C.R.I. PIPES
Quality in every inch

# uPVC COLUMN & CASING PIPES


An ISO 9001 & 14001 Company

# Vision, Mission and Values

To be the industry leader providing best - in - class fluid management solutions to individual and institutional customers and societies in our chosen markets.

We will achieve this through our dedicated efforts to enhance the welfare of all our stakeholders and by living by our values of **commitment, reliability** and **innovation.**

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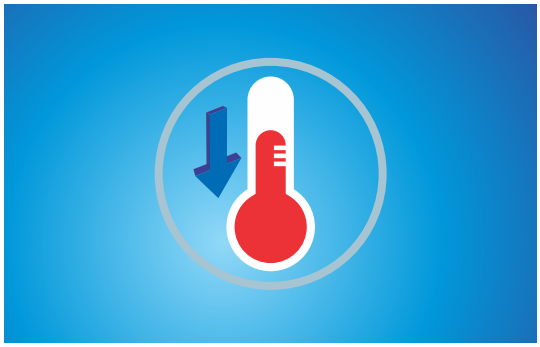
## Polymer Bond Thread Sink Locking system

The couplers are bonded with pipes using a specially formulated polymer using PBTS technology. This helps the pipe to withstand high tensile force, ensures durability of the joints and makes it completely leak proof.

## Low temperature uPVC column pipes

C.R.I. has formulated a special grade of uPVC mixed compound which provides a flawless performance at even temperatures as low as -20°C.



**C.R.I. uPVC column pipes are also**

# Why uPVC column pipes?

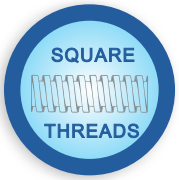
uPVC (un-plasticised poly vinyl chloride)is a derivative of PVC compound. The following are the benefits of using an uPVC column pipe compared to Mild Steel or Galvanized steel pipes.

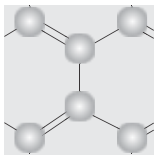
**Table - 1**

| Sl. No. | Characteristic feature | CRI uPVC column pipe | Mild / Galvanized Steel pipe |
|---|---|---|---|
| 1. | Rigidity | Pipes are rigid | Pipes are rigid |
| 2. | Load bearing capacity | High load bearing capacity due to inherent strength and specially designed square threads. | High load bearing capacity due to heavy strength. Over a period of time, the need for re-threading arises because of rust. |
| 3. | Leak proof joints | Special rubber seals are provided with the thread to ensure 100% leak proof. | These threads are not pressure tight and do not have any rubber sealing system. Therefore, these pipes are not leak proof. |
| 4. | Reliability | The pipes are totally free from rust and corrosion for its entire life span. | The threads have to be reworked after few years due to corrosion & rusting. The pipe length is reduced during this process as the customer has to cut the corroded portion of thread area. It involves additional expenses for the customer. |
| 5. | Smooth internal surface | Since the internal surface is very smooth head loss due to friction is low and water discharge is higher by 10%-30%. | Internal surface Is rough and head loss is high. |
| 6. | Light weight and ease of installation | Pipes come in 3 metres standard length and are light weight for easy handling both during pump installation and removal. | Pipes are of heavy weight which requires tedious efforts during transportation, installation & removal. |
| 7. | Long life | C.R.I. Drop/Riser pipes do not react with acidic or alkaline water and provide a long life inside the bore well. | These pipes are prone to rust, corrosion and ultimately get damaged and have to be replaced very quickly. |

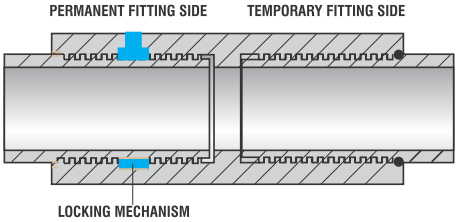
# Features of C.R.I. uPVC column pipes

- Rigid construction & longer life span
- Can be used for potable water supply.
- Specially designed square threads are capable of withstanding heavy load and are corrosion free.
- PBTS locking system: (Polymer Bond Thread Sink) To avoid the loosening of coupler during the removal of pipes, a special polymer is injected into the threads via the coupler. The polymer forms a permanent bond between the coupler and pipe, thus nullifying any possibility of coupler loosening.
- Special rubber seal is provided at the end of threads to ensure 100% leak proof joints even at high pressure.
- A special rubber (EPDM - Highstrand) ring is provided in the coupling between the two pipes to absorb the vibration caused due to high pump pressure.
- Internal surface of these pipes are very smooth, resulting in very low head loss due to friction and increases water discharge upto 30%, compared with traditional G.I. pipes, thereby saving power.
- uPVC column pipes are resistant to chemical reactions when used in acidic or alkaline waters assuring long life.
- Can handle water with maximum temperature upto 45°C.
- These pipes come in 3m Standard length and are of light weight ensuring easy handling, storage and installation.



Bi-axial orientation during column pipe extrusion




**Physical and Mechanical Properties of uPVC - Table 2**

| Property | Unit | Standard |
|---|---|---|
| Specific Gravity | 1.40 to 1.46 g/cm$^3$ | As per IS : 12818 : 2010 |
| Tensile Strength | Min 45 MPa | As per IS : 12818 : 2010 |
| Resistance to external blows @ 0°C | 0% True Impact Rate (TIR) | As per IS : 12818 : 2010 |
| Vicat Softening Temperature | Min 80°C | As per IS : 12818 : 2010 |

# Dimension Details

| Dimension Details (Table 3) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nominal Pipe Size | Pipe Type | Variant | Wall thickness at ends (mm) | | Wall thickness at center (mm) | | No. of pipes per bundle (Nos) |
| | | | Min. | Max. | Min. | Max. | |
| OD Min 32.8 mm, Max 33.1mm | | | | | | | |
| 1 inch (OD: 33mm) | Bell Mouth | Espy | 3.4 | 3.6 | 1.7 | 2.0 | 25 |
| | | Elite | 3.6 | 3.9 | 1.7 | 2.0 | 25 |
| | | Medium | 4.0 | 4.3 | 2.0 | 2.3 | 25 |
| | | Standard | 5.2 | 5.5 | 3.1 | 3.4 | 25 |
| | Coupler | Espy | 3.4 | 3.6 | 1.7 | 2.0 | 25 |
| | | Elite | 3.6 | 3.9 | 1.7 | 2.0 | 25 |
| | | Medium | 4.0 | 4.3 | 2.0 | 2.3 | 25 |
| | | Standard | 5.2 | 5.5 | 3.1 | 3.4 | 25 |
| | OD Min 41.8, Max 42.1mm | | | | | | |
| 1¼ inch (OD: 42mm) | Bell Mouth | Espy | 3.7 | 4 | 2 | 2.3 | 25 |
| | | Elite | 4.5 | 4.8 | 2.4 | 2.7 | 25 |
| | | Medium | 5.0 | 5.3 | 2.9 | 3.2 | 25 |
| | | Standard | 5.5 | 5.8 | 3.4 | 3.7 | 25 |
| | Coupler | Espy | 3.7 | 4 | 2 | 2.3 | 25 |
| | | Elite | 4.5 | 4.8 | 2.4 | 2.7 | 25 |
| | | Medium | 5.0 | 5.3 | 2.9 | 3.2 | 20 |
| | | Standard | 5.5 | 5.8 | 3.4 | 3.7 | 20 |
| | | Heavy | 7.6 | 7.9 | 4.5 | 4.8 | 15 |
| | | Super Heavy | 7.8 | 8.1 | 5.3 | 5.6 | 15 |
| | OD Min 47.8, Max 48.1mm | | | | | | |
| 1½ inch (OD: 48mm) | Bell Mouth | Espy | 3.8 | 4.1 | 2.3 | 2.6 | 20 |
| | | Elite | 4.9 | 5.2 | 2.8 | 3.1 | 20 |
| | | Medium | 5.4 | 5.7 | 3.3 | 3.6 | 25 |
| | | Standard | 6.1 | 6.4 | 4.0 | 4.3 | 25 |
| | Coupler | Espy | 3.8 | 4.1 | 2.3 | 2.6 | 20 |
| | | Elite | 4.9 | 5.2 | 2.8 | 3.1 | 20 |
| | | Medium | 5.4 | 5.7 | 3.3 | 3.6 | 20 |
| | | Standard | 6.1 | 6.4 | 4.0 | 4.3 | 20 |
| | | Heavy | 8.3 | 8.6 | 5.2 | 5.5 | 15 |
| | | Super Heavy | 8.5 | 8.8 | 6.0 | 6.3 | 10 |
| | OD Min 59.8, Max 60.1 mm | | | | | | |
| 2 inch (OD: 60mm) | Bell Mouth | Elite | 4.0 | 4.3 | 1.8 | 2.1 | 15 |
| | | Medium | 5.1 | 5.4 | 2.6 | 2.9 | 15 |
| | | Standard | 6.4 | 6.7 | 3.9 | 4.2 | 10 |
| | Coupler | Espy | 3.8 | 4.1 | 1.6 | 1.9 | 15 |
| | | Elite | 4.0 | 4.3 | 1.8 | 2.1 | 15 |
| | | Medium | 5.1 | 5.4 | 2.6 | 2.9 | 15 |
| | | Standard | 6.4 | 6.7 | 3.5 | 3.8 | 15 |
| | | Heavy | 7.8 | 8.1 | 4.7 | 5.0 | 10 |
| | | Super Heavy | 9.0 | 9.3 | 6.5 | 6.8 | 10 |

