## Technical Data Catalogue

## About us

Tahweel Building Trading Company is a subsidiary company of Tahweel Integrated Company (TIC) registered in Saudi Arabia. We are specialized in supplying piping products and fittings for plastic piping systems of pressure and hot and cold water as well as sanitary distribution. Our main products are PP-R Pipes and Fittings.

Tahweel PPR Pipes \& Fittings products are entirely manufactured in Saudi Arabia, in accordance with the European standards and highly advanced technologies. Our products are durable to different water pressures and harsh environmental conditions. All our products comply with the Saudi (SASO) and German (DIN) Standards.

Tahweel PPR Pipes \& Fittings systems follow German standard with 50 years of service life. Tahweel PPR Pipes \& Fittings applies a strict quality control system on all its products and provides non-corrosive, defect-free and safe pipes for a smooth flow of water for homes and industrial processes.

Tahweel PPR Pipes \& Fittings are produced using high-tech extrusion lines and injection molding machines to ensure maximum efficiency while bearing cold, as well as, hot water. Tahweel PPR Pipes \& Fittings is reliable for the transfer of all aggressive acidic, alkaline, and other corrosive and reactive chemicals, without being affected. Tahweel PPR Pipes \& Fittings are not only of splendid quality, but the company also guarantees complete customer satisfaction through constant improvement and friendly customer care services.

## Products Main Characteristics

- High temperature stability
- Resistance to electrochemical corrosion
- Hygienic and environmental friendliness
- Low thermal conductivity
- No siltation
- Resistance to stray electric currents
- Easy and clean installation, easy welding
- High sound insulating
- High heat insulating
- High impact rate
- Chemical resistance
- Low loss of pressure
- Recyclable
- Light weight


## Products Technical Specifications

Material - Polypropylene copolymer random PPR, for injection molding and extrusion processes with excellent welding ability

Manufacturing process - pipes are produced by extrusion, while fittings by injection molding

Assembly/fixing - the product range covers all needs for interior water distribution systems and heating system routes

Transitions for other pipe materials - implemented by threaded connections or flange connections

Coupling - standard method is poly fusion welding or by electro fusion

Surface finish - Elements are in green color without any finish. Separate metal elements - Approved high grade brass used for water distribution

## PHYSIC - CHEMICAL PROPERTIES

## Density - $0.895 \mathrm{~g} / \mathrm{m} 3$

Thermal expansion coefficient - for PPR pipes
$0.15 \mathrm{~mm} / \mathrm{Mk}$ Thermal conductivity $0.24 \mathrm{~W} / \mathrm{mK}$, at 20
Degree Celsius.
Resistance against chemicals - PPR piping systems are intended mainly for water distribution (drinking, cold, hot, irrigation, etc.) - it is also possible to use the system for other media, in which case their concrete use is governed by DIN 8078 - possible to consult the manufacturer.

## Healthy Choice

Tahweel PPR Pipes \& Fittings keeps the Occupational Health and Safety at the forefront of all circumstances. Our management will continue to raise awareness on this issue and conduct all necessary trainings to ensure developing a clear policy for employees health, safety, and protection in the working environment. This also apply to product and process design, taking into account the environmental impacts. We strive to lay less waste to the environment, efficient use of natural resources and use technologies that reduce the risk of occupational health and safety. Our employees and other stakeholders work together to raise health and safety performance, reduce occupational accident rates, minimize the amounts of waste and unnecessary use of natural resources.

## Environmental Management System

Tahweel PPR Pipes \& Fittings first determines the environmental impact of its activities, control raw materials, energy and use of natural resources in an efficient manner to reduce waste. The recovery of raw materials used in the manufacturing processes enables Tahweel PPR Pipes \& Fittings to control and reduce waste in a regular and periodic basis, yet measuring the effectiveness of our environmental management system. Tahweel PPR Pipes \& Fittings investigate, initiate corrective action and make continuous improvements. Thus, we are able to save energy consumption and use of natural resources.

## Corrosion \& Chemical Resistance

Tahweel PPR Pipes \& Fittings have high corrosion resistance properties in addition to remarkable resistance to the common chemicals used in virtually all household detergents and disinfectants. This advantage beats traditional piping systems, thus ensuring a longer working life, less prone to premature failures and expensive maintenance.

## Ease of Installation

Tahweel PPR Pipes \& Fittings system is designed for hot and cold water reticulation, utilizing proven and efficient techniques. This system always represents quality and only selects materials which are specifically designed for their applications.

Based on hydraulic engineering principles and backed by superior manufacturing standards worldwide, Tahweel PPR Pipes \& Fittings innovative products provide dependable plumbing solutions that are time-proven. Architects and specifiers are attracted by its quality and security. The efficiency of installation appeals to tradesmen, and it is Tahweel PPR Pipes \& Fittings economics and reliability that are most important to end users' long-lasting peace of mind.

Tahweel PPR Pipes \& Fittings system is designed to be used with ample confidence. You will get a simple, controlled, accurate joint every time. The flexibility of pipes also means easier installation in confined spaces.

## Quality Assurance System

Tahweel PPR Pipes \& Fittings never comprises its quality. We are constantly providing the best quality. Our products and services are progressively enhanced through strict compliance with an effective quality assurance system using state of the art laboratory. We ensure that quality requirements are being fulfilled in order to deliver fittingness, effectiveness and proficiency of our products.

## Warranty

We are providing 15-year warranty for the entire piping network products from the date of installation; our dedicated testing team makes sure that the pipes and fittings are installed properly by testing the installed network. A guarantee certificate will be provided for each house hold after testing the networks.

## Environmental Aspects

Fully recyclable product; neither toxic nor otherwise harmful substances are used in its manufacture and/or application

## Quality Considerations

The deciding factor in the PPR pipes and fittings manufacturing process is the use of correct/pure raw materials. To reduce production costs, some manufacturers tend to:

- Use B and/or-H granulates as alternative to original PPR Type 3 granulates.
- Use / PE blends (obsolete generation and second generation) alternative to original PPR Type 3 granulates.
- A high percentage of recycling material with original granulates.

Products manufactured by using non-proper and/or low quality raw material has a great effect on quality of end products:

- Pipes and pipe fittings are no longer consistent with PPR material properties and characteristics.
- A direct impact on the welding quality (example : melting point of material is $140^{\circ} \mathrm{C}$, that of-B material is $160^{\circ} \mathrm{C}$ ) - welding conditions become different that the welding quality is easy to grasp. This is due to the fact that kinds of crystalline materials used in the PP blend mix have varying melting degrees.
- The rate is different in the welding process due to the different shrinkage rates which leads to stress concentration.
- When the raw material is mixed with a number of recycling industrial waste plastic granulates, pipes and fittings produced could be and thus not suitable for-term use transport drinking water. This seriously damage people's health.
- Black smoke appears during the welding process.
- The span of pipes fittings is rather short. Leakage problems will start within first months of regular function. The repair and replacement costs in case of occupied residential units will be much higher.

The production process play also an important role in securing a quality product. Low quality suppliers tend to use cheap equipment for their manufacturing process. For example :are produced with an uneven wall thickness all throughout the pipe. This will have a great impact on quality of the pipe and its chemical/thermal characteristics.

Tahweel pipes and fittings insures that its product is manufactured as per the DIN and SASO standards.

## Standards and Regulations DIN 8076

Pressurized thermoplastic pipelines.
Compression type metal fittings.

## DIN 8077

Polypropylene PP pipes, dimensions.
DIN 8078
Polypropylene pipes. General quality requirements - tests.

## DIN 16960

Welding of thermoplastic materials, principles.

## DVS 2203

Tests of thermoplastic pipe fittings for welding.

## DVS 2207, part 11

Welding of thermoplastic materials, PP type 1 and type 2, pipes and accessories.

DVS 2208, part 1
Machinery and equipment for welding thermoplastics, welding with hot elements.

## W 328

Realization of drinking water installations inside buildings.

## VOB part C DIN 18381

Installation of gas, water and waste pipes inside houses.

## DIN 1988

Drinking water pipes in the floor Part 1. Technical standards for drinking water installations.

