

WELL CASING & SCREEN PIPES



<http://vinylpipes.com>



Company Profile

Vinyl Tubes Pvt. Ltd., one of the first few company to envisage the future of Plastic and invest in the future. The Group started by Mr. Jaychand Jain in 1941 was developed and nurtured Mr. Vitul Jain who had taken an active role in helping India Agri. Irrigation during the period Green revolution.

Vinyl Tubes Pvt. Ltd., was incorporated as a separate company in 1987 where in it was the pioneer in setting up the PVC pipe factory in North India. This ISO 9001 Certified factory has been a part of 300Mio USD Group who have been diversified interests in Textile, Chemical and Mining.

The Company has been spread over 65,000 Sqmt area and have annual capacity to process 12,000 MT of PVC in to various product like uPVC Column pipe, Casing Pipes, Pressure pipe, SWR Pipe and Plumbing pipes. The Computerize Control CNC machines are capable of producing pipes of Diameter from 20mm to 315mm in various specification and standards.

Vinyl Tubes Pvt. Ltd., has been one step ahead of on the Quality Assurance. It has been certified by Bureau of Indian Standards (BIS) apart from the CE for European market. The products are regularly inspected by third party inspection agency like SGS, RITES, CIEPT etc. The Company is also in final stage.

Today, Vinyl is a leading brand in India with its own Branch office / Stock points more than 15 different cities in India Exports to More than 10 Counties in Europe along with Africa, Australia and Middle East.

Vinyl has achieved this distinctive position across the world due to its ability to provide reliable and cost effective solution. Vinyl is committed to continuous improvement in its Quality of product and services by implementing new and advanced technology.

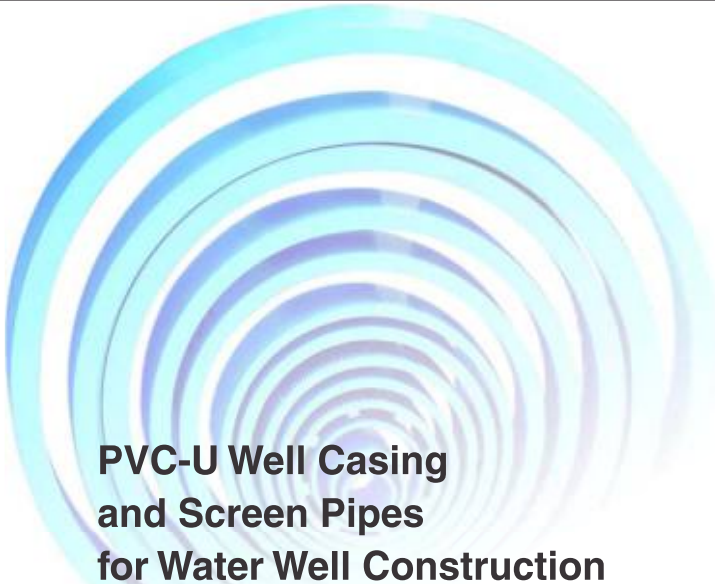
It has been regularly investing in Design, Engineering and R&D for product improvement. Investing in dedicated manpower has also been a key factory in Vinyl. They have employed external Trainers and consultants to improvise service to Customer and develop new business model based on needs.

OUR VISION

To emerge as global leader in Water Pipe industry by being Emerging market centric, and adopting new technology and innovating the processes thus providing Value for Money. Expanding globally networked and thus placed amongst the top 5 private sector players by 2020".

OUR MISSION

To demonstrate our leadership in our chosen field of business by focusing all our actions towards customer's satisfaction and make significant contributions to his success. We shall continue to innovate our processes, products and services to provide value for money in all our efforts.



PVC-U Well Casing and Screen Pipes for Water Well Construction

Introduction

Water covers almost three quarters of the earth's surface and a major portion of this is found in the oceans or frozen in the Polar Regions. Only a small percentage of fresh water is available as surface water in lakes, rivers, streams and as ground water. Groundwater is the finite source and it must be exploited very carefully.

The past fifty years witnessed a global expansion of the water well industry particularly as extraction of water from the wells has become the lifeline of industry, agriculture, and drinking water supply in cities, towns and villages.

Well construction products, therefore, play an important role to ensure the highest quality, efficiency and productivity of the well. In the past, metal casing and screens were the natural choice of well design engineers and drillers. However this material was not always found to be suitable, particularly in conditions where rapid corrosion of casing pipes, deterioration of screens or formation of bacteria resulted in abandonment of the well or worse still to contaminate the source.