## Dimension Details

| Size | Pipe Type | Varient | Wall thickness at ends (mm) | | Wall thickness at center (mm) | | No. of pipes per bundle (Nos) |
|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | |
| | OD Min 74.7, Max 75.2 mm | | | | | | |
| 2½ inch (OD: 75mm) | Coupler | Medium | 5.1 | 5.4 | 2.6 | 2.9 | 10 |
| | | Standard | 6.5 | 6.8 | 4.0 | 4.3 | 10 |
| | | Heavy | 9.0 | 9.3 | 6.3 | 6.6 | 7 |
| | | Super Heavy | 10.8 | 11.1 | 8.3 | 8.6 | 5 |
| | OD Min 87.7, Max 88.2 mm | | | | | | |
| 3 inch (OD: 88mm) | Coupler | Medium | 5.7 | 6.0 | 3.2 | 3.5 | 8 |
| | | Standard | 7.5 | 7.8 | 4.6 | 4.9 | 5 |
| | | Heavy | 9.8 | 10.1 | 6.0 | 6.3 | 5 |
| | | Super Heavy | 12.4 | 12.7 | 9.7 | 10.0 | 5 |
| | OD Min 112.7, Max 113.2 mm | | | | | | |
| 4 inch (OD: 113mm) | Coupler | Medium | 6.3 | 6.6 | 3.8 | 4.1 | 5 |
| | | Standard | 8.2 | 8.5 | 5.7 | 6.0 | 5 |
| | | Heavy | 11.9 | 12.3 | 7.0 | 7.3 | 3 |
| | | Super Heavy | 15.1 | 15.4 | 12.6 | 12.9 | 3 |
| | OD Min 139.7, Max 140.2 mm | | | | | | |
| 5 inch (OD: 140mm) | Coupler | Standard | 10.3 | 10.6 | 7.6 | 7.9 | 3 |
| | | Heavy | 15.3 | 15.6 | 11.9 | 12.2 | 2 |
| | | Super Heavy | 19.0 | 19.3 | 15.6 | 15.9 | 2 |
| | OD Min 167.7, Max 168.2 mm | | | | | | |
| 6 inch (OD: 168mm) | Coupler | Standard | 11.8 | 12.2 | 8.8 | 9.2 | 2 |
| | | Heavy | 15.0 | 15.4 | 10.8 | 11.2 | 2 |
| | | Super Heavy | 19.8 | 20.2 | 15.8 | 16.2 | 1 |
| Effective length of pipe (3,000 mm ± 10 mm) | | | | | | | |

# Load Bearing Details

**Load bearing details of CRI uPVC column pipes - Table 4**

| Nominal Pipe Size | Pipe type | Varient | Recom-mended depth (m) | Approx. pipe weight for the recommended depth (kg) (A) | Approx. weight of the water in the column (kg) (B) | Approx. weight of the pump set (kg) (C) | Approx. weight of the cable (kg) (D) | Total Weight (A+B+C+D) (kg) | Ultimate breaking load (kg) | Maximum load capacity for pulling with chain pully (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | OD Min 32.8, Max 33.1 mm | | | | | | | | | |
| 1 inch (OD: 33mm) | Bell Mouth | Espy | 125 | 40 | 86 | 50 | 50 | 227 | 682 | 455 |
| | | Elite | 150 | 51 | 103 | 55 | 70 | 281 | 844 | 563 |
| | | Medium | 210 | 82 | 139 | 60 | 90 | 372 | 1,117 | 745 |
| | | Standard | 300 | 167 | 169 | 65 | 150 | 553 | 1,660 | 1,107 |
| | Coupler | Espy | 125 | 45 | 86 | 50 | 50 | 231 | 700 | 488 |
| | | Elite | 150 | 59 | 103 | 55 | 70 | 287 | 900 | 607 |
| | | Medium | 210 | 92 | 139 | 60 | 90 | 381 | 1.200 | 803 |
| | | Standard | 300 | 181 | 169 | 65 | 150 | 565 | 1,700 | 1,191 |
| | OD Min 41.8, Max 42.1 mm | | | | | | | | | |
| 1¼ inch (OD: 42mm) | Bell Mouth | Espy | 125 | 56 | 142 | 70 | 50 | 321 | 962 | 641 |
| | | Elite | 150 | 78 | 163 | 75 | 70 | 388 | 1,165 | 776 |
| | | Medium | 210 | 125 | 217 | 80 | 90 | 515 | 1,544 | 1,029 |
| | | Standard | 260 | 197 | 254 | 85 | 150 | 689 | 2,066 | 1,378 |
| | Coupler | Espy | 125 | 62 | 142 | 70 | 50 | 324 | 1,000 | 685 |
| | | Elite | 150 | 89 | 163 | 75 | 70 | 397 | 1,200 | 838 |
| | | Medium | 210 | 140 | 217 | 80 | 90 | 527 | 1,600 | 1,112 |
| | | Standard | 260 | 204 | 254 | 85 | 150 | 694 | 2,100 | 1,462 |
| | | Heavy | 350 | 336 | 299 | 90 | 220 | 945 | 2,900 | 1,990 |
| | | Super Heavy | 400 | 433 | 310 | 130 | 250 | 1.123 | 3,400 | 2,364 |
| | OD Min 47.8, Max 48.1 mm | | | | | | | | | |
| 1½ inch (OD: 48mm) | Bell Mouth | Espy | 125 | 72 | 185 | 100 | 50 | 411 | 1,232 | 821 |
| | | Elite | 150 | 103 | 213 | 110 | 70 | 498 | 1,495 | 997 |
| | | Medium | 210 | 163 | 284 | 120 | 90 | 660 | 1,987 | 1,321 |
| | | Standard | 260 | 235 | 328 | 130 | 150 | 847 | 2,540 | 1,694 |
| | Coupler | Espy | 125 | 79 | 185 | 100 | 50 | 414 | 1,300 | 876 |
| | | Elite | 150 | 113 | 213 | 110 | 70 | 506 | 1,500 | 1,069 |
| | | Medium | 210 | 177 | 284 | 120 | 90 | 671 | 2,000 | 1,416 |
| | | Standard | 260 | 265 | 328 | 130 | 150 | 873 | 2,700 | 1,840 |
| | | Heavy | 350 | 432 | 388 | 140 | 220 | 1,180 | 3,600 | 2,485 |
| | | Super Heavy | 400 | 537 | 407 | 160 | 250 | 1,354 | 2,500 | 1,722 |
| | OD Min 59.8, Max 60.1 mm | | | | | | | | | |
| 2 inch (OD: 60mm) | Bell Mouth | Espy | 70 | 40 | 177 | 150 | 70 | 440 | 1,321 | 880 |
| | | Elite | 90 | 57 | 225 | 150 | 70 | 506 | 1,518 | 1,012 |
| | | Medium | 130 | 110 | 306 | 160 | 90 | 671 | 2,012 | 1,342 |
| | | Standard | 200 | 232 | 428 | 170 | 150 | 984 | 2,951 | 1,968 |
| | Coupler | Espy | 70 | 47 | 177 | 150 | 70 | 444 | 1,400 | 940 |
| | | Elite | 90 | 70 | 225 | 150 | 70 | 515 | 1,600 | 1,091 |
| | | Medium | 130 | 128 | 306 | 160 | 90 | 685 | 2,100 | 1,447 |
| | | Standard | 200 | 259 | 428 | 170 | 150 | 1,007 | 3,100 | 2,124 |
| | | Heavy | 270 | 449 | 517 | 180 | 220 | 1,366 | 4,100 | 2,877 |
| | | Super Heavy | 350 | 708 | 1,056 | 200 | 250 | 2,214 | 6,700 | 4,663 |