DVGW W 544 - DVGW Testing Standard
SKZ HR 3.10 - PPR Pipe \& Fitting Standards for SKZ
ISO 15874-1, 2 \& 3 - Plastic piping systems for hot and cold water installations - polypropylene (PP)

## KTW : KTW recommendations from the Federal

 Department of Health, Health -related evaluation of plastics and non-metal materials within the framework of the food and commodities law for drinking water.W 270 : Reproduction of microorganisms on materials used for drinking water, - Test and evaluation.

## DIN 1988

Drinking water pipes in the floor Part 1. Technical standards for drinking water installations.

## DIN 4109, sheet 5

Soundproofing in the construction sector (complementary regulations).
Soundproofing in water piping.
DIN 16774
Thermoplastic mass: polypropylene PP.

## DIN 53735

Tests of plastic materials; determination of melt index of thermoplastics.

## DIN 16962

Polypropylene (PP) pipes and fittings.
Sheet 5: general quality requirements - tests.
Sheet 6: moulded elbows for welding with couplings, dimensions.

Sheet 7: moulded union tees for welding with couplings, dimensions.

Sheet 8: moulded caps and couplings for welding with couplings, dimensions.

Sheet 9: moulded pipe fittings and reductions for welding with couplings, dimensions.

Sheet 10: collars, flanges and seals for welding with couplings, dimensions.

## DIN 2000

Directives concerning the requirements for drinking water. Design, development and operation of installations.

## Tahweel Fittings

The Tahweel Pipes system comprises a wide range of fittings, which can be subdivided into two groups, depending on their intended use:
a) PP-R fittings for welding;
b) PP-R fittings with metal insert.

In the first case, the joint between the pipe and the fitting (and in some cases between fitting and fitting) is made by melting the parts, while in the second case one end of the fitting has a threaded metal insert sunk into the PP-R body. Parts of this kind are used in the ends of the system, allowing connection to equipment installed previously, or any other threaded metal elements.

## Product Range

## Socket

Acc. To DIN 16962

| Size | D | d | L | Z |
| :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| Ø 20 mm | 29.2 | 19.2 | 32 | 14.5 |
| $\varnothing 25$ mm | 34.3 | 24.2 | 35 | 16 |
| Ø 32 mm | 43.3 | 31.1 | 40.5 | 18 |
| $\varnothing 40 \mathrm{~mm}$ | 52.6 | 39 | 47 | 21 |
| $\emptyset 50 \mathrm{~mm}$ | 66.8 | 49 | 53 | 24 |
| Ø63 mm | 83.2 | 61.9 | 61 | 28 |
| $\varnothing 75 \mathrm{~mm}$ | 100 | 74.3 | 68 | 31.5 |
| $\varnothing 90 \mathrm{~mm}$ | 120.2 | 89.3 | 76 | 35 |
| $\varnothing 110 \mathrm{~mm}$ | 147.1 | 109.4 | 88 | 40 |

## Reducer Socket M-F

Acc. To DIN 16962

| Size | D | d | D1 | d1 | L | Z |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| $25 / 20$ | 29.2 | 19.2 | 25 | 23 | 39 | 14.5 |
| $32 / 20$ | 29.2 | 19.2 | 32 | 30 | 37 | 14.5 |
| $32 / 25$ | 34.3 | 24.2 | 32 | 30 | 38 |  |
| $40 / 32$ | 42.6 | 31.1 | 40.1 | 38 | 50.5 | 18.2 |
| $50 / 25$ |  |  |  |  |  |  |
| $50 / 32$ | 42.6 | 31.1 | 50.2 | 46.7 | 54 | 18.2 |



| Reducer Socket F-F <br> Acc. To DIN 16962 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Size | In mm | In mm | In mm | In mm | In mm | In mm |  |  |  |  |  |  |  |
|  | 43.3 | 31.3 | 34.3 | 24.3 | 40 | 18 |  |  |  |  |  |  |  |
| $32 / 25$ | 66.8 | 49 | 34.7 | 24.2 | 50 | 24 |  |  |  |  |  |  |  |
| $50 / 25$ | 66.8 | 49 | 52.6 | 39 | 52.5 | 24 |  |  |  |  |  |  |  |
| $50 / 40$ | 83.2 | 61.9 | 34.4 | 24.3 | 59 | 28 |  |  |  |  |  |  |  |
| $63 / 25$ | 83.2 | 61.9 | 42.6 | 31.1 | 60 | 28 |  |  |  |  |  |  |  |
| $63 / 32$ | 83.2 | 61.9 | 52.6 | 39 | 60.5 | 28 |  |  |  |  |  |  |  |
| $63 / 40$ | 83.2 | 61.9 | 66.8 | 49 | 60.5 | 28 |  |  |  |  |  |  |  |
| $63 / 50$ | 100 | 74.3 | 66.8 | 49 | 67.5 | 31.5 |  |  |  |  |  |  |  |
| $75 / 50$ | 100 | 74.3 | 83.2 | 61.9 | 68 | 31.5 |  |  |  |  |  |  |  |
| $75 / 63$ | 120.2 | 89.3 | 42.6 | 31.1 | 75 | 35 |  |  |  |  |  |  |  |
| $90 / 32$ | 120.2 | 89.3 | 52.6 | 39.2 | 76 | 35 |  |  |  |  |  |  |  |
| $90 / 40$ | 120.2 | 89.3 | 67 | 49.2 | 76 | 35 |  |  |  |  |  |  |  |
| $90 / 50$ | 120.2 | 89.3 | 83.2 | 61.9 | 76 | 35 |  |  |  |  |  |  |  |
| $90 / 63$ | 120.2 | 89.3 | 100 | 74.3 | 77 | 35 |  |  |  |  |  |  |  |
| $90 / 75$ | 147.1 | 109.4 | 100 | 74.3 | 87.5 | 40 |  |  |  |  |  |  |  |
| $110 / 75$ | 147.1 | 109.4 | 120.2 | 89.3 | 87.5 | 40 |  |  |  |  |  |  |  |
| $110 / 90$ |  |  |  |  |  |  |  |  |  |  |  |  |  |



| Transition Female Elbow Acc. To DIN 16962 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | h |
|  | In mm | In mm | In mm | In mm |
| Ø 20 mm * 1/2" | 29.2 | 19.2 | 14.5 | 14 |
| Ø 25 mm * 1/2" | 34.3 | 24.2 | 16 | 14 |
| Ø 25 mm * 3/4" | 34.3 | 24.2 | 16 | 14 |
| $\varnothing 32 \mathrm{~mm}$ * 3/4" | 43.3 | 31.1 | 18 | 14 |
| $\varnothing 32 \mathrm{~mm}$ * 1" | 43.3 | 31.1 | 18 | 21 |

 Saudi Arabia

| Transition Male Elbow Acc. To DIN 16962 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | h |
|  | In mm | In mm | In mm | In mm |
| Ø20 mm * 1/2" | 34.4 | 19.2 | 16 | 14 |
| Ø 25 mm * 1/2" | 34.4 | 24.3 | 16 | 14 |
| Ø $25 \mathrm{~mm} * 3 / 4 "$ | 34.4 | 24.3 | 16 | 15 |
| Ø 32 mm *1" | 43.3 | 31.5 | 18.2 | 34 |



## End Cap

Acc. To DIN 16962

| Size | D | d | L | h |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| Ø20 mm | 29.2 | 19.2 | 25.7 | 14.5 |
| $\varnothing 25 \mathrm{~mm}$ | 34.3 | 24.2 | 26 | 16 |
| Ø32 mm | 43.3 | 31.1 | 31.5 | 18 |
| $\varnothing 40 \mathrm{~mm}$ | 52.5 | 39 | 34 | 21 |
| $\varnothing 50 \mathrm{~mm}$ | 66.8 | 49 | 41 | 24 |
| $\varnothing 63 \mathrm{~mm}$ | 83.2 | 61.9 | 53 | 28 |
| $\varnothing 75 \mathrm{~mm}$ | 100 | 74.3 | 58.5 | 31.5 |
| $\varnothing 90 \mathrm{~mm}$ | 120 | 89.3 | 60 | 33 |
| $\varnothing 110 \mathrm{~mm}$ | 147.1 | 109.4 | 79 | 40 |



| Elbow 90 <br> Acc. To DIN 16962 |  |  |  |
| :---: | :---: | :---: | :---: |
| Size | D | d | Z |
|  | In mm | In mm | In mm |
| Ø 20 mm | 29.2 | 19.2 | 14.5 |
| $\varnothing 25 \mathrm{~mm}$ | 34.3 | 24.2 | 16 |
| Ø 32 mm | 43.3 | 31.1 | 18 |
| $\varnothing 40 \mathrm{~mm}$ | 52.6 | 39 | 21 |
| $\varnothing 50 \mathrm{~mm}$ | 66.8 | 49 | 24 |
| $\emptyset 63 \mathrm{~mm}$ | 83.2 | 61.9 | 28 |
| $\varnothing 75 \mathrm{~mm}$ | 100 | 74.3 | 31.5 |
| $\varnothing 90 \mathrm{~mm}$ | 120 | 89.3 | 35 |
| $\varnothing 110 \mathrm{~mm}$ | 147.1 | 109.4 | 40 |