Synthetic materials that belong to a family of Thermoplastics have proven to be the most superior materials for well construction. Among others, unplasticised Polyvinyl Chloride (u-PVC) that is ideally suited for use in well construction also belongs to this family of thermoplastics.

PVC-U has higher density than water that provides a clear advantage in well construction. Its yield stress of 55N/mm² is comparatively high. The modulus of elasticity is also high enough to achieve excellent stiffness in pipes preventing undesired deformation of the pipe.

The other mechanical and thermal properties of PVC-U are so favourable that they comply with the specific requirements of well construction. Well pipes in use are continuously affected by the water and soil corrosion. It is therefore important to use the materials that are insensitive and resistant to corrosion.

PVC-U is resistant to all substances dissolved in natural ground waters. PVC-U is also resistant to aggressive and highly concentrated acids and salts. Its resistance covers a pH range of water between 2 & 12, due to which the chemicals used, for cleaning, developing and regenerating the wells (both organic and inorganic) do not affect the PVC-U well pipes. PVC-U is completely resistant to bacteria in water and soil.

The various physical and chemical properties of PVC-U material make it an ideal choice for well construction. Mechanical properties could be achieved by designing the right dimensional requirements of the pipes. Well pipe made with PVC-U can be adapted to the respective conditions by choosing the corresponding wall thickness of the pipes.

Tensile Strength

The tensile strength required can be calculated on the basis of the pipe weight. In addition to the pipe weight, gravel that gets stuck on the joints during the assembly and settlement phase should be considered in design calculations. The lower load bearing capacity of screen pipes with slots should also be considered when the screen pipes are installed at multiple locations in a deep well. General recommendations on the admissible laying depth of the pipes therefore are not possible. It is imperative to assess the respective loads for each individual project.

Resistance to External Pressure

In order to determine the admissible laying depth of the well pipes, it is necessary to establish the load bearing capacity of the joints and the resistance to the external pressures. In practice, possible external pressures depend on several factors and some of those pressures cannot be quantified. Major external pressures are observed while laying the well pipes, gravel packing, sealing the annular spaces, developing the well or when pumping (due to larger differences in water level). The effect of such pressures cannot be precisely determined.

When sinking pipes through clay layers, additional compressive forces are exerted due to swelling clays. This can happen at any depth and in extreme cases may cause considerable strain on the material surface. The values indicated in the tables of this brochure are based on the minimum wall thickness of the pipes, their diameters and material composition.

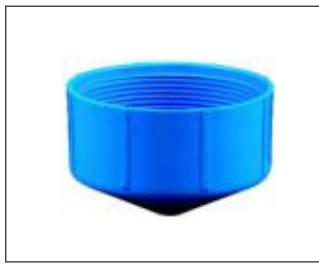
Impact of Temperature

Temperature conditions prevailing during the laying of PVC-U well pipes will influence the mechanical properties of the material. High temperature between 30°C and 40°C as indicated by the creep strength in relation to time, the PVC-U material properties provide sufficient safety factor for the intended use. It is however important to determine the other influences while encasing the well pipes with concrete to seal the drill holes. Temperature increases can be caused by the hydration heat of concrete. Calculations however show that these temperatures do not normally exceed 15°C, with the temperature of unset concrete reaching approx. 18°C, the temperature within the seal will be slightly more than 30°C and that is within the optimum limits.



VINYLPVC-U Screen & Casing Pipes Accessories

The following accessories, adaptors and Transition fittings in various sizes and types of joints are available to complete well installation



End Cap



Reducer



Centering Guide



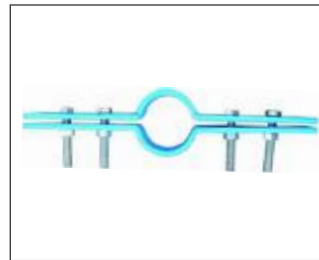
Top Cap



Lifting Cap



Wooden Clamp



Split Clamp



Transition Fittings

Advantages of Vinyl uPVC Well Casing & Ribbed Screens over Metal Casings & Screens Pipes.

