0.10 | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 9.00-13.00  | 17.00-20.00 | -         | Ti > 5xC, max 0.60%       |
| TP 317                      | A213, A312       | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-14.00 | 18.00-20.00 | 3.00-4.00 | -                         |
| TP 317L                     | A213, A312       | < 0.035   | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 11.00-15.00 | 18.00-20.00 | 3.00-4.00 | -                         |
| TP 310S                     | A213, A312       | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 19.00-22.00 | 24.00-26.00 | 0.75 max  | -                         |
| TP 310H                     | A213, A312       | < 0.10    | < 1.0   | < 2.00 | < 0.040 | < 0.030 | 19.00-22.00 | 24.00-26.00 | -         | -                         |
| TP 347                      | A269, A213, A312 | < 0.08    | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 9.00-13.00  | 17.00-20.00 |           | Co + Ta > 10xC, max 1.00% |
| TP 347H                     | A213, A312       | 0.04-0.10 | < 0.75  | < 2.00 | < 0.040 | < 0.030 | 9.00-13.00  | 17.00-20.00 | -         | Co + Ta > 8xC, max 1.00%  |
| TP 904L                     | A269, A312       | < 0.02    | < 1.0   | < 2.00 | < 0.040 | < 0.030 | 23.00-28.00 | 19.00-23.00 | 4.00-5.00 | N 0.10, Cu 1.0-2.0        |
| 1.4301                      | EN 10216-5       | < 0.07    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 8.0-10.5    | 17.0-19.5   | -         | 0.11                      |
| 1.4306                      | EN 10216-5       | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 10.0-12.0   | 18.0-20.0   | -         | 0.11                      |
| 1.4307                      | EN 10216-5       | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 8.0-10.0    | 17.5-19.5   | -         | 0.11                      |
| 1.4311                      | EN10216-5        | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 8.5-11.5    | 17.0-19.5   | -         | 0.12-0.22                 |
| 1.4401                      | EN 10216-5       | < 0.07    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 10.0-13.0   | 16.5-18.5   | 2.0-2.5   | 0.11                      |
| 1.4404                      | EN 10216-5       | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 10.0-13.0   | 16.5-18.5   | 2.0-2.5   | 0.11                      |
| 1.4435                      | EN 10216-5       | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 12.5-15.0   | 17.0-19.0   | 2.5-3.0   | -                         |
| 1.4429                      | EN 10216-5       | < 0.03    | < 1.00  | < 2.00 | < 0.040 | < 0.015 | 11.0-14.0   | 16.5-18.5   | 2.5-3.0   | 0.12-0.22                 |
| 1.4436                      | EN 10216-5       | < 0.05    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 10.5-13.0   | 16.5-18.5   | 2.5-3.0   | -                         |
| 1.4541                      | EN 10216-5       | < 0.08    | < 1.00  | < 2.00 | < 0.040 | < 0.015 | 9.0-12.0    | 17.0-19.0   | -         | 5*C-0.70                  |
| 1.4571                      | EN 10216-5       | < 0.08    | < 1.00  | < 2.00 | < 0.040 | < 0.030 | 10.5-13.5   | 16.5-18.5   | 2.0-2.5   | 5*C-0.70                  |
| 1.4828                      | SEW 470          | < 0.20    | 1.5-2.5 | < 2.00 | < 0.045 | < 0.030 | 11.0-13.0   | 19.0-21.0   | -         | -                         |
| 1.4845                      | SEW 470          | < 0.15    | < 0.75  | < 2.00 | < 0.045 | < 0.030 | 19.0-22.0   | 24.0-26.0   | -         | -                         |
| 1.4878                      | SEW 470          | < 0.12    | < 1.00  | < 2.00 | < 0.045 | < 0.030 | 9.0-12.0    | 17.0-19.0   | -         | 4*C-0.80                  |
| Duplex stainless steel      |                  |           |         |        |         |         |             |             |           |                           |
| S31803                      | A790             | < 0.03    | < 1.0   | < 2.00 | < 0.030 | < 0.020 | 4.50-6.50   | 21.0-23.0   | 2.50-3.50 | N 0.08-0.20               |
| S32205                      | A790             | < 0.03    | < 1.0   | < 2.00 | < 0.030 | < 0.020 | 4.50-6.50   | 22.00-23.00 | 3.00-3.50 | N 0.14-0.20               |
| 1.4462                      | 10216-5          | < 0.03    | < 1.0   | < 2.00 | < 0.035 | < 0.020 | 4.50-6.50   | 21.0-23.0   | 2.50-3.50 | -                         |
| Superduplex stainless steel |                  |           |         |        |         |         |             |             |           |                           |
| S32750                      | A790             | < 0.03    | < 1.0   | < 2.00 | < 0.030 | < 0.020 | 4.50-6.50   | 21.0-23.0   | 2.50-3.50 | N 0.08-0.20               |
| S32760                      | A790             | < 0.03    | < 1.0   | < 2.00 | < 0.030 | < 0.020 | 4.50-6.50   | 22.00-23.00 | 3.00-3.50 | N 0.14-0.20               |