Elbow 45
Acc. To DIN 16962

| Size | D | d | L | Z |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| $\varnothing 20 \mathrm{~mm}$ | 29.2 | 19.2 | 20 | 14.5 |
| $\varnothing 25 \mathrm{~mm}$ | 34.3 | 24.2 | 21.6 | 16 |
| $\varnothing 32 \mathrm{~mm}$ | 43.3 | 31.1 | 25.5 | 18 |
| $\varnothing 40 \mathrm{~mm}$ | 52.5 | 39 | 30.5 | 21 |
| $\varnothing 50 \mathrm{~mm}$ | 66.8 | 49 | 35.8 | 24 |
| $\varnothing 63 \mathrm{~mm}$ | 83.2 | 61.9 | 42.5 | 28 |
| $\varnothing 75 \mathrm{~mm}$ | 100 | 74.3 | 49 | 31.5 |
| $\varnothing 90 \mathrm{~mm}$ | 120.2 | 89.3 | 55 | 35 |



Technology

Equal Tee
Acc. To DIN 16962

| Size | D | d | L | Z |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| Ø20 mm | 29.2 | 19.2 | 25.5 | 14.5 |
| $\varnothing 25 \mathrm{~mm}$ | 34.3 | 24.2 | 31 | 16 |
| $\varnothing 32 \mathrm{~mm}$ | 43.3 | 31.1 | 35 | 18 |
| $\varnothing 40 \mathrm{~mm}$ | 52.6 | 39 | 41.5 | 21 |
| $\varnothing 50 \mathrm{~mm}$ | 66.8 | 49 | 49.5 | 24 |
| $\varnothing 63 \mathrm{~mm}$ | 83.2 | 61.9 | 60.5 | 28 |
| $\varnothing 75 \mathrm{~mm}$ | 100 | 74.3 | 71 | 31.5 |
| $\varnothing 90 \mathrm{~mm}$ | 120.2 | 89.3 | 79 | 35 |
| $\varnothing 110 \mathrm{~mm}$ | 147.1 | 109.4 | 97 | 40 |

Reducer Tee
Acc. To DIN 16962

| Size | D | d | D1 | d1 | Z | Z1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| 25*20*25 | 34.3 | 24.2 | 29.2 | 19.2 | 16 | 14.5 |
| 32*20*32 | 43.3 | 31.1 | 29.2 | 19.2 | 18 | 14.5 |
| 32*25*32 | 43.3 | 31.1 | 34.3 | 24.2 | 18 | 16 |
| $40 * 32 * 40$ | 52.6 | 39 | 42.6 | 31.3 | 21 | 18 |
| $50 * 25 * 50$ | 66.8 | 49 | 34.6 | 24.2 | 24 | 16 |
| 50*32*50 | 66.8 | 49 | 42.6 | 31.3 | 24 | 18 |
| 63*25*63 | 83.2 | 62.1 | 52.6 | 24.4 | 28 | 21 |
| $63 * 40 * 63$ | 83.2 | 62.1 | 52.6 | 39.1 | 28 | 21 |
| 63*50*63 | 83.2 | 62.2 | 83.2 | 49.3 | 28 | 24 |
| $75 * 32 * 75$ | 100 | 74.3 | 52.5 | 31.3 | 31.5 | 18.2 |
| $75 * 40$ * 75 | 100 | 74.3 | 52.5 | 39.2 | 31.5 | 21 |
| 75*50*75 | 100 | 74.3 | 83.2 | 49.3 | 31.5 | 24 |
| 75*63*75 | 100 | 74.3 | 83.2 | 61.9 | 31.5 | 28 |
| 90*32*90 | 120.2 | 89.4 | 66.9 | 31.3 | 35 | 18.2 |
| 90*40*90 | 120.2 | 89.4 | 66.9 | 39.2 | 35 | 21 |
| 90*50*90 | 120.2 | 89.4 | 66.9 | 49.2 | 35 | 24 |
| 90*63*90 | 120.2 | 89.3 | 100 | 61.9 | 35 | 28 |
| 90* $75 * 90$ | 120.2 | 89.3 | 100 | 74.3 | 35 | 31.5 |
| 110*75*110 | 147.1 | 109.4 | 120.2 | 74.3 | 40 | 31.5 |
| 110*90*110 | 147.1 | 109.4 | 120.2 | 89.3 | 40 | 35 |



Saddle
Acc. To DIN 16962

| Size | D1 | d | d1 | Z |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| $90-32$ | 43.3 | 32 | 31.1 | 18 |
| $63-32$ | 42.6 | 32 | 31.1 | 18 |

End Plug
Acc. To DIN 16962

| Size | G | D | h | H |
| :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| $1 / 2^{\prime \prime}$ | 20.2 | 30 | 12.5 | 54.5 |
| $3 / 4^{\prime \prime}$ | 25.4 | 30 | 12.5 | 54.5 |

Bridge Bow
Acc. To DIN 16962

| Size | D | L | h |
| :--- | :---: | :---: | :---: |
|  | In mm | ln mm | In mm |
| $\varnothing 20 \mathrm{~mm}$ | 20 | 352 | 25 |
| $\varnothing 25 \mathrm{~mm}$ | 25 | 352 | 35 |
| $\varnothing 32 \mathrm{~mm}$ | 32 | 352 | 35 |

## Bridge Bow with Socket

Acc. To DIN 16962

| Acc. To DiN 16962 |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Size | $D$ | $d$ | $L$ | $Z$ |  |
|  | In mm | In mm | In mm | In mm |  |
| $\varnothing 25 \mathrm{~mm}$ | 34.3 | 24.3 | 182 | 16 |  |
| $\varnothing 32 \mathrm{~mm}$ | 43.3 | 31.3 | 240 | 18 |  |

Union Both end Welding
Acc. To DIN 16962

| Size | D | d | Z | L |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| 25 mm | 34.3 | 24.2 | 16 | 20 |
| 32 mm | 43.3 | 31.1 | 18 | 22 |
| 40 mm | 52.6 | 39 | 29 | 36.4 |
| 50 mm | 66.8 | 49 | 32 | 41.8 |
| 63 mm | 83.2 | 61.9 | 28 | 34 |



Union Male
Acc. To DIN 16962

| Size | $D$ | $d$ | Z | L |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| 25 mm | 34.3 | 24.2 | 16 | 45 |
| 32 mm | 43.3 | 31.1 | 18 | 52 |
| 40 mm | 52.6 | 39 | 29 | 77 |
| 50 mm | 66.8 | 49 | 32 | 84 |
| 63 mm | 83.2 | 61.9 | 28 | 80 |
| 90 mm | 90 | 74.4 | 30 | 113 |



| Union Female Acc. To DIN 16962 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | L |
|  | In mm | In mm | In mm | In mm |
| 25 mm | 34.3 | 24.2 | 16 | 36 |
| 32 mm | 43.3 | 31.1 | 18 | 40 |
| 40 mm | 52.6 | 39 | 29 | 59 |
| 50 mm | 66.8 | 49 | 32 | 66 |
| 63 mm | 83.2 | 61.9 | 28 | 60 |
| 90 mm | 90 | 74.4 | 30 | 89 |



| Wall Mount with Double Elbow Acc. To DIN 16962 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | h | 11 | L |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| Ø 20 mm * 1/2" | 29.2 | 19.2 | 14.5 | 13.5 | 76.5 | 187.3 |
| Ø 25 mm * 1/2" | 34.3 | 24.2 | 16 | 13.5 | 76.5 | 187.3 |