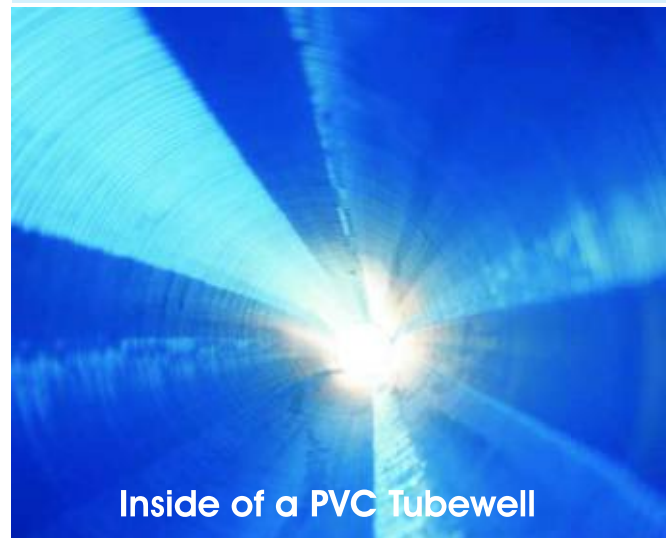
METAL CASINGS AND SCREENS



Inside of a Steel Tubewell

- Due to local action and corrosive soil nature the life of tube wells is as low as two years.
- Slot openings get enlarged and silting starts due to erosion in the screens.
- More than 50% of slot opening is obstructed by Filtering Media (Gravel Pack) hence low permeability.
- Screen slot widths can not be made to suit aquifer sieve analysis for proper design of the well which cannot be avoided.
- Metal casings and screens are heavy, thus making installation cumbersome and tedious.
- Metal casings require special equipments like welding sets and generator sets for assembly and erection.
- Due to its weight, vertically can not be maintained.
- Metal Casing and Screen are costly.

VINYL uPVC WELL CASING AND RIBBED SCREENS



Inside of a PVC Tubewell

- VINYL WELL CASINGS AND RIBBED SCREENS are manufactured out of quality PVC compound and PVC being an inert material. VINYL WELL CASINGS AND RIBBED SCREENS are totally unaffected by corrosion.
- Slot openings are not subjected to erosion hence they do not offer any resistance to flow.
- Due to the Ribs on the screen the FILTERING MEDIA (Gravel Pack) is kept 2 mm away from the slot opening and this increases the permeability of VINYL RIBBED SCREENS.
- VINYL RIBBED SCREENS are manufactured with slot widths ranging from 0.2mm to 3mm to suit the aquifer sieve analysis which helps engineers to design the well to give better life and yield.
- The Specific gravity of PVC being 1.4, the VINYL WELL CASINGS AND RIBBED SCREENS weigh only 1/5th of steel Casings and Screens. This makes it easier to handle and install.
- VINYL WELL CASINGS AND RIBBED SCREENS are manufactured with socket and spigot ends with suitable locking, which require no special equipments to assemble and install.
- VINYL WELL CASINGS AND RIBBED SCREENS are supplied with centering guides to maintain verticality of the well.
- Total Installation with VINYL WELL CASINGS AND RIBBED SCREENS will be substantially cost effective when compared with conventional mild steel casings and screens.

Screen Permeability

The possible production capacity of a well basically depends on the following factors:

- Permeability and yield of the water bearing strata
- Permeability of the filtering gravel
- Permeability of the well screen
- Entrance velocity of the water at the screen

Screen dimensions are determined assuming good yield of the aquifer and an average entrance velocity of water at 3 cm/sec.

This value prevents tendency towards incrustation and thus possible reduction in the service life of the water well. This also avoids the possible risk of carrying sand from the formation as designing within this velocity avoids turbulence in the entrance to the screen. (Please refer to the relevant technical literature as well)

Under realistic conditions, free pore area of gravel heap in its densest packing amounts to approx. 4.5% due to the grading mix containing non circular gravel grains. Aquifer worthy of development show permeability (kF values) of 10^{-7} to 10^{-3} m/sec. Upon entry into the annular spaces filled with filter gravel these values changes between 10^{-4} to 10^{-2} m/sec.

This means that in situ grain size distribution of the aquifer represents the major hindrance that leads to largest flow losses. When the water has reached the annular spaces it can enter the screen pipe almost without any hindrance.

Free Open Area

The percentage free open area is the sum of all internal slotted area of the screen pipe in relation to the total internal surface area of the slotted length of pipe. The plastic screens are manufactured with slots across the pipe axis. This ensures better stability against lateral rock or soil pressure that is especially important in deep wells.