## Load Bearing Details

| Nominal Pipe Size | Pipe type | Variant | Recom-mended depth (m) | Approx. pipe weight for the recommended depth (kg) (A) | Approx. weight of the water in the column (kg) (B) | Approx. weight of the pump set (kg) (C) | Approx. weight of the cable (kg) (D) | Total Weight (A+B+C+D) (kg) | Ultimate breaking load (kg) | Maximum load capacity for pulling with chain pully (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | OD Min 74.7, Max 75.2 mm | | | | | | | | | |
| 2½ inch (OD: 75mm) | Coupler | Medium | 100 | 125 | 382 | 270 | 90 | 868 | 2,700 | 1,835 |
| | | Standard | 160 | 269 | 564 | 290 | 150 | 1,273 | 3,900 | 2,686 |
| | | Heavy | 260 | 629 | 795 | 310 | 220 | 1,954 | 5,900 | 4,116 |
| | | Super Heavy | 350 | 1,083 | 937 | 350 | 250 | 2,620 | 7,900 | 5,517 |
| | OD Min 87.7, Max 88.2 mm | | | | | | | | | |
| 3 inch (OD: 88mm) | Coupler | Medium | 110 | 189 | 575 | 375 | 90 | 1,229 | 3,700 | 2,596 |
| | | Standard | 170 | 401 | 812 | 400 | 150 | 1,763 | 5,300 | 3,717 |
| | | Heavy | 260 | 829 | 1,100 | 450 | 220 | 2,586 | 7,800 | 5,474 |
| | | Super Heavy | 350 | 1,443 | 1,293 | 450 | 280 | 3,466 | 10,400 | 7,296 |
| | OD Min 112.7, Max 113.2 mm | | | | | | | | | |
| 4 inch (OD: 113mm) | Coupler | Medium | 100 | 257 | 872 | 500 | 70 | 1,699 | 5,200 | 3,592 |
| | | Standard | 150 | 517 | 1,215 | 500 | 180 | 2,412 | 7,300 | 5,090 |
| | | Heavy | 260 | 1,359 | 1,811 | 550 | 280 | 4,000 | 12,000 | 8,426 |
| | | Super Heavy | 350 | 2,403 | 2,118 | 550 | 280 | 5,351 | 16,100 | 11,265 |
| | OD Min 139.7, Max 140.2 mm | | | | | | | | | |
| 5 inch (OD: 140mm) | Coupler | Standard | 160 | 888 | 1,956 | 600 | 220 | 3,664 | 11,000 | 7,726 |
| | | Heavy | 260 | 2,154 | 2,756 | 650 | 280 | 5,840 | 17,500 | 12,301 |
| | | Super Heavy | 350 | 3,792 | 3,252 | 650 | 300 | 7,994 | 24,000 | 16,825 |
| | OD Min 167.7, Max 168.2 mm | | | | | | | | | |
| 6 inch (OD: 168mm) | Coupler | Standard | 170 | 1,325 | 3,019 | 750 | 350 | 5,443 | 16,400 | 11,483 |
| | | Heavy | 260 | 2,397 | 4,374 | 750 | 450 | 7,972 | 24,000 | 16,793 |
| | | Super Heavy | 350 | 4,002 | 5,112 | 800 | 500 | 10,413 | 31,500 | 21,931 |
| Effective length of the pipe(3,000 mm ± 10 mm) | | | | | | | | | | |

In view of continuous developments the information/descriptions/specifications/illustrations are subject to change without notice.