Wall Mount Back Plate Elbow
Acc. To DIN 16962

| Size | D | d | Z | h | I1 | L |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| Ø20 mm * 1/2" | 29.2 | 19.2 | 14.5 | 13.5 | 50 | 66 |
| $\varnothing 25 \mathrm{~mm}^{*} 1 / 2^{2}$ | 34.3 | 24.2 | 16 | 13.5 | 50 | 66 |

 Saudi Arabia

| Flange Adapter <br> Acc. To DIN 16962 |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | L | I1 |
|  | In mm | In mm | In mm | In mm | In mm |
| 75 mm | 90 | 74.4 | 30 | 46 | 17 |
| 90 mm | 108 | 89.4 | 33 | 50 | 18 |
| 110 mm | 131 | 109.5 | 37 | 55.5 | 18.5 |



Flange Adapter
Acc. To DIN 16962

| Size | D |  | d1 | K | Z | d2 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| 75 mm | 186 | 92 | 145 | 4 | 18 | 19 |
| 90 mm | 201 | 110 | 160 | 8 | 18 | 21 |
| 110 mm | 221 | 133 | 180 | 8 | 18 | 22 |

## Gate Valve

Acc. To DIN 16962

| Size | D | d | Z | L |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| 32 mm | 34.3 | 24.2 | 18 | 95 |



| Ball Valve (BV) <br> Acc. To DIN 16962 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | L | 11 | 12 |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| 25 mm | 34.3 | 24.2 | 16 | 55 | 89 | 109 |
| 32 mm | 43.3 | 31.1 | 18 | 58 | 98 | 109 |
| 40 mm | 52.6 | 39 | 21 | 70 | 135 | 137 |
| 50 mm | 66.8 | 49 | 24 | 71 | 151 | 135 |
| 63 mm | 83.2 | 61.9 | 28 | 85 | 157 | 143 |



| Ball Valve (BV2) Acc. To DIN 16962 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | L | 11 | 12 |
|  | In mm | In mm | In mm | In mm | In mm | In mm |
| 32 mm | 34.3 | 24.2 | 18 | 57 | 124.5 | 107 |



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## Stop Glove Valve <br> Acc. To DIN 16962

| Size | D | d | Z | L |
| :---: | :---: | :---: | :---: | :---: |
|  | In mm | In mm | In mm | In mm |
| 25 *3/4" | 34.3 | 24.2 | 35 | 67 |
| 32 *1" | 43.3 | 31.1 | 40.5 | 96.5 |
| 40 *1 1/4" | 52.6 | 39 | 47 | 115 |
| 50 * 1/1/4" | 66.8 | 49 | 53 | 115 |
| 63 * 1 1/2" | 83.2 | 61.9 | 61 | 106.9 |
| 75 *2 1/4" | 100 | 74.3 | 68 | 115 |
| 90 *2 3/4 | 120.2 | 89.3 | 76 | 122 |


| Concealed Valve Acc. To DIN 16962 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Size | D | d | Z | L |
|  | In mm | In mm | In mm | In mm |
| 25 *3/4" | 34.3 | 24.2 | 35 | 120.7 |
| 32 *1" | 43.3 | 31.1 | 40.5 | 121.8 |
| 40 *1 1/4" | 52.6 | 39 | 47 | 130 |
| 50 *1 1/4" | 66.8 | 49 | 53 | 130 |



| Transition Male Acc. To DIN 16962 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Size | D | d | h | Z |
|  | In mm | In mm | In mm | In mm |
| $\varnothing 20$ *1/2" | 29.2 | 19.2 | 14 | 14.5 |
| Ø25*1/2" | 34.3 | 24.2 | 14 | 16 |
| $\varnothing 25$ *3/4" | 34.3 | 24.2 | 15 | 16 |
| $\varnothing 32$ *3/4" | 43.3 | 31.1 | 15 | 18 |
| Ø 32 *1 | 43.3 | 31.1 | 32 | 18 |
| $\varnothing 40$ *11/4" | 52.6 | 39 | 36 | 21 |
| Ø50 *11/2" | 66.8 | 49 | 40 | 24 |
| Ø63 *2" | 83.2 | 61.9 | 44 | 28 |
| Ø75 *21/2" | 100 | 74.3 | 47 | 31.5 |
| Ø 90 *3" | 120.2 | 89.3 | 56 | 35 |
| Ø110*4" | 147.1 | 109.4 | 66 | 40 |



## Transition Female

Acc. To DIN 16962

| Size | D | d | h | Z |
| :--- | :---: | :---: | :---: | :---: |
|  | In mm | ln mm | In mm | In mm |
| $\varnothing 20$ *1/2" | 29.2 | 19.2 | 14 | 14.5 |
| Ø25 *1/2" | 34.3 | 24.2 | 14 | 16 |
| $\varnothing 25$ *3/4" | 34.3 | 24.2 | 14 | 16 |
| $\varnothing 32$ *3/4" | 43.3 | 31.1 | 21 | 18 |
| $\varnothing 32$ *1 | 43.3 | 31.1 | 21 | 18 |
| $\varnothing 40$ *11/4" | 52.6 | 39 | 21 | 21 |
| $\varnothing 50$ *11/2" | 66.8 | 49 | 23 | 24 |
| $\varnothing 63$ *2" | 83.2 | 61.9 | 23 | 28 |
| $\varnothing 75$ *21/2" | 100 | 74.3 | 29 | 31.5 |
| $\varnothing 90$ *3" | 120.2 | 89.3 | 35 | 35 |
| $\varnothing 110$ *4" | 147.1 | 109.4 | 42.5 | 40 |



Warranty

## Mechanical and Thermal properties

| Property |  | Test Method | Unit | Value |
| :---: | :---: | :---: | :---: | :---: |
| Viscosity Number J |  | ISO 1628 T3 | $\mathrm{cm}^{3} / \mathrm{g}$ | 430 |
| Melt Flow Rate | MFR 190/5 | ISO 1133 Condition 18 | $\mathrm{g} / 10 \mathrm{~min}$ | 0.5 |
|  | MFR 230/2.16 | ISO 1133 Condition 12 | $\mathrm{g} / 10 \mathrm{~min}$ | 0.3 |
|  | MFR 230/5 |  | $\mathrm{g} / 10 \mathrm{~min}$ | 1.5 |
| Density at $23^{\circ} \mathrm{C}$ |  | ISO 1183 | $\mathrm{g} / \mathrm{cm}^{3}$ | 0.898 |
| Crystalline Melting Temperature |  | DIN 53736 B2 | ${ }^{\circ} \mathrm{C}$ | 150-154 |
| Tensile Stress At Yield |  | ISO 527 | $\mathrm{N} / \mathrm{mm}^{2}$ | 23 |
| Tensile Strength At Break |  | Speed $50 \mathrm{~mm} / \mathrm{min}$ | $\mathrm{N} / \mathrm{mm}^{2}$ | 40 |
| Elongation at Break |  | Test Specimen 1B | \% | >50 |
| Ball Indentation Hardness |  | ISO 2039 T1 (132N) | $\mathrm{N} / \mathrm{mm}^{2}$ | 43 |
| Flexural Stress at 3.5\% |  | DIN 53452 |  | 20 |
| Outer Fiber Strain |  | DIN 53452 | /mm | 20 |
| Modulus of Elasticity, Tensile Test |  | ISO 527 | $\mathrm{N} / \mathrm{mm}^{2}$ | 700 |
| Shear Modulus | $-10^{\circ} \mathrm{C}$ | ISO 537 Method A | $\mathrm{N} / \mathrm{mm}^{2}$ | 1100 |
|  | $0^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 770 |
|  | $10^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 500 |
|  | $20^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 370 |
|  | $30^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 300 |
|  | $40^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 240 |
|  | $50^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 180 |
|  | $60^{\circ} \mathrm{C}$ |  | $\mathrm{N} / \mathrm{mm}^{2}$ | 140 |
| Mechanical Strength Properties |  | DIN 8078 |  | no failure |
| Determined by Impact Strength at $0^{\circ} \mathrm{C}$ |  |  |  | no falure |
| Impact Strength | RT | ISO 179/1eU | $\mathrm{kj} / \mathrm{m}^{2}$ | no failure |
| (Charpy) | $0^{\circ} \mathrm{C}$ |  | $\mathrm{kj} / \mathrm{m}^{2}$ | no failure |
|  | $-10^{\circ} \mathrm{C}$ |  | $\mathrm{kj} / \mathrm{m}^{2}$ | no failure |
| Notched Impact Strength | RT | ISO 179/1eA | $\mathrm{kj} / \mathrm{m}^{2}$ | 20 |
| (Charpy) | $0^{\circ} \mathrm{C}$ |  | $\mathrm{kj} / \mathrm{m}^{2}$ | 4 |
|  | $-10^{\circ} \mathrm{C}$ |  | $\mathrm{kj} / \mathrm{m}^{2}$ | 3 |
| Coefficient of Linear Thermal Expansion |  | VDE 0304 Part 1\&4 | K-1 | $1.5 \times 10^{-4}$ |
| Thermal Conductivity at $20^{\circ}$ |  | DIN 52612 | W/mK | 0.24 |
| Specific Heat at $20^{\circ} \mathrm{C}$ |  | Adiabatic Calorimeter | kj/kg K | 2 |