Screen Open Area Dia. 50 mm - 400 mm

Nominal Diameter		Number of slots	zá *	Slot Width in mm							
				0.2	0.3	0.5	0.75	1	1.5	2	3
mm	inch	Diameter	mm	Percentage of Open Area							
50	2	3	108	3.7	5.2	6.0	9.1	9.4	9.7	12.1	—
80	3	3	168	3.7	5.2	6.0	9.1	9.4	9.7	12.1	—
100	4	5	216	3.7	5.2	6.0	9.1	9.4	9.7	12.1	14.0
115	4½	5	240	3.7	5.2	6.0	9.1	9.4	9.7	12.1	14.0
125	5	5	240	—	4.7	5.6	8.2	8.5	8.8	11.0	13.5
150	6	5	285	—	—	5.6	8.2	8.5	8.8	11.0	13.5
175	7	6	340	—	—	5.6	8.3	8.5	8.8	11.0	13.5
200	8	6	390	—	—	—	8.3	8.5	8.8	11.0	13.5
250	10	6	450	—	—	—	7.6	7.9	8.1	10.2	12.5
300	12	6	530	—	—	—	7.6	7.9	8.1	10.2	12.5
350	14	8	640	—	—	—	—	7.9	8.1	10.2	12.5
400	16	8	720	—	—	—	—	7.9	8.1	10.2	12.5
Slot pitch mm				4.0	4.0	5.5	5.5	6.8	9.5	9.5	11.0

* Summation of slots given is for medium thickness screens. For heavy thickness screens, the summation of slots will be marginally less. The percentage of open area remains the same for both thicknesses.

Screen Permeability Dia. 50 mm - 400 mm

Nominal Diameter		Slot Width in mm							
		0.2	0.3	0.5	0.75	1	1.5	2	3
mm	inch	Permeability per Meter of Screen in LPS at V = 3 cm /sec.							
50	2	0.18	0.25	0.29	0.44	0.45	0.46	0.58	0.67
80	3	0.27	0.39	0.45	0.68	0.70	0.72	0.90	1.04
100	4	0.35	0.50	0.57	0.87	0.90	0.93	1.16	1.34
115	4½	0.40	0.56	0.64	0.97	1.01	1.04	1.30	1.50
125	5	—	0.56	0.66	0.97	1.00	1.04	1.30	1.59
150	6	—	—	0.78	1.15	1.19	1.23	1.54	1.89
175	7	—	—	0.93	1.38	1.41	1.46	1.82	2.24
200	8	—	—	—	1.59	1.62	1.68	2.10	2.58
250	10	—	—	—	1.81	1.88	1.93	2.42	2.97
300	12	—	—	—	2.13	2.22	2.27	2.86	3.51
350	14	—	—	—	—	2.69	2.76	3.47	4.26
400	16	—	—	—	—	3.03	3.11	3.91	4.79



Vinyl PVC-U Well Casing & Screen Pipes

DIN 4925 - Threaded Joints

Nominal Diameter		Outside Dia.	Wall Thickness	Inside Dia.	Outside Diameter	Resistance to Hydraulic Collapse Pressure (RHCP)	Max. Tensile Strength Threaded Connection	Weight kg/m	
					DIN				
mm	Inch	min.	min.	min.	max.	Kg/cm ²	kg		
35	1¼	42	3.5	33.8	46	32	492	0.61	Pipe Thread acc. to DIN 4925 & 2999
40	1½	48	3.5	39.8	53	32	554	0.71	
50	2	60	4.0	50.8	66	24	856	1.02	
80	3	88	4.0	78.8	94	7.5	1351	1.53	
100	4 *	113	5.0	101.6	121	7.5	2024	2.46	Trapezoidal Thread acc. to DIN 4925
			7.0	97.2	125	15.5	3458	3.38	
115	4 ½	125	5.0	113.6	132	7.5	2253	2.73	
			7.5	108.0	137	15.5	4247	4.02	
125	5	140	6.5	125.2	149	7.5	3192	3.95	
			8.0	122.0	152	15.5	4528	4.81	
150	6	165	7.5	148.0	176	7.5	4873	5.38	
			9.5	143.6	180	15.5	6972	6.73	
175	7	195	8.5	175.6	205	7.5	7022	7.22	
			11.5	168.4	211	15.5	10745	9.62	
200	8	225	10.0	202.6	241	7.5	10364	9.80	
			13.0	195.4	247	15.5	14659	12.56	
250	10	280	12.5	252.0	297	7.5	12518	15.24	
			16.0	244.8	304	15.5	18755	19.25	
300	12	330	14.5	297.6	350	7.5	17964	20.85	
			19.0	288.0	359	15.5	27418	26.93	
350	14	400	17.5	361.0	425	7.5	29713	30.50	
			21.5	352.2	433	15.5	39944	37.08	
400	16	450	19.5	406.6	475	7.5	33195	38.26	
			23.5	397.8	490	15.5	45870	45.67	

Available in straight length: 1.0, 2.0, 3.0, 4.0 & 6.0 meter.