# APPROXIMATE FRICTIONAL HEAD LOSS IN C.R.I. STANDARD TYPE COLUMN PIPES

| FLOW | | NOMINAL DIAMETER OF PIPE (INCHES/MM) (Table - 5) | | | | | | | | | HEAD LOSS IN METERS, FOR 100M LENGTH OF PIPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| m³/h | l/min. | 1" / 25 | 1¼" / 32 | 1½" / 40 | 2" / 50 | 2½" / 65 | 3" / 80 | 4" / 100 | 5" / 125 | 6" / 150 | |
| 1 | 16.67 | 1.758 | 0.570 | 0.199 | 0.056 | 0.018 | 0.009 | | | | |
| 1.5 | 25.00 | 3.575 | 1.158 | 0.404 | 0.121 | 0.037 | 0.018 | 0.005 | 0.002 | 0.001 | |
| 2 | 33.33 | 5.914 | 1.917 | 0.668 | 0.200 | 0.061 | 0.029 | 0.009 | 0.003 | 0.001 | |
| 2.5 | 41.67 | 8.739 | 2.832 | 0.987 | 0.296 | 0.090 | 0.043 | 0.012 | 0.004 | 0.002 | |
| 3 | 50.00 | 12.023 | 3.897 | 1.358 | 0.407 | 0.123 | 0.059 | 0.017 | 0.005 | 0.002 | |
| 3.5 | 58.33 | 15.747 | 5.103 | 1.779 | 0.533 | 0.162 | 0.077 | 0.022 | 0.007 | 0.003 | |
| 4 | 66.67 | 19.892 | 6.447 | 2.247 | 0.674 | 0.204 | 0.098 | 0.028 | 0.009 | 0.004 | |
| 4.5 | 75.00 | 24.446 | 7.922 | 2.761 | 0.828 | 0.251 | 0.120 | 0.034 | 0.011 | 0.004 | |
| 5 | 83.33 | 29.396 | 9.526 | 3.320 | 0.996 | 0.302 | 0.144 | 0.041 | 0.013 | 0.005 | |
| 6 | 100.00 | 40.443 | 13.107 | 4.568 | 1.370 | 0.415 | 0.198 | 0.056 | 0.017 | 0.007 | |
| 7 | 116.67 | 52.967 | 17.165 | 5.983 | 1.794 | 0.544 | 0.260 | 0.074 | 0.023 | 0.01 | |
| 8 | 133.33 | | 21.683 | 7.557 | 2.267 | 0.687 | 0.328 | 0.093 | 0.029 | 0.012 | |
| 9 | 150.00 | | 26.647 | 9.287 | 2.785 | 0.844 | 0.403 | 0.115 | 0.036 | 0.015 | |
| 10 | 166.67 | | 29.534 | 11.168 | 3.349 | 1.015 | 0.485 | 0.138 | 0.043 | 0.018 | |
| 12 | 200.00 | | 36.849 | 12.699 | 4.608 | 1.397 | 0.668 | 0.190 | 0.059 | 0.025 | |
| 14 | 233.33 | | 48.657 | 16.761 | 6.035 | 1.830 | 0.874 | 0.248 | 0.078 | 0.032 | |
| 16 | 266.67 | | | 21.321 | 6.312 | 2.310 | 1.104 | 0.314 | 0.099 | 0.041 | |
| 18 | 300.00 | | | 26.368 | 7.803 | 2.840 | 1.357 | 0.386 | 0.122 | 0.051 | |
| 20 | 333.33 | | | 31.891 | 9.435 | 3.080 | 1.502 | 0.464 | 0.148 | 0.061 | |
| 22 | 366.67 | | | 37.883 | 11.204 | 3.351 | 1.696 | 0.548 | 0.175 | 0.072 | |
| 24 | 400.00 | | | 44.334 | 13.108 | 3.920 | 1.859 | 0.638 | 0.205 | 0.085 | |
| 26 | 433.33 | | | | 15.146 | 4.528 | 2.147 | 0.734 | 0.237 | 0.098 | |
| 28 | 466.67 | | | | 17.316 | 5.176 | 2.453 | 0.835 | 0.27 | 0.112 | |
| 30 | 500.00 | | | | 19.615 | 5.862 | 2.778 | 0.979 | 0.306 | 0.126 | |
| 35 | 583.33 | | | | 25.921 | 7.743 | 3.669 | 1.028 | 0.404 | 0.167 | |
| 40 | 666.67 | | | | 33.010 | 9.856 | 4.669 | 1.307 | 0.515 | 0.212 | |
| 45 | 750.00 | | | | 40.863 | 12.196 | 5.776 | 1.617 | 0.638 | 0.263 | |
| 50 | 833.33 | | | | 49.466 | 14.759 | 6.988 | 1.955 | 0.772 | 0.318 | |
| 55 | 916.67 | | | | | 17.540 | 8.303 | 2.323 | 0.982 | 0.378 | |
| 60 | 1000.00 | | | | | 20.537 | 9.720 | 2.718 | 1.151 | 0.443 | |
| 65 | 1083.33 | | | | | 23.746 | 11.237 | 3.142 | 1.332 | 0.513 | |
| 70 | 1166.67 | | | | | 27.164 | 12.853 | 3.592 | 1.525 | 0.587 | |
| 75 | 1250.00 | | | | | 30.789 | 14.566 | 4.070 | 1.73 | 0.666 | |
| 80 | 1333.33 | | | | | 34.619 | 16.375 | 4.575 | 1.947 | 0.749 | |
| 85 | 1416.67 | | | | | 38.651 | 18.281 | 5.106 | 2.039 | 0.855 | |
| 90 | 1500.00 | | Friction loss calculated using Darcy - Weisbach equation $hfs = 4f (L/D) (V^2 / 2)g$ for $H_2O$ at 20°C | | | 42.885 | 20.280 | 5.664 | 2.265 | 0.929 | |
| 95 | 1583.33 | | | | | 47.317 | 22.374 | 6.247 | 2.502 | 1.026 | |
| 100 | 1666.67 | | | | | | 24.560 | 6.856 | 2.75 | 1.128 | |
| 105 | 1750.00 | | | | | | 26.839 | 7.491 | 3.009 | 1.233 | |
| 110 | 1833.33 | | | | | | 29.209 | 8.151 | 3.279 | 1.344 | |
| 115 | 1916.67 | | | | | | 31.670 | 8.837 | 3.56 | 1.458 | |

# APPROXIMATE FRICTIONAL HEAD LOSS IN C.R.I. HEAVY TYPE COLUMN PIPES

| FLOW | | NOMINAL DIAMETER OF PIPE (INCHES/MM) (Table -6) | | | | | | | | | HEAD LOSS IN METERS, FOR 100M LENGTH OF PIPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| m³/h | l/min. | 1" / 25 | 1¼" / 32 | 1½" / 40 | 2" / 50 | 2½" / 65 | 3" / 80 | 4" / 100 | 5" / 125 | 6" / 150 | |
| 1 | 16.67 | 2.596 | 0.587 | 0.295 | 0.089 | 0.029 | 0.014 | | | | |
| 1.5 | 25.00 | 5.277 | 1.193 | 0.599 | 0.181 | 0.060 | 0.028 | 0.009 | 0.002 | | |
| 2 | 33.33 | 8.731 | 1.974 | 0.990 | 0.299 | 0.099 | 0.046 | 0.015 | 0.003 | 0.001 | |
| 2.5 | 41.67 | 12.902 | 2.917 | 1.464 | 0.442 | 0.147 | 0.068 | 0.021 | 0.004 | 0.002 | |
| 3 | 50.00 | 17.751 | 4.013 | 2.014 | 0.609 | 0.203 | 0.094 | 0.029 | 0.006 | 0.002 | |
| 3.5 | 58.33 | 23.248 | 5.257 | 2.638 | 0.797 | 0.265 | 0.123 | 0.039 | 0.008 | 0.003 | |
| 4 | 66.67 | 29.368 | 6.640 | 3.332 | 1.007 | 0.335 | 0.155 | 0.049 | 0.01 | 0.004 | |
| 4.5 | 75.00 | 36.090 | 8.160 | 4.095 | 1.237 | 0.412 | 0.190 | 0.060 | 0.012 | 0.005 | |
| 5 | 83.33 | 43.398 | 9.812 | 4.924 | 1.488 | 0.495 | 0.229 | 0.072 | 0.014 | 0.006 | |
| 6 | 100.00 | 59.708 | 13.500 | 6.774 | 2.047 | 0.682 | 0.315 | 0.099 | 0.019 | 0.008 | |
| 7 | 116.67 | 64.634 | 17.680 | 8.871 | 2.681 | 0.893 | 0.412 | 0.130 | 0.025 | 0.01 | |
| 8 | 133.33 | | 22.335 | 11.207 | 3.387 | 1.128 | 0.521 | 0.164 | 0.032 | 0.013 | |
| 9 | 150.00 | | 27.448 | 13.772 | 4.162 | 1.386 | 0.640 | 0.201 | 0.04 | 0.016 | |
| 10 | 166.67 | | 32.340 | 16.560 | 5.002 | 1.667 | 0.770 | 0.242 | 0.048 | 0.019 | |
| 12 | 200.00 | | 37.969 | 18.910 | 6.886 | 2.293 | 1.059 | 0.334 | 0.066 | 0.026 | |
| 14 | 233.33 | | 50.135 | 24.963 | 7.448 | 3.002 | 1.387 | 0.438 | 0.087 | 0.034 | |
| 16 | 266.67 | | | 31.759 | 9.472 | 3.793 | 1.652 | 0.553 | 0.11 | 0.043 | |
| 18 | 300.00 | | | 39.281 | 11.711 | 3.854 | 1.903 | 0.679 | 0.136 | 0.053 | |
| 20 | 333.33 | | | 47.513 | 14.161 | 4.659 | 2.134 | 0.817 | 0.164 | 0.065 | |
| 22 | 366.67 | | | 56.445 | 16.819 | 5.531 | 2.533 | 0.965 | 0.195 | 0.077 | |
| 24 | 400.00 | | | | 19.679 | 6.470 | 2.963 | 1.066 | 0.228 | 0.089 | |
| 26 | 433.33 | | | | 22.741 | 7.476 | 3.422 | 1.124 | 0.263 | 0.103 | |
| 28 | 466.67 | | | | 25.994 | 8.545 | 3.911 | 1.220 | 0.301 | 0.118 | |
| 30 | 500.00 | | | | 29.454 | 9.678 | 4.429 | 1.380 | 0.34 | 0.134 | |
| 35 | 583.33 | | | | 38.931 | 12.787 | 5.850 | 1.822 | 0.449 | 0.176 | |
| 40 | 666.67 | | | | 49.585 | 16.280 | 7.446 | 2.319 | 0.572 | 0.224 | |
| 45 | 750.00 | | | | | 20.148 | 9.213 | 2.868 | 0.708 | 0.277 | |
| 50 | 833.33 | | | | | 24.385 | 11.148 | 3.469 | 0.858 | 0.336 | |
| 55 | 916.67 | | | | | 28.984 | 13.248 | 4.121 | 1.02 | 0.399 | |
| 60 | 1000.00 | | | | | 33.940 | 15.510 | 4.823 | 1.195 | 0.468 | |
| 65 | 1083.33 | | | | | 39.247 | 17.933 | 5.576 | 1.383 | 0.541 | |
| 70 | 1166.67 | | | | | 44.901 | 20.513 | 6.376 | 1.584 | 0.619 | |
| 75 | 1250.00 | | | | | 50.899 | 23.250 | 7.225 | 1.797 | 0.702 | |
| 80 | 1333.33 | | | | | 57.236 | 26.140 | 8.121 | 2.022 | 0.79 | |
| 85 | 1416.67 | | | | | | 29.183 | 9.065 | 2.26 | 0.883 | |
| 90 | 1500.00 | | Friction loss calculated using Darcy - Weisbach equation $hfs = 4f (L/D) (V^2 / 2)g$ for $H_2O$ at 20°C | | | | 32.378 | 10.056 | 2.51 | 0.98 | |
| 95 | 1583.33 | | | | | | 35.723 | 11.093 | 2.772 | 1.082 | |
| 100 | 1666.67 | | | | | | 39.216 | 12.176 | 3.047 | 1.189 | |
| 105 | 1750.00 | | | | | | 42.857 | 13.304 | 3.333 | 1.301 | |
| 110 | 1833.33 | | | | | | 46.644 | 14.477 | 3.632 | 1.417 | |
| 115 | 1916.67 | | | | | | 50.577 | 15.696 | 3.942 | 1.538 | |