Long Term Behavior of Tahweel Pipes


Made in Saudi Arabia

German Technology

15 years Warranty

## Life Span of Tahweel Pipes PN-20 Pipes

he life span of Tahweel Pipes depends on three factors: working temperature and the pressure, regardless of the dimensions of the pipes under specific continues duration of water flow.
The allowable operating pressures have been calculated according to the bellow equation on the basis of the long term hydrostatic strengths shown in the reference curves in DIN 8078 and taking account of a safety factor $\mathbf{S F}=\mathbf{1 . 2 5}$.
$p=[\sigma /(S X S F)]$ * 10
Where:
$\mathbf{p}$ is the allowable operating pressure, in bar1);
$\boldsymbol{\sigma}$ is the relevant long-term hydrostatic strength from the reference characteristic curve in DIN 8078, in MPA; $\mathbf{S}$ is the pipe series number taken from ISO 4065
(calculated value)

## The Below table shows the life span of Tahweel Pipes:

| Temperature in C | Years of Service | Allowable Operating Pressure in Bar |
| :---: | :---: | :---: |
| 10 | 1 | 42.1 |
|  | 5 | 39.7 |
|  | 10 | 38.6 |
|  | 25 | 37.4 |
|  | 50 | 36.4 |
|  | 100 | 35.5 |
| 20 | 1 | 35.9 |
|  | 5 | 33.7 |
|  | 10 | 32.8 |
|  | 25 | 31.7 |
|  | 50 | 30.9 |
|  | 100 | 30.1 |
| 30 | 1 | 30.5 |
|  | 5 | 28.6 |
|  | 10 | 27.8 |
|  | 25 | 26.8 |
|  | 50 | 26.1 |
|  | 100 | 25.4 |
| 40 | 1 | 25.9 |
|  | 5 | 24.2 |
|  | 10 | 23.5 |
|  | 25 | 22.6 |
|  | 50 | 22 |
|  | 100 | 21.4 |
| 50 | 1 | 21.9 |
|  | 5 | 20.4 |
|  | 10 | 19.8 |
|  | 25 | 19 |
|  | 50 | 18.5 |
|  | 100 | 17.9 |
| 60 | 1 | 18.5 |
|  | 5 | 17.2 |

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|  | 10 | 16.6 |
| :---: | :---: | :---: |
|  | 25 | 16 |
|  | 50 | 15.5 |
|  | 1 | 15.5 |
|  | 5 | 14.4 |
|  | 10 | 13.9 |
|  | 25 | 12.1 |
|  | 50 | 10.2 |
|  | 1 | 13 |
|  | 5 | 11.5 |
|  | 10 | 9.7 |
|  | 25 | 7.8 |
|  | 1 | 9.2 |
|  | 5 | 6.2 |

## Installation Principles Linear Expansion

For transportation of hot water, like all metal or plastic pipes, we have to deal with its linear expansion. This applies only to PN (SDR6) $\mathbf{2 0}$ pipes for hot water applications.
The coefficient of linear expansion for Tahweel Pipes PN 20 (SDR6) is $15.0 \times 10^{-5} \mathrm{~K}^{-1}$
$\Delta I=\alpha L x \Delta t$

Where: $\quad \boldsymbol{\Delta l}=$ linear expansion, mm
$\boldsymbol{\alpha}=$ coeff. of linear expansion, constant
For Tahweel pipes $0.15 \mathrm{~mm} / \mathrm{mK}$
$\mathbf{L}=$ pipe length,m
$\boldsymbol{\Delta} \mathbf{t}=$ temperature difference between normal
water temperature and desired operating hot
water temperature,K
$\Delta I=\alpha L \times \Delta t$
$=0.15 \times 1.5 \times 35$
linear expansion is $\mathbf{7 . 8 8}{ }^{\sim} \mathbf{8} \mathbf{~ m m}$

## By reading off table PN 20 (SDR)

|  |  |  |  |  |  |  |  |  | Temperature Difference |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Pipe Length $\mathrm{L}(\mathrm{m})$ | 10 | 20 | 30 | 40 | 50 | 60 | 70 |  |  |  |  |  |  |  |  |
| 0.1 | 0.15 | 0.30 | 0.45 | 0.60 | 0.75 | 0.90 | 1.05 |  |  |  |  |  |  |  |  |
| 0.2 | 0.30 | 0.60 | 0.90 | 1.20 | 1.50 | 1.80 | 2.10 |  |  |  |  |  |  |  |  |
| 0.3 | 0.45 | 0.90 | 1.35 | 1.80 | 2.25 | 2.70 | 3.15 |  |  |  |  |  |  |  |  |
| 0.4 | 0.60 | 1.20 | 1.80 | 2.40 | 3.00 | 3.60 | 4.20 |  |  |  |  |  |  |  |  |
| 0.5 | 0.75 | 1.50 | 2.25 | 3.00 | 3.75 | 4.50 | 5.25 |  |  |  |  |  |  |  |  |
| 0.6 | 0.90 | 1.80 | 2.70 | 3.60 | 4.50 | 5.40 | 6.30 |  |  |  |  |  |  |  |  |
| 0.7 | 1.05 | 2.10 | 3.15 | 4.20 | 5.25 | 6.30 | 7.35 |  |  |  |  |  |  |  |  |
| 0.8 | 1.20 | 2.40 | 3.60 | 4.80 | 6.00 | 7.20 | 8.40 |  |  |  |  |  |  |  |  |
| 0.9 | 1.35 | 2.70 | 4.05 | 5.40 | 6.75 | 8.10 | 9.45 |  |  |  |  |  |  |  |  |
| 1.0 | 1.50 | 3.00 | 4.50 | 6.00 | 7.50 | 9.00 | 10.50 |  |  |  |  |  |  |  |  |
| 1.5 | 2.25 | 4.50 | 6.75 | 9.00 | 11.25 | 13.50 | 15.75 |  |  |  |  |  |  |  |  |
| 2.0 | 3.00 | 6.00 | 9.00 | 12.00 | 15.00 | 18.00 | 21.00 |  |  |  |  |  |  |  |  |
| 2.5 | 3.75 | 7.50 | 11.25 | 15.00 | 18.75 | 22.50 | 26.25 |  |  |  |  |  |  |  |  |
| 3.0 | 4.50 | 9.00 | 13.50 | 18.00 | 22.50 | 27.00 | 31.50 |  |  |  |  |  |  |  |  |
| 3.5 | 5.25 | 10.50 | 15.75 | 21.00 | 26.25 | 31.50 | 36.75 |  |  |  |  |  |  |  |  |
| 4.0 | 6.00 | 12.00 | 18.00 | 24.00 | 30.00 | 36.00 | 42.00 |  |  |  |  |  |  |  |  |
| 4.5 | 6.75 | 13.50 | 20.25 | 27.00 | 33.75 | 40.50 | 47.25 |  |  |  |  |  |  |  |  |
| 5.5 | 8.25 | 16.50 | 24.75 | 33.00 | 41.25 | 49.50 | 57.75 |  |  |  |  |  |  |  |  |
| 6.0 | 9.00 | 18.00 | 27.00 | 36.00 | 45.00 | 54.00 | 63.00 |  |  |  |  |  |  |  |  |
| 6.5 | 9.75 | 19.50 | 29.25 | 39.00 | 48.75 | 58.50 | 68.25 |  |  |  |  |  |  |  |  |
| 7.0 | 10.50 | 21.00 | 31.50 | 42.00 | 25.50 | 63.00 | 73.50 |  |  |  |  |  |  |  |  |
| 7.5 | 11.25 | 22.50 | 33.75 | 45.00 | 56.25 | 67.50 | 78.75 |  |  |  |  |  |  |  |  |
| 8.0 | 12.00 | 24.00 | 36.00 | 48.00 | 60.00 | 72.00 | 84.00 |  |  |  |  |  |  |  |  |

Once the Linear Expansion is established, compensation for this expansion for this expansion can be made by either an Expansion Elbow or Expansion Loop.