* 4 inch Casing also available with Pipe Thread according to DIN 4925 & 2999.

Slot Size	DN 35-115	0.2, 0.3, 0.5, 0.75, 1.0, 1.5, 2.0 mm
	DN 125	0.3, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 150 - 175	0.5, 0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 200 - 300	0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 350 - 400	1.0, 1.5, 2.0, 3.0 mm



Material

PVC-U, unplasticised polyvinyl chloride is the most ideal material for manufacturing well pipes as it is impervious to corrosion and chemical action, easy to handle and install, light in weight, non toxic, non conductive. Its long service life makes it an economical choice over other materials. Selection of right polymer grades, additives and stabilizing agents is an important criteria to produce a quality product and the Vinyl lay a special emphasis on this.

Upon request the manufacturer can provide a certificate of compliance with DIN EN 10204, 2.1

In Europe and other countries most of the manufactures are still using Lead Stabilizers due to its lower cost.

The "European Plastic Pipes and fittings association" represented by TEPPFA has set itself the goal to reduce the use of Lead Stabilizers in the EU by 25% until 2005 and by 75% until 2010 and by 100% until 2015.

PVC-U well casing and screen pipes manufactured by Vinyl and distributed in the EU are already 100% free from LEAD STABILIZERS

Properties

Physical Properties

To meet or exceed the user's expectations on the external pressure resistance, load bearing capacity of the threads, pipe dimensions and free open area of the screen pipe Vinyl follows all the set standards for the criteria. Tests on the physical properties and their compliance with the applicable rules and guidelines are carried out at State of the art in-house Laboratory. Technical data of the physical properties of our well pipes are listed in the table below:

Properties	Unit	Value	Standard
Impact strength	-	max. 10 % ruptures	DIN EN ISO179
Notched impact strength	Kj/m ²	above 5	DIN EN ISO179
Yield stress	N/mm ²	45 to 55	DIN EN ISO 527-2
Modulus of elasticity	N/mm ²	2500 to 3000	DIN EN ISO 178

Standard

Since 1981, Plastic Well Casing and Screen pipes manufacturing guidelines have been laid in DIN 4925, Part 1-3 Standard. This standard defines the following properties:

- Material
- Pipe Colour (Ral 5015) Dark Blue
- Pipe nominal diameter, outside diameter and wall thickness.
- laying length
- Slot cutting lateral to the tubular axis including slot specifications like slot width, slot length, number of slots, Summation of slots, minimum open area, etc.
- Thread Joints

Summarizing, we can say that the standard on plastic screen and well casing pipes manufactured with unplasticised polyvinyl chloride (PVC-U) comprises the following:

DIN 4925, Part 1

Well screens and casing of unplasticised polyvinyl chloride (PVC-U) for Water Well Filter Pipes & Casing – Part1: DN 35 to DN 100 with Whitworth pipe thread according to DIN 2999-1

DIN 4925, Part 2

Well screens and casing of unplasticised polyvinyl chloride (PVC-U) for Water Well Filter Pipes & Casing – Part2: DN 100 to DN 200 with Trapezoidal thread.

DIN 4925, Part 3

Well screens and casing of unplasticised polyvinyl chloride (PVC-U) for Water Well Filter Pipes & Casing tube wells – Part3: DN 250 to DN 400 with Trapezoidal thread.

Chemical Properties

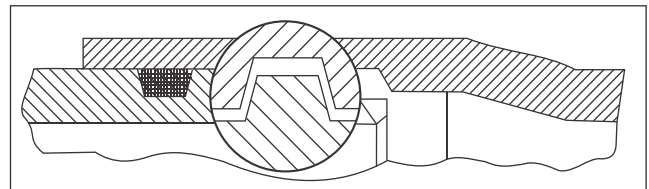
The chemical resistance of PVC-U well pipes is exceptionally high. Vinyl pipes are highly resistant to all kinds of groundwater, lake water, brine and even diluted acids and alkaline solutions.

Even the repeated treatment with regenerating and disinfecting agents do not affect our well pipes.