## Selection of Pipes

| Permissible Hydrostatic pressure of C.R.I. uPVC column pipes (Table - 8) | | | | | | | | | | | | | (10 m = 1 kg/cm$^2$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variant / Nominal Diameter | 1 inch (25 mm) | | 1¼ inch (32 mm) | | 1½ inch (40 mm) | | 2 inch (50 mm) | | 2½ inch (65 mm) | 3 inch (80 mm) | 4 inch (100 mm) | 5 inch (140 mm) | 6 inch (165 mm) |
| Pipe Type | Bell Mouth | Coupler | Bell Mouth | Coupler | Bell Mouth | Coupler | Bell Mouth | Coupler | Coupler | Coupler | Coupler | Coupler | Coupler |
| Epsy | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 7 | 7 | - | - | - | - | - |
| Elite | 15 | 15 | 15 | 15 | 15 | 15 | 9 | 9 | - | - | - | - | - |
| Medium | 21 | 21 | 21 | 21 | 21 | 21 | 13 | 13 | 10 | 11 | 10 | - | - |
| Standard | 30 | 30 | 26 | 26 | 26 | 26 | 20 | 20 | 16 | 17 | 15 | 16 | 17 |
| Heavy | - | - | - | 35 | - | 35 | - | 27 | 26 | 26 | 26 | 26 | 26 |
| Super Heavy | - | - | - | 40 | - | 40 | - | 35 | 35 | 35 | 35 | 35 | 35 |

## Accessories

**Bottom adaptor:** Available in cast iron & stainless steel, this adaptor is used to connect the first piece of uPVC column pipe to the submersible pump. Since the threads of the pump and the pipe vary an adaptor is used.

**Top adaptor**: Available in Mild Steel, this adaptor is used to connect the last piece of uPVC column pipe to the outlet / discharge bend. Since, the threads of the pipe and the outlet connective vary, an adaptor is used.

**Pump Guard:** In theory in the entire length of the column, the first joint of column pipe with the submersible pump is the weakest one. C.R.I. uPVC column pipes are produced considering this factor. Even though, as a precautionary care, a pump guard is recommended as an accessory.

A Pump guard set consists of a short length uPVC column pipes, along with two steel rods, two flanges, nuts and cotter pins.

**Expander / Reducer:** Depending on the customer request, to use a column pipe varying from the size of the outlet of the pump, an expender / reduce will be supplies.

**Lowering Jig:** It is an accessory used to lower the pipe in the borewell. The Lowering Jig is with square threads to fit into the pipe and the other end is provided with a hook, which can be tied up to the chain of the tripod stand.

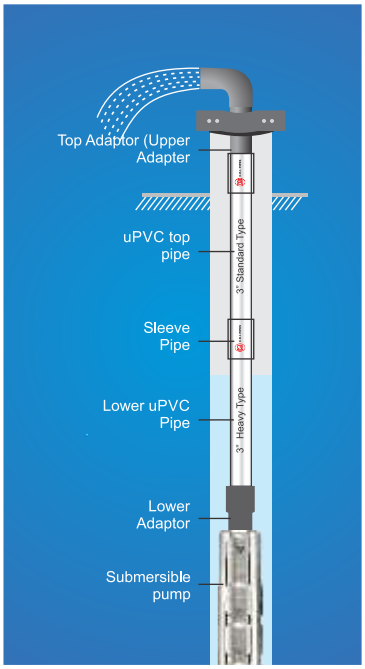
**Belt Wrench:** C.R.i. suggests to use only belt wrenches to tighten the column pipes. A metal wrench will cause damage while tigtening.

**Clamps:** These clamps are used to support the column pipe at the outlet of the borewell.

In view of continuous developments the information/descriptions/specifications/illustrations are subject to change without notice.

# Installation Procedure:

- First connect the bottom adaptor firmly to the pump discharge housing using a pipe wrench and first pipe can be connected along with pump guard.
- Before connecting clean both the ends of the pipes with clean water and check rubber seal ring for any damage.
- The pipe can be tightened by hand itself but, while tightening water has to be poured on pipe threads for lubrication. Anyhow for better grip belt wrench can be used to tighten / hold the pipes. Never use metal wrench on pipes.
- Tighten the pipes until the rubber seal ring in the pipe end completely enters in to the coupling.
- Submersible pump cable need to be tied in regular intervals along with the column pipes, for securing the cable from getting damaged.
- Once the top column pipe reaches the ground level, connect the top adaptor.
- Finally from the ground level, regular plumbing accessories can be used to transfer water to required delivery point.




**NOTE** : Separate earth conductor should be used for earthing the submersible pump, as these pipes are insulators.

**Precautions:**

**Installation Conditions:**

Full casing of bore well is recommended for long life of bore and pump. The casing pipes protect the bore from collapsing due to loose boulders, stones, soil and silt. It also reduces the chance of accident due to protruding stones and boulders at the time of removing the pump and pipe.

**Removal Conditions:**

At the time of removal of pumps from bores, it is advisable to ensure that there is no accumulation of boulders, stones and silt. During removal in case pump gets stuck due to such accumulation, proper flushing of the borehole should be done before applying the pulling load on the pipes.

**Avoid Dry Run of Pump:**

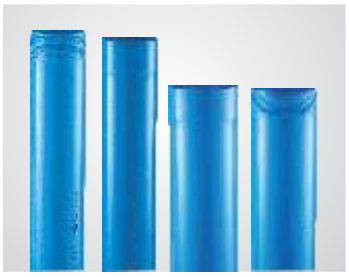
Dry run of submersible pump generates hot air which can damage/ deform the first Column Pipe connected with the pump. To avoid this:

- Use timer switch to turn on or off the pump automatically as per the pre-set time, determined after assessing the bore yield.
- Use of 3 metres S.S. Pipe between pump and C.R.I. uPVC Column Pipe will help dissipate the heat, preventing any damage or deformation.

**Prevention of Water Hammer:**

At the time of pump stoppage, water recedes/falls at tremendous speed from a height. Especially in deep bore wells of about 500 ft & above, this creates enormous pressure and load on the pump which leads to damage of pump and pipe. For such deep bore wells, it is recommended to make a 3mm hole in the pump NRV to protect the pump and pipe from water hammering.

# Casing & Screen pipe :



The important component of any water well are its casing & screening pipes. Properly selected and installed, they will ensure that the water well / borehole remains intact and ensures that it continues to remain a perennial source of clean water.