## Multi \& Multi Plus Pipes

## Faser Composite Pipes <br> \& UV Resistant Pipes

UV Resistant \& Doesn't Need Insolation (Multi)


High Pressure Resistancy


20\% Faster Water Flow

## TAHWEEL FASER COMPOSITE PIPES

Tahweel Multi pipe range includes multilayer PPR pipes reinforced by an intermediate layer of special fibers. Suitable for hot and cold potable water, Tahweel Multi pipe can be joined with the whole range of fittings using the traditional welding techniques; it finds application in the following fields:

Closed system, heating Systems, cooling systems, systems for swimming pools, transport of chemicals, rainwater, irrigation, compressed air systems, district heating systems,food \& beverage industry.

## ADVANTAGES

- Reduced Linear Thermal Expansion
- Reduced quantity of pipe supports
- Higher Mechanical Stability
- Reduced Weight
- Increased water flow rate
- Suitable for drinking water applications
- High Impact Resistance
- Resistance to certain chemicals
- Thermal Insulation
- High Stability at high temperatures
- Low pressure Loss
- Corrosion Resistance
- Easy Installation


15 years Warranty

## TAHWEEL MULTI PIPES DATA SHEET (SDR 7.4)

| Art.No | Dimension | Outer Diameter (OD)mm | Wall Thickness (S) | Internal Diamter (ID)mm | Water content I/mt | Kg/mt |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PF20-20 | 20 mm | 20 | 2.8 | 14.4 | 0.163 | 0.159 |
| PF20-25 | 25 mm | 25 | 3.5 | 18.0 | 0.254 | 0.247 |
| PF20-32 | 32 mm | 32 | 4.4 | 23.2 | 0.423 | 0.395 |
| PF20-40 | 40 mm | 40 | 5.5 | 29.0 | 0.660 | 0.610 |
| PF20-50 | 50 mm | 50 | 6.9 | 36.2 | 1.029 | 0.950 |
| PF20-63 | 63 mm | 63 | 8.6 | 45.8 | 1.647 | 1.490 |
| PF20-75 | 75 mm | 75 | 10.3 | 54.4 | 2.323 | 2.115 |
| PF20-90 | 90 mm | 90 | 12.3 | 65.4 | 3.358 | 3.030 |
| PF20-110 | 110 mm | 110 | 15.1 | 79.8 | 4.999 | 4.530 |

?

## MAXIMUM PERMISSIBLE OPERATING PRESSURE (BAR)

| Temperature | TAHWEEL MULTI PIPE ( FASER COMPOSITE ) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1 | 5 | 10 | 25 | 50 |
|  | Maximum Permissible Operating Pressure (bar) |  |  |  |  |
| ${ }^{\circ} 20 \mathrm{C}$ | 28.5 | 26.8 | 26.1 | 25.2 | 24.5 |
| ${ }^{\circ} 30 \mathrm{C}$ | 24.2 | 22.7 | 22.1 | 21.3 | 20.7 |
| ${ }^{\circ} 40 \mathrm{C}$ | 20.6 | 19.2 | 18.7 | 18.0 | 17.4 |
| ${ }^{\circ} 50 \mathrm{C}$ | 17.4 | 16.2 | 15.7 | 15.1 | 14.7 |
| ${ }^{\circ} 60 \mathrm{C}$ | 14.7 | 13.6 | 13.2 | 12.7 | 12.3 |
| ${ }^{\circ} 70 \mathrm{C}$ | 12.3 | 11.4 | 11.1 | 9.6 | 8.1 |
| ${ }^{\circ} 80 \mathrm{C}$ | 10.3 | 9.1 | 7.7 | 6.2 | - |
| ${ }^{\circ} 95 \mathrm{C}$ | 7.3 | 4.9 | 4.1 | - | - |

## Linear Expansion of Tahweel Pipes with Fiber Glass

For transportation of hot water, like all metal or plastic pipes, we have to deal with its linear expansion.
This applies to only Tahweel Multi Faser Composite Pipes \& Tahweel Mutli Plus UV Rated Pipes.

Tahweel Multi P Coefficient of Thermal Expansion: $0.035 \mathrm{~mm} / \mathrm{mK}$
$\Delta I=a \times L \times \Delta t$

$$
\text { Where } \quad \begin{array}{lll}
\Delta l & = & \text { linear expansion in } \mathrm{mm} \\
\mathrm{a} & =\text { Coefficient of linear expansion for Tahweel }
\end{array}
$$

Multi pipe is constant $0.035 \mathrm{~mm} / \mathrm{mK}$

$$
\begin{array}{ll}
\mathrm{L} & =\text { pipe length, (9m) } \\
\Delta \mathrm{t} & =\text { temp. Difference between normal water }
\end{array}
$$ temperature and desired operating hot water temperature, ( 65 K )

$$
\Delta I=\mathrm{a} \times L \times \Delta \mathrm{t} \quad=\quad 0.035 \times 9 \times 65
$$

Linear Expansion is $=20.5 \mathrm{~mm}$

| Pipe length (m) | Temperature Variation $\Delta \mathrm{T}$ in K |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | Linear Expansion $\Delta \mathrm{L}$ (mm) |  |  |  |  |  |  |  |  |  |  |  |
| 1.0 | 0.035 | 0.17 | 0.35 | 0.70 | 1.05 | 1.40 | 1.75 | 2.10 | 2.45 | 2.80 | 3.15 | 3.50 |
| 2.0 | 0.070 | 0.35 | 0.70 | 1.40 | 2.10 | 2.80 | 3.50 | 4.20 | 4.90 | 5.60 | 6.30 | 7.00 |
| 3.0 | 0.105 | 0.52 | 1.05 | 2.10 | 3.15 | 4.20 | 5.25 | 6.30 | 7.35 | 8.40 | 9.45 | 10.50 |
| 4.0 | 0.140 | 0.70 | 1.40 | 2.80 | 4.20 | 5.60 | 7.00 | 8.40 | 9.80 | 11.20 | 12.60 | 14.00 |
| 5.0 | 0.175 | 0.87 | 1.75 | 3.50 | 5.25 | 7.00 | 8.75 | 10.50 | 12.25 | 14.00 | 15.75 | 17.50 |
| 6.0 | 0.210 | 1.05 | 2.10 | 4.20 | 6.30 | 8.40 | 10.50 | 12.60 | 14.70 | 16.80 | 18.90 | 21.00 |
| 7.0 | 0.245 | 1.22 | 2.45 | 4.90 | 7.35 | 9.80 | 12.25 | 14.70 | 17.15 | 19.60 | 22.05 | 24.50 |
| 8.0 | 0.280 | 1.40 | 2.80 | 5.60 | 8.40 | 11.20 | 14.00 | 16.80 | 19.60 | 22.40 | 25.20 | 28.00 |
| 9.0 | 0.315 | 1.57 | 3.15 | 6.30 | 9.45 | 12.60 | 15.75 | 18.90 | 22.05 | 25.20 | 28.35 | 31.50 |
| 10.0 | 0.350 | 1.75 | 3.50 | 7.00 | 10.50 | 14.00 | 17.50 | 21.00 | 24.50 | 28.00 | 31.50 | 35.00 |

## Thermal Expansion of Tahweel Pipes With Fiber Glass



## Fixing Distances

| Pipe <br> length <br> $(\mathrm{m})$ | 20 | 25 | 32 | 40 | 50 | 63 | 75 | 90 | 110 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | 120 | 140 | 160 | 180 | 205 | 230 | 245 | 260 | 290 |
| 20 | 60 | 70 | 90 | 100 | 120 | 140 | 150 | 160 | 180 |
| 30 | 60 | 70 | 90 | 100 | 120 | 140 | 150 | 160 | 180 |
| 40 | 60 | 70 | 80 | 90 | 110 | 130 | 140 | 150 | 170 |
| 50 | 60 | 70 | 80 | 90 | 110 | 130 | 140 | 150 | 170 |
| 60 | 50 | 60 | 70 | 80 | 100 | 110 | 120 | 140 | 160 |
| 70 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 140 |

## Tahweel Multi Plus for outdoor Applications

Tahweel Expands its product range with the new Tahweel Multi Plus pipe with a UV Layer added to its Multi Pipe Range. Due to its external UV-Resistant layer, this pipe is suitable for the installation of supply pipes in the outdoor environments such as: drinking water systems, irrigation systems, heating \& cooling water systems.