## Austenitic Steel

### TYPES OF APPLICATIONS

|            |                                                                                                                                                                                                                                                                                                                                                                                            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TP304      | Chemical processing equipment, Chemical tubing, Food preparation equipment, Food processing equipment, Bar rails, Pharmaceutical processing equipment, Piping systems, Railings, Water pipes, Heat exchanger tubes, Mechanical & structural components General purpose stainless steel with good corrosion resistance for most application.                                                |
| TP304L     | Chemical plant and food processing equipment, where freedom from sensitization is required                                                                                                                                                                                                                                                                                                 |
| TP304H     | Higher carbon content than 304L, for increased strength at high temperatures.                                                                                                                                                                                                                                                                                                              |
| TP316/316L | Where higher corrosion resistance is required. Chemical processing equipment, Chemical tubing, Food preparation equipment, Food processing equipment, Bar rails, Pharmaceutical processing equipment, Piping systems, Railings, Water pipes, Heat exchanger tubes, Mechanical & structural components General purpose stainless steel with good corrosion resistance for most application. |
| TP316H     | Heat exchangers, furnaces, chemical and petrochemical plant. Similar oxidation resistance to TP 316.                                                                                                                                                                                                                                                                                       |
| TP316Ti    | A titanium stabilized version of 316 used where good resistance to intergranular corrosion and high temperature strength is required                                                                                                                                                                                                                                                       |
| TP321      | Heat exchanger tubing, Chemical processing tubing, Pressure tank tubing.                                                                                                                                                                                                                                                                                                                   |
| TP321H     | Heat exchangers, furnaces, boilers in chemical and petrochemical plant. High carbon version of TP 321 which ensures greater resistance.                                                                                                                                                                                                                                                    |
| TP317      | Ink manufacturing equipment, Pulp & paper manufacturing equipment, Chemical processing tubing.                                                                                                                                                                                                                                                                                             |
| TP347      | Boilers in the thermal power plant, reheaters and super heaters                                                                                                                                                                                                                                                                                                                            |
| TP904L     | High resistance to general corrosion in e.g. sulphuric and acetic acids, crevice corrosion, stress corrosion cracking, pitting in chloride bearing solutions                                                                                                                                                                                                                               |

## DUPLEX

|        |                                                                                                                                                                |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S31803 | Heat exchangers, fans, chemical tanks, flow lines, marine and refinery.                                                                                        |
| S32750 | Oil & gas, chemical process, power industries. Where heat-exchangers is main application.                                                                      |
| S31254 | High levels of chromium, molybdenum, and nitrogen is especially suited for high-chloride environments such as sea water and other high-chloride process flows. |

## QUALITY ASSURANCE

Pipe Inspection is a continuous process, Various inspections and tests are performed at all stages of manufacturing to produce a good quality pipe.

### Metallurgical

To confirm that the chemical requirements of pipe are as per the material standard. Normally known as Micro and Macro pipe inspection & testing.

Micro Analysis or Chemical Analysis of Raw material and Product

### Destructive

To confirm the mechanical requirements of pipe are as per the material standard.

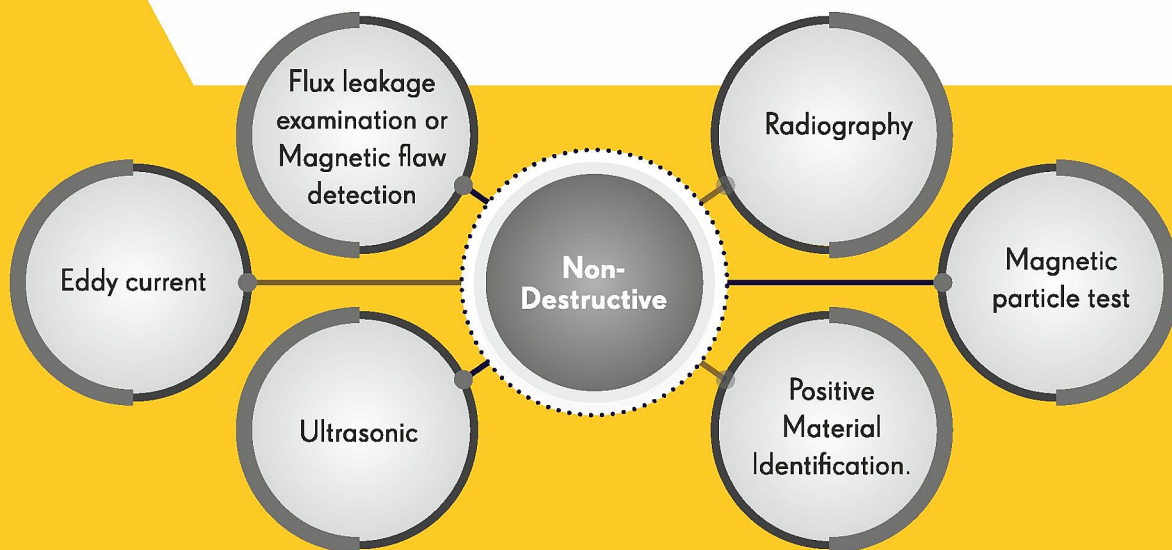
Tensile test is done to check the yield and ultimate tensile of the pipe Bend test / Guided bend test is used to check the integrity of weld joint Flattening test examines the ability of plastic deformation in a pipe Impact test / Charpy V-Notch Test, check the ability of a material to withstand low-temperature conditions

### Hydro Test

To Ensure that pipe is 100% leak proof and the ability of the pipe to withstand pressure

### Non-destructive

To check whether any physical defects are present in the pipe/weld, which may affect its performance during the service. These testing are



### Visual

To check for surface imperfections such as mechanical marks, lamination, tears or any other visual imperfections and also check weld defects such as porosity and undercuts,

### Dimension

During a dimensional inspection, following to be confirmed with the standard Diameter, Length, Thickness, Straightness, Ovality and Weight

### Marking

To consist of Manufacturer logo, ASTM material code, Material Grade, Size, Thickness/schedule, Length and Heat number.

### Packing

To prevent the damage during transportation, pipe ends are covered with plastic cap,



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