Until a few years ago, metal pipes and screens were the only option for these applications. The inherent disadvantages were corrosion of metal casing pipes, deterioration of screens and formation of bacteria, resulted in the abandonment of wells, and sometimes even, contamination of the water source.

We at C.R.I., manufacture uPVC casing and screen pipes as per IS 12818:2010 standards. They are available in different sizes ranging from 40 mm to 300 mm. These pipes can be used in any of the irrigation, domestic, mining and industrial boreholes, helping to keep out the gravel pack and foreign particles, providing clean and clear water.

Well Casing pipes are necessary to exclude the shallow groundwater, protect the pump and support the unstable upper layers of loose soil and rock from collapsing into the borehole.

Deeper down, the groundwater flow system may be through unstable sands and gravels, or highly fractured and weathered bedrock aquifers. In both the cases, it is important to stablise the aquifer strata, and at the same time, allow the groundwater to flow easily into the borehole. A Well Screen pipe is installed to achieve this purpose.

**Advantages of C.R.I. uPVC casing & screen pipes:**

- Corrosion resistant: Being of plastic material, these pipes do not corrode.
- Lightweight: These pipes are light in weight and and are easy to transport. It is a big advantage in the areas where the road conditions are not good.
- Easy to handle and install: High quality threaded joints ensure easy assembly and installation at the site.
- Non-Conductive: These pipes are non reactive and thus no electro-chemical reaction takes place with water, thus preventing encrustation in the pipes.
- Economical: Compared to other alternatives, these pipes are economical to the end user.
- Ensuring water quality: These pipes donot impart any colour, taste or odour to the water
- Stiffness and strength: these pipes are embedded with excellent mechanical properties, thus are capable of withstanding the hydraulic pressure, the pipes are subjected during the construction of the well.
- Convenient and reliable: Provides easy and stronger joints.
- C.R.I. uPVC casing pipes are provided with Trapezoidal threads which provide easy and strong joints.
- C.R.I. uPVC screen pipes facilitate optimum performance & safety by keeping the gravel pack & other foreign substances out of the well.
- C.R.I. uPVC screen pipes has horizontal slots which enables laminar flow into the well ensuring higher permeability and reducing well entrance losses, thus saving pumping energy and offer higher yields.

  Kindly note, it is recommended that the diameter of the casing should be atleast 2" (50 mm) greater than the outer diameter of the pump. Also, kindly ensure that the installed length of the pump chamber is sufficient to accommodate the pump even when the pumping water level is at its lowest.

# Casing Pipe Dimension Details:

| Table 9 : CS Pipes for shallow wells upto 80m depth | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 100 | 4" | 113 | 113.3 | 112.9 | 113.4 | 119 | 3.9 | 4.6 |
| 115 | 4.5" | 125.00 | 125.30 | 124.90 | 125.40 | 130 | 4.2 | 4.8 |
| 125 | 5" | 140.00 | 140.40 | 139.90 | 140.50 | 150 | 5.20 | 6.00 |
| 150 | 6" | 165.00 | 165.40 | 164.60 | 165.60 | 174.00 | 5.70 | 6.50 |
| 180 | 6.5" | 180.00 | 180.50 | 179.80 | 180.60 | 190 | 7.00 | 7.80 |
| 175 | 7" | 200.00 | 200.50 | 199.60 | 200.60 | 211.00 | 7.00 | 7.80 |
| 200 | 8" | 225.00 | 225.50 | 224.50 | 225.80 | 238.00 | 7.60 | 8.80 |
| 250 | 10" | 280.00 | 280.50 | 279.40 | 280.80 | 292.00 | 9.60 | 11.00 |
| 300 | 12" | 330.00 | 330.60 | 329.30 | 331.00 | 346.00 | 11.20 | 13.30 |

| Table 10 : CM Pipes for medium wells upto 250m depth | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 35 | 1.25" | 42.00 | 42.20 | 41.90 | 42.30 | 46.00 | 3.50 | 4.00 |
| 40 | 1.5" | 48.00 | 48.20 | 47.90 | 48.30 | 52.00 | 3.50 | 4.00 |
| 50 | 2" | 60.00 | 60.20 | 59.90 | 60.30 | 65.00 | 4.00 | 4.60 |
| 80 | 3" | 88.00 | 88.30 | 87.90 | 88.40 | 94.00 | 4.00 | 4.60 |
| 100 | 4" | 113.00 | 113.30 | 112.90 | 113.40 | 120.00 | 5.00 | 5.70 |
| 115 | 4.5" | 125.00 | 125.30 | 124.90 | 125.40 | 132.00 | 5.00 | 5.70 |
| 125 | 5" | 140.00 | 140.40 | 139.90 | 140.50 | 150.00 | 6.50 | 7.30 |
| 150 | 6" | 165.00 | 165.40 | 164.60 | 165.60 | 178.00 | 7.50 | 8.50 |
| 180 | 6.5" | 180.00 | 180.50 | 179.80 | 180.60 | 193 | 8.00 | 8.80 |
| 175 | 7" | 200.00 | 200.50 | 199.60 | 200.60 | 215.00 | 8.80 | 9.80 |
| 200 | 8" | 225.00 | 225.50 | 224.50 | 225.80 | 243.00 | 10.00 | 11.20 |
| 250 | 10" | 280.00 | 280.50 | 279.40 | 280.80 | 298.00 | 12.50 | 14.00 |
| 300 | 12" | 330.00 | 330.60 | 329.30 | 331.00 | 352.00 | 14.50 | 16.20 |

| Table 11 : CD Pipes for deep wells upto 400 mtrs depth | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 100 | 4" | 113.00 | 113.30 | 112.90 | 113.40 | 125.00 | 7.00 | 7.90 |
| 115 | 4.5" | 125.00 | 125.30 | 124.90 | 125.40 | 137.00 | 7.50 | 8.50 |
| 125 | 5" | 140.00 | 140.40 | 139.90 | 140.50 | 152.00 | 8.00 | 9.00 |
| 150 | 6" | 165.00 | 165.40 | 164.60 | 165.60 | 180.00 | 9.50 | 10.70 |
| 180 | 6.5" | 180.00 | 180.50 | 179.80 | 180.60 | 190.00 | 10.20 | 11.40 |
| 175 | 7" | 200.00 | 200.50 | 199.60 | 200.60 | 217.00 | 11.80 | 13.60 |
| 200 | 8" | 225.00 | 225.50 | 224.50 | 225.80 | 247.00 | 13.00 | 14.80 |
| 250 | 10" | 280 | 280.5 | 279.4 | 280.8 | 304 | 16 | 17.6 |
| 300 | 12" | 330 | 330.6 | 329.3 | 331 | 359 | 19 | 21 |

In view of continuous developments the information/descriptions/specifications/illustrations are subject to change without notice.