The Advantages of Tahweel - Multi Plus

- UV Resistant
- \%75 Less Thermal Expansion
- No Special Tools Required for Installation
- Heat preservative and energy saving
- Wide Range
- No bacteria and moss reproduction within the pipes


## Areas of Application

Water tank connection, Hot and Cold water installations, Outside wall installations, Roof installations, Boiler connection, House connection stations, Water distribution, Floor level distribution, Pipe network for rainwater systems, Pipelines for agricultural and horticultural use, Industrial pipeline networks.

Technology

## Tahweel Multi plus Data Sheet (SDR 7.4)

| Art.No | Dimension | Outer Diameter (OD)mm | Wall Thickness (S) | Internal Diamter (ID) mm | Water content I/mt | Kg/mt |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PFU25-20 | 20 mm | 20 | 2.8 | 14.4 | 0.163 | 0.211 |
| PFU25-25 | 25 mm | 25 | 3.5 | 18.0 | 0.254 | 0.316 |
| PFU25-32 | 32 mm | 32 | 4.4 | 23.2 | 0.423 | 0.488 |
| PFU25-40 | 40 mm | 40 | 5.5 | 29.0 | 0.660 | 0.733 |
| PFU25-50 | 50 mm | 50 | 6.9 | 36.2 | 1.029 | 1.108 |
| PFU25-63 | 63 mm | 63 | 8.6 | 45.8 | 1.647 | 1.697 |
| PFU25-75 | 75 mm | 75 | 10.3 | 54.4 | 2.323 | 2.363 |
| PFU25-90 | 90 mm | 90 | 12.3 | 65.4 | 3.358 | 3.400 |
| PFU25-110 | 110 mm | 110 | 15.1 | 79.8 | 4.999 | 5.093 |

## Chemical Resistance

Polypropylene has a very high chemical resistance. The following table lists the chemical resistance of PP-r pipe and fittings according to ISO 10358. Since chemical resistance depends on factors such as chemical composition, concentration and temperature, the table below gives chemical resistance for three different temperatures and different concentrations.

The below abbreviations are used in the table:
w.s- Water Solution
(-) no sufficient info
$R$ - Resistant $\quad L$ - Limited Resistant
n.r - not resistant

Chemical Resistance of Polypropylene, at $20,60 \& 100^{\circ} \mathrm{C}$ (ISO 10358)

| Chemical or Product | Concentration | Temperature ${ }^{\circ} \mathrm{C}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | 20 | 60 | 100 |
| Acetic acid | Up to 40 \% | R | R | - |
| Acetic acid | 50 \% | R | R | L |
| Acetic acid, glacial | > $96 \%$ | S | L | NR |
| Acetic anhydride | $100 \%$ | R | - | - |
| Acetone | 100\% | R | R | - |
| Aceptophenone | 100\% | R | L | - |
| Acrylonitrile | 100\% | R | - | - |
| Air |  | R | R | R |
| Alyl alcohol | 100\% | R | R | - |
| Almond oil |  | R | - | - |
| Alum | W.s | R | R | - |
| Ammonia, aqueous | S.s | R | R | - |
| Ammonia, dry gas | 100\% | R | - | - |
| Ammonia, liquid | 100\% | R | - | - |
| Ammonium acetate | S.s | R | R | - |
| Ammonium chloride | S.s | R | R | - |
| Ammonium fluoride | Up to 20\% | R | R | - |
| Ammonium hydrogen carbonate | S.s | R | R | - |
| Ammonium metaphosphate | S.s | R | R | R |
| Ammonium nitrate | S.s | R | R | R |
| Ammonium persulphate | S.s | R | R | - |
| Ammonium phosphate | S.s | R | - | - |
| Ammonium sulphate | S.s | R | R | R |
| Ammonium sulphide | S.s | R | R | - |
| Amyl acetate | 100\% | L | - | - |
| Amyl alcohol | 100\% | R | R | R |
| Aniline | 100\% | R | R | - |
| Apple juice |  | R | - | - |
| Aqua regia | HCI/HNO3=3/1 | NR | NR | NR |
| Barium bromide | S.s | R | R | R |
| Barium carbonate | S.s | R | R | R |
| Barium chloride | S.s | R | R | R |
| Barium hydroxide | S.s | R | R | R |
| Barium sulphide | S.s | R | R | R |
| Beer |  | R | R | - |
| Benzene | 100\% | L | NR | NR |
| Benzoic acid | S.s | R | R | - |
| Benzyl alcohol | 100\% | R | L | - |
| Borax | W.s | R | R | - |
| Boric acid | S.s | R | - | - |
| Boron trifluoride | S.s | R | - | - |
| Bormine, gas | 100\% | NR | NR | NR |
| Bromine, liquid | 100\% | NR | NR | NR |
| Butane, gas | 100\% | R | - | - |
| Butyl acetate | $100 \%$ | L | NR | NR |
| Butyl glycol | 100\% | R | - | - |
| Butyl phenols | S.s | R | - | - |
| Butyl phthalate | 100\% | R | L | L |
|  |  |  |  |  |
| Calcium carbonate | S.s | R | R | R |
| Calcium chlorate | S.s | R | R | - |
| Calcium chloride | S.s | R | R | R |
| Calcium hydroxide | S.s | R | R | R |
| Calcium hypochlorite | W.s | R | - | - |
| Calcium nitrate | S.s | R | R | - |
| Camphor oil |  | NR | NR | NR |
| Carbon dioxide, dry gas |  | R | R | - |
| Carbon dioxide, wet gas |  | R | R | - |
| Carbon disulphide | 100\% | R | NR | NR |
| Carbon monoxide, gas |  | R | R | - |
| Carbon tetrachloride | 100\% | NR | NR | NR |
| austic soda | Up to 50\% | R | L | L |
| lorine, aqueous | S.s | R | L | - |
| , lorine, dry gas | 100\% | NR | NR | NR |