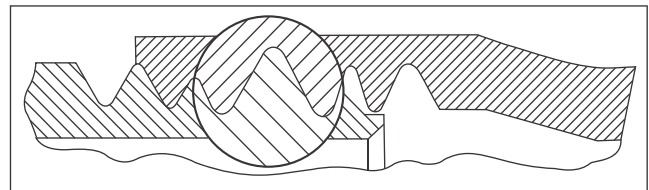
Thread Joints (More connection on next page)

R \triangleq Pipe thread, DIN 4925

T \triangleq Trapezoidal thread, DIN 4925



T \triangleq Trapezoidal thread according to DIN 4925 Part 2 and 3, pitch 12mm, DN 250-400



R \triangleq Pipe thread (Whitworth pipe thread) according to DIN 4925 Part 1, with reference to DIN 2999 Part 1, cylindrical internal thread and taper external thread, pitch 11 threads per inch, DN 35-100



Vinyl PVC - U Screen, Casing Pipes & Joints

Nominal Diameter		Outside Dia.	Wall Thickness	Inside Dia.	Socket Outside Dia.	Resistance to Hydraulic Collapse Pressure (RHCP)	Max. Tensile Strength Sure-Loc Connection	Weight
mm	inch	mm	mm	mm	mm	Kg/cm ²	kg	kg/m
50	2	60.0	5.5	47.6	73	66	929	1.37
80	3	88.7	6.0	75.1	103	25	1400	2.24
100	4	113.0	6.0	99.4	127	11.5	1830	2.93
115	4 ½	125.0	6.0	111.4	139	8.5	2042	3.25
125	5	140.0	6.5	125.2	155	7.5	2758	3.95
150	6	165.0	7.5	148.0	183	7.5	3369	5.38
175	7	195.0	8.5	175.6	215	7.5	5020	7.22
200	8	225.0	10.0	202.6	248	7.5	5790	9.80
250	10	280.0	12.5	252.0	309	7.5	10800	15.24
300	12	330.0	14.5	297.6	363	7.5	12729	20.85
350	14	400.0	17.5	361.0	440	7.5	15428	30.50
400	16	450.0	19.5	406.6	495	7.5	17357	38.26

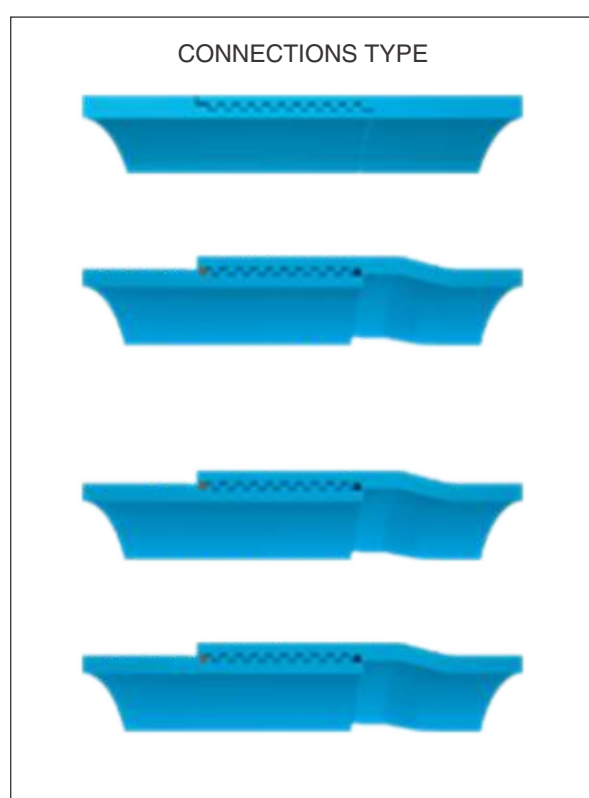


Available in straight length: 1.0, 2.0, 3.0, 4.0 & 6.0 meter.

Resistance to Hydraulic Collapse Pressure (RHCP) given in the table are valid only for plain casing pipe with sure-loc joint.

Slot Size:	DN 50 - 115	0.3, 0.5, 0.75, 1.0, 1.5, 2.0 mm
	DN 125	0.3, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 150 - 175	0.5, 0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 200 - 300	0.75, 1.0, 1.5, 2.0, 3.0 mm
	DN 350 - 400	1.0, 1.5, 2.0, 3.0 mm

How to assemble VINYL THREAD LOCK





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