## Screen Pipe Dimension Details:

| Table 12 : Ribbed Medium Well Screen (RMS) Pipes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 35 | 1.25" | 46 | 46.2 | 45.90 | 46.30 | 50.00 | 3.50 | 4.00 |
| 40 | 1.5" | 52 | 52.2 | 51.90 | 52.30 | 56.00 | 3.50 | 4.00 |
| 50 | 2" | 64 | 64.2 | 63.90 | 64.30 | 69.00 | 4.00 | 4.60 |
| 80 | 3" | 92 | 92.3 | 91.80 | 92.40 | 98.00 | 4.00 | 4.60 |
| 100 | 4" | 117.00 | 117.30 | 116.80 | 117.40 | 124.00 | 5.00 | 5.70 |
| 115 | 4.5" | 129.00 | 129.30 | 128.80 | 129.40 | 136.00 | 5.00 | 5.70 |
| 125 | 5" | 144.00 | 114.40 | 143.70 | 144.50 | 154.00 | 6.50 | 7.30 |
| 150 | 6" | 169.00 | 169.40 | 168.60 | 169.60 | 182.00 | 7.50 | 8.50 |
| 175 | 7" | 204.00 | 204.50 | 203.60 | 204.60 | 219.00 | 8.80 | 9.80 |
| 200 | 8" | 229.00 | 229.50 | 228.50 | 229.80 | 247.00 | 10.00 | 11.20 |
| 250 | 10" | 284.00 | 284.50 | 283.40 | 284.80 | 302.00 | 12.50 | 14.00 |
| 300 | 12" | 334.00 | 334.60 | 333.40 | 335.00 | 356.00 | 14.50 | 16.20 |

| Table 13 : Ribbed Deep Well Screen (RDS) Pipes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 100 | 4" | 117.00 | 117.30 | 116.80 | 117.40 | 129.00 | 7.00 | 7.90 |
| 115 | 4.5" | 129.00 | 129.30 | 128.80 | 129.40 | 141.00 | 7.50 | 8.50 |
| 125 | 5" | 144.00 | 144.40 | 143.70 | 144.50 | 156.00 | 8.00 | 9.00 |
| 150 | 6" | 169.00 | 169.40 | 168.60 | 169.60 | 184.00 | 9.50 | 10.70 |
| 175 | 7" | 204.00 | 204.50 | 203.60 | 204.60 | 221.00 | 11.80 | 13.60 |
| 200 | 8" | 229.00 | 229.50 | 228.50 | 229.80 | 251.00 | 13.00 | 14.80 |
| 250 | 10" | 284.00 | 284.50 | 283.40 | 284.80 | 309 | 16 | 17.6 |
| 300 | 12" | 334.00 | 334.60 | 333.30 | 335.00 | 363 | 19 | 21 |

| Table 14 : Plain Medium Well Screen (PMS) Pipes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 200 | 8" | 225.00 | 225.50 | 224.50 | 225.80 | 243.00 | 10.00 | 11.20 |
| 250 | 10" | 280.00 | 280.50 | 279.40 | 280.80 | 298.00 | 12.50 | 14.00 |
| 300 | 12" | 330.00 | 330.60 | 329.30 | 331.00 | 352.00 | 14.50 | 16.20 |

| Table 15 : Plain Deep Well Screen (PDS) Pipes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nominal Size - DN (mm) | Pipe size in inches | Outer Diameter | | O.D at any point | | Mean OD over Connection | Wall Thickness (mm) | |
| | | Min. | Max. | Min. | Max. | Max. | Min. | Max. |
| 200 | 8" | 225.00 | 225.50 | 224.50 | 225.80 | 247.00 | 13.00 | 14.80 |
| 250 | 10" | 280.00 | 280.50 | 279.40 | 280.80 | 304 | 16 | 17.6 |
| 300 | 12" | 330.00 | 330.60 | 329.30 | 331.00 | 359 | 19 | 21 |

## Installation Procedure

- Arrange the pipe assembly on the ground
- Fix the centering guides on the pipes once in every 15 meters (minimum), just below the neck of the socket, with the open end of the centering guides facing upwards while lowering.
- Always use a plain casing pipe (sand trap) for the first pipe to be lowered, with a conical end cap (Bullnose) blanking the spigot end of the pipe. Fill this pipe with water or drilling fluid before lowering into the well.
- Wash the reamed borehole thoroughly with fresh drilling fluid (Bentonite Solution) for 40-45 minutes from the bottom, keeping the specific gravity of the drilling fluid to below 1.4. This will prevent heavy sedimentation at the bottom of the borehole and also easy lowering of the assembly.
- To obtain better results, ensure that the reamed borehole is at least 15 to 20cms more than the outside diameter of the casing pipe.
- The sand trap is the lowest pipe in a tubewell and is the first to be selected. Fit this pipe with an end plug (cap) and centering guide.
- Lower the sand trap into the borehole and hold with a split clamp with the socketed end facing upward.
- The next pipe, which is either a screen pipe or a plain pipe (depending on lithology of well) is fitted to the sand trap by screwing them together.
- Jointing of pipes can be done either by belt wrench or with manila rope. Never use a chain wrench. Clean the threads to remove mud or burrs using wire brush. Soap solution may be used to lubricate the joints. Avoid grease or waste oil.
- Fit the socketed end of the next pipe (which can be a screen/plain casing) with the fitting cap.
- Connect the lifting cap securely with the wire rope of the drilling frame.
- Use winch of drilling machine to lift the threaded pipe string.
- This pipe string is jointed to the pipe already lowered into the borehole.
- Centre the assembled pipe string and permit it to descend into the borehole by releasing the split clamp, Fill the pipe with water or mud solution to equalize pressure.
- Repeat the operation till all the casings and screens are lowered according to the lithology of the well. The time needed to make each joint is less than 5 minutes.
- Lowering time can be reduced by jointing the casings and screens on the ground to make additional lengths. Do this correctly as per lithology of well to avoid wrong placement of screens in the bore well.
- Do not set the lowered pipe assembly at the bottom of the borehole. Ensure at least 10 feet of free bore below the sand trap. This helps the lowered casing and screen pipes to remain hanging and achieve a vertical installation.
- Centering guides should always be fixed at a minimum interval of 1.5 meters to ensure uniform gravel packing around the casing and screen pipes.
- Take extra care at the time of bore well flushing. Use a rubber coated metal pipe joined at the end of the compressor air hose. It is advisable to maintain compressor air pressure below 12 bars. Generation of excess pressure inside the casing pipe may lead to pipe breakage.

**Accessories :**

**End cap** : These are used for sealing the bottom and top of the casing and screen pipe and to avoid the entrance of any foreign particles into the borehole.

**Centering Guides** : These are used in casing and screen pipes to ensure proper positioning of the casing in the borehole and uniform gravel packing around the casing and screen pipes.

# Quality control

We at C.R.I. adopt and follow stringent quality control procedures starting right from the procurement of raw materials, during production, and test the final products from each and every batch that are produced and also before shipping the goods to our customer. Hence, without any hesitation, we proclaim, we supply our customers the best quality of the products in the market.

We believe that Change is constant and we continuously upgrade and adapt ourselves to the latest technologies available in the market. Hence, our customers can be assured that they are owning the product, which is a derivative of these latest technologies and a constant innovation in design for better quality.

Some of the tests that are conducted on our pipes are (Table 16)

| Tests | C.R.I. Requirement | Standard |
|---|---|---|
| Specific Gravity | 1.40 to 1.46 g/cm$^3$ | As per IS : 12818 : 2010 |
| Tensile Strength | Min. 45 MPa | As per IS : 12818 : 2010 |
| Resistance to external blows @ 0$^\circ$C | 0% True Impact Rate (TIR) | As per IS : 12818 : 2010 |
| Vicat Softening Temperature | Min 80$^\circ$C | As per IS : 12818 : 2010 |

**Bundling and Telescopic stuffing of uPVC column pipes:**

The pipes are batched and bundled in alternative directions for the proper utilization of the space in the bundle. Also, in case of the requirement for multiple sizes of pipes, on customer request and if feasible, we do telescopic stuffing of the pipes, i.e. we stuff smaller pipes inside the bigger pipes, for maximum utilization of the space inside the container.

**Handling & Storage of pipes:**

Even though our pipes are rigid, they are to be handled with reasonable care. It is suggested to avoid throwing of the pipes or bundles of pipe on the floor. The pipes should not be dragged or pushed from the bed of the truck or container. On the receipt of the pipes, kindly check and inspect for any damage that has occurred during transportation or improper handling / treatment. In all cases, severe contact with any sharp objects such as nails, rocks, angle irons, pieces of glass, etc. should be totally avoided.

Preferably, the pipes are to be stored indoors. If this is not viable, the pipes should be stored on level ground which is dry and free from sharp objects, properly covered avoiding exposure to direct sunlight. If different variants of pipes are to be stacked together, the pipe with the thicker walls should be at the bottom. Kindly see to it that the pipes are placed in alternative layers, perpendicular to each other, with the first layer in a square shape. The maximum stacking height of these pipes should be 7 feet.

**Container stuffing:**

The maximum length of each bundle of pipe is 3.3 meters. Hence, a maximum of three rows of pipe can be stuffed in a 40 foot container. Whereas, in a 20 foot container only one row of pipe can be stuffed. Hence, it is advised to our customers, to order the pipes in a 40 foot container, which significantly reduces their cost of investment per pipe. The remaining space in the container is used to stuff other accessories, which are required to install the uPVC column pipes.

# Frequently Asked Questions

**1. Why only C.R.I. uPVC Drop / Riser pipes?**

C.R.I. is an ISO 9001, ISO 14001 and OHSAS 18001 certified company. It has introduced several new products to suit the customer's requirements and these products are well accepted across the continents. C.R.I. has a well developed distributor, dealer and service network in India and we have 11 subsidiaries across the globe.

**2. What are the benefits of uPVC pipes over steel pipes?**

Savings on (a) Cost of pipes (b) Handling time (c) Power (d) Upto 30% higher water discharge (e) Longer working life (f) Zero maintenance.

**3. What is the expected life of C.R.I. Column Pipes?**

C.R.I. Column Pipe system design & standards incorporate significant engineering safety factors which should translate to a long service life. C.R.I. Column Pipe System is not susceptible to corrosion, scale build up or electrolysis in areas where water, solid and / or atmospheric conditions are aggressive. C.R.I. firmly believes that the system will provide a service life as long or longer than alternative materials in the market.

**4. How do you say that this is better than the traditional GI pipes?**

These pipes are lesser in weight, easy installation procedure, less manpower required, no rust after any number of years, economical, no friction loss, this will support motor, take less load and give longer life, and customers can use these pipes at full depth with full confidence.

**5. How the usage of the pipe affect on the quantity and quality of water?**

Due to smooth internal surface, friction is low and therefore we get upto 30% more water compared to steel / GI pipes. Over a period of use, the steel pipes get corroded, rusted and the water quality deteriorates. In C.R.I. uPVC pipes, since there is no corrosion or chemical reaction throughout the depth of column pipe, the water quality remains the same as the source.

**6. Can we compare the strength of uPVC pipes with a steel pipe?**

The specific gravity of uPVC is 1.4-1.45 gm/cm3 where as the steel has 8 gm/cm3. Taking the strength of the material into consideration, the pipes are optimally designed to make them lite without any compromise in their strength requirements.

**7. Why is there a variation in thickness of the pipes?**

The end of the pipes are made thicker so that even after making the threads and removal of material the thickness of the pipe remains the same under the threads so that the strength of pipe is maintained throughout.

**8. Can uPVC pipes take load of the pump?**

C.R.I. Drop / Riser pipes are designed to withstand not only the weight of the pump, but also the weight of the pipes itself, weight of the water in the column and also weight of the cables to supply electricity with additional factor of safety. Thus these pipes hold several times the weight of entire column filled with water and pump assembly.

**9. Up to what depth can the pipes be lowered?**

The depth of the bore well may differ from place to place depending upon the water level in the borewell. C.R.I. offers a range of pipes to suit the customer's requirement of various depths and they have been successfully used upto the depths as mentioned against them (Kindly refer Table 4). Proper selection of C.R.I. pipes can be made for various depth applications after a careful study of the pump pressure and the technical booklet.

**10. Does Drop / Riser pipes need full casing in the bore?**

These pipes give the best service and performance in borewells that have full casing or borewells which are free from loose boulders and stones. In areas where loose boulders and stones are prevalent, full casing is recommended, which helps in tackling the bore collapse problem. Care should be taken during drilling of the borewell so that it is vertically down without any bend.

**11. What should be the bore size with respect to the outside diameter of the pump?**

For bore wells without casing pipe, specially in areas with loose boulders and soil are present, it is suggested that the borewell size should be minimum 2" more than the pump outer diameter. This helps to prevent pump getting stuck up. For borewells with casing, a minimum gap of 1½" between the Casing internal diameter and pump outer diameter is required.

**12. What happens if a bore collapses?**

The pump and the pipes can be pulled out only in cases where the applied force for lifting the assembly is within the ultimate breaking strength of the pipe as mentioned in the charts. In case of severe bore collapse and boulder problems even the retrieval of steel pipes is impossible.

**13. If situation demands is it advisable re-threading at site?**

No, it is not allowed to cut or re-thread the pipes on site. These pipes are threaded on highly sophisticated CNC machines with highest dimensional accuracy. This type of perfection is not possible at site.

## C.R.I. PUMPS (PVT) LIMITED

(International Division)
7/46-1, Keeranatham Road, Saravanampatty, Coimbatore - 641 035. India.
Phone : +91-422-7117310, 7117312, Fax : +91-422-7117300, e-mail : cri@crifluidsystems.com website : www.crifluidsystems.com

### BOMBAS C.R.I. ESPAÑA, S.L.

Poligono Industrail El.Bony Calle 31, No. 137, 46470
Catarroja (Valencia) Spain.
Tel : +34-96 1842 974, Fax : +34-96 1842 977
E-mail : admin-es@crifluidsystems.com, www.crifluidsystems.com

### C.R.I. BOMBAS HIDRÁULICAS LTDA

Av. Rodrigo Fernando Grillo, 457, Jd. Manacas,
CEP - 14.801-534, Araraquara - SP, **Brasil.**
Fone : +55-16-3331 1099, Fax : +55-16-3331 5344
e-mail : cri@cribombas.com.br website : www.cribombas.com.br
Filial : Jaboatão dos Guararapes-PE, Brasil
Fone : (81) 3093-9620, Fax : (81) 3093-9600

### C.R.I. PUMPS S.A. (PTY) LIMITED

Stand 63, Capital Hill Commercial Estate,
Cnr. K101 & Le Roux Avenue, Midrand -1685,
Johannesburg. South Africa. Phone : +27 11 8058631 /32,
Fax : +27-11-8058630, E-mail : cri-za@crifluidsystems.com,
Web : www.crifluidsystems.com

### C.R.I. PUMPS (Shanghai) Co., Ltd.

Room 510, No 1855 Qixin Road,
Minhang District, **Shanghai** - 201101 China.
Tel : +86-21-54405082, Fax : +86-21-54405083
e-mail : sales-chn@crifluidsystems.com
web : www.crifluidsystems.com

### C.R.I. FLUID SYSTEMS USA LLC.

620 N Fairfield St, Amarillo, Texas 79107, **USA.**
Tel : 832-430-4660 E-mail : sales.us@crifluidsystems.com
Website : www.crifluidsystems.com

### C.R.I. FLUID SYSTEMS MEXICO S.DE R.L. DE C.V

Cuidad De Mexico
E-mail : sales.mx@crifluidsystems.com
website : www.crifluidsystems.com

### C.R.I. PUMPS (FZC)

P.O. Box : 7988 , L1-10, Sharjah Airport International Free Zone
(SAIF-Zone) **Sharjah**. United Arab Emirates (UAE),
Tel: +971-6-5573041, email: service-uae@crifluidsystems.com
web: www.crifluidsystems.com

### C.R.I. FLUID SYSTEMS INC.,

Polyland Industrial Subdivision, Warehouse #3, Block 4,
Kendex St., Bo. Iba, Meycauayan, Bulacan. **Philippines**. Zip-3017.
Phone : +63 44 762 8887 / +63 44 802 6199, Fax : +63 44 762 8883
E-mail : sales_ph@crigroups.com
Website : www.crifluidsystems.com

### PT. CRI FLUID SYSTEMS

Boutique Office Jalan Kawasan Industri & Pergudangan
Marunda Center Block C, No. 10, Kelurahan, Segaramakmur,
Kecamatan Tarumajaya Kabupaten, Bekasi,
Jawa Barat, **Indonesia** -17211. Telepon : 021 88998118
E-mail : sales.id@crifluidsystems.com,
Website : www.crifluidsystems.com


EC-CCP2 - 03/24-E2