| Chemical or Product | Concentration | Temperature ${ }^{\circ} \mathrm{C}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | 20 | 60 | 100 |
| Chloroacetic acid | W.s | R | - | - |
| Chloroform | 100\% | L | NR | NR |
| Chlorosulphonic acid | 100\% | NR | NR | NR |
| Chrome alum | W. s | R | R | - |
| Chromic acid | Up to 40\% | R | L | NS |
| Citric acid | S.s | R | R | R |
| Coconut oil |  | R | - | - |
| Copper (II) chloride | S.s | R | R | - |
| Copper (II) nitrate | S.s | R | R | R |
| Copper (II) | S.s | R | R | - |
| Corn oil |  | R | L | - |
| Cottonseed oil |  | R | R | - |
| Cresol | Greater than 90\% | R | - | - |
| Cyclohexane | 100\% | R | - | - |
| Cyclohexanol | 100\% | R | L | - |
| Cyclohexanone | 100\% | L | NR | NR |
| Decalin (decahydronaphthalene) | 100\% | NR | NR | NR |
| Dextrin | W.s | R | R | - |
| Dextrose | W.s | R | R | R |
| Dibutyl phthalate | 100\% | R | L | NR |
| Dichloroacetic acid | 100\% | L | - | - |
| Dichloroethylene (A and B) | 100\% | L | - | - |
| Diethanolamine | 100\% | R | - | - |
| Diethyl ether | 100\% | R | L | - |
| Diethylene glycol | 100\% | R | R | - |
| Diglycolic acid | S.s | R | - | - |
| Diisooctyl | 100\% | R | L | - |
| Dimethyl amine, gas |  | R | - | - |
| Dimethyl formamide | 100\% | R | R | - |
| Dioctyl phthalate | 100\% | L | L | - |
| Dioxane | 100\% | L | L | - |
| Distilled water | 100\% | R | R | R |
| Ethanolamine | 100\% | R | - | - |
| Ethyl acetate | 100\% | L | NR | NR |
| Ferric chloride | S.s | R | R | R |
| Formaldehyde | 40\% | R | - | - |
| Formic acid | 10 \% | R | R | L |
| Formic acid | 85\% | R | NR | NR |
| Formic acid, anhydrous | $100 \%$ | R | L | L |
| Fructose | W. s | R | R | R |
| Fruit juice |  | R | R | R |
| Gasoline, petrol (aliphatic hydrocarbons) |  | NR | NR | NR |
| Gelatine |  | R | R | - |
| Glucose | 20\% | R | R | R |
| Glycerine | 100\% | R | R | R |
| Glycolic acid | $30 \%$ | R | - | - |
| Heptane | 100\% | L | NR | NR |
| Hexane | 100\% | R | L | - |
| Hydrobromic acid | Up to 48 \% | R | L | NR |
| Hydrochloric acid | Up to $20 \%$ | R | R | R |
| Hydrochloric acid | 30\% | R | L | L |
| Hydrofluoric acid | w.s. | R | - | - |
| Hydrofluoric acid | 40\% | R | - | - |
| Hydrogen | 100\% | R | - | - |
| Hydrogen chloride, dry gas | $100 \%$ | R | R | - |
| Hydrogen peroxide | Up to $10 \%$ | R | - | - |
| Hydrogen peroxide | Up to $30 \%$ | R | L | - |
| Hydrogen sulphide, dry gas | 100\% | R | R | - |
| lodine, in alcohol |  | R | - | - | Saudi Arabia

German
Technology

Chemical Resistance of Polypropylene, at 20, 60 \& $100^{\circ} \mathrm{C}$ (ISO 10358)

| Chemical or Product | Concentration | Temperature ${ }^{\circ} \mathrm{C}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | 20 | 60 | 100 |
| Isopropyl alcohol | $100 \%$ | R | R | R |
| Isopropyl ether | 100\% | L | - | - |
| Lanoline |  | R | L | - |
| Linseed oil |  | R | R | R |
| Magnesium carbonate | S.s | R | R | R |
| Magmesium cloride | S.s | R | R | - |
| Magnesium hydroxide | S.s | R | R | - |
| Magnesium sulphate | S.s | R | R | - |
| Maleic acid | S.s | R | R | - |
| Mercury (II) chloride | S.s | R | R | - |
| Mercury (II) cyanide | S.s | R | R | - |
| Mercury (I) nitrate | W.s | R | R |  |
| Mercury | 100\% | R | R | - |
| Methyl acetate | 100\% | R | R | - |
| Methyl alcohol | 5 \% | R | L | L |
| Methyl amine | Up to $32 \%$ | R | - | - |
| Methyl bromide | $100 \%$ | NR |  | NR |
| Methyl ethyl ketone | $100 \%$ | R | - | - |
| Methylene chloride | 100\% | L | NR | NR |
| Milk |  | R | R | R |
| Monochloroacetic acid | >85\% | R | R | - |
|  |  |  |  |  |
| Naphtha |  | R | NR | NR |
| Nickel chloride | S.s | R | R | - |
| Nickel nitrate | S.s | R | R | - |
| Nickel sulphate | S.s | R | R | - |
| Nitric acid | Up to $30 \%$ | R | NR | NR |
| Nitric acid | From 40 to $50 \%$ | L | NR | NR |
| Nitric acid, fujming (with nitrogen dioxide) |  | NR | NR | NR |
| Nitrobenzene | 100\% | R | L | - |
|  |  |  |  |  |
| Oleic acid | $100 \%$ | R | L |  |
| Oleum (sulphuric acid with $60 \%$ of SO 3 ) |  | R | L | - |
| Olive oil |  | R | R | L |
| Oxalic acid | w.s | R | L | NR |
|  |  |  |  |  |
| Paraffin oil (FL65) |  | R | L | NR |
| Peanut oil |  | R | R | - |
| Peppermint oil |  | R | - | - |
| Perchloric acid | (2N) $20 \%$ | R | - | - |
| Petroleum ether (ligroin) |  | L | L | - |
| Phenol | 5\% | R | R | - |
| Phenol | 90\% | R | - | - |
| Phosphine, gas |  | R | R | - |
| Phosphoric acid | Up.to 85\% | R | R | R |
| Phosphorus oxychloride | 100\% | L | - | - |
| Picric acid | S.s | R | - | - |
| Potassium borate | S.s | R | R | - |
| Potassium fluride | S.s | R | R | - |
| Potassium hydroxide | Up to 50\% | R | R | R |
| Ptassium iodide | S.s | R | - | - |
| Potassium nitrate | S.s | R | R | - |
| Potassium pechlorate | 10\% | R | R | - |
| Potassium permanganate | (2 N) $30 \%$ | R | - | - |
| Potassium persulphate | S.s | R | R | - |
| Potassium sulphate | S.s | R | R | - |
| Propane, gas | 100\% | R | - | - |
| Propionic acid | >50\% | R | - | - |
| Pyridine | 100\% | L | - | - |
|  |  |  |  |  |
| Seaweter |  | R | R | R |
| Silicon oil |  | R | R | R |
| Silver nitrate | S.s | R | R | L |


| Chemical or Product | Concentration | Temperature ${ }^{\circ} \mathrm{C}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | 20 | 60 | 100 |
| Sodium benzoate | 35\% | R | L | - |
| Sodium bicarbonate | S.s | R | R | R |
| Sodium carbonate | Up to 50\% | R | R | L |
| Sodium chlorate | S.s | R | R | - |
| Sodium chloride | S.s | R | R | - |
| Sodium chlorite | 2\% | R | L | NR |
| Sodium chlorite | 20\% | R | L | NR |
| Sodium dichromate | S.s | R | R | R |
| Sodium hydrogen carbonate | S.s | R | R | R |
| Sodium hydrogen sulphate | S.s | R | R | - |
| Sodium hydrogen sulphite | S.s | R | - | - |
| Sodium hydroxide | 1\% | R | R | R |
| Sodium hydroxide | From 10 to $60 \%$ | R | R | R |
| Sodium hypochlorite | 5\% | R | R | - |
| Sodium hypochlorite | 10\%-15\% | R | - | - |
| Sodium hypochlorite | 20\% | R | L | - |
| Sodium metaphosphate | W.s | R | - | - |
| Sodium nitrate | S.s | R | R | - |
| Sodium perorate | S.s | R | R | - |
| Sodium phisohate (neutral) |  | R | R | R |
| Sodium silicate | W.s | R | R | - |
| Sodium sulphate | S.s | R | R | - |
| Sodium sulphide | S.s | R | - | - |
| Sodium sulphite | 40\% | R | R | R |
| Sodium thiosulphate (hypo) | S.s | R | - | - |
| Soybean oil |  | R | L | - |
| Succinic acid | S.s | R | R | - |
| Sulphuric acid | Up to 10\% | R | R | R |
| Sulphuric dioxide, dry or wet | 10\% | R | R | - |
| Sulphur acid | From 10 to 30\% | R | R | - |
| Sulphuric acid | $50 \%$ | R | L | L |
| Sulphuric acid | 96\% | R | L | NR |
| Sulphuric acid | 98\% | L | NR | NR |
| Sulphurous acid | Up to $30 \%$ | R | - | - |
|  |  |  |  |  |
| Tartaric acid | S.s | R | R | - |
| Tetrahydrofuran | $100 \%$ | L | NR | NR |
| Tetralin | $100 \%$ | NR | NR | NR |
| Thiophene | $100 \%$ | R | L | - |
| Tin(IV) chloride | W. s | R | R | - |
| Tin (II) chloride | S.s | R | R | - |
| Toluene | $100 \%$ | L | NR | NR |
| Trichloroacetic acid | Up to 50\% | R | R | - |
| Trichloroethylene | $100 \%$ | NR | NR | NR |
| Triethanolamine | W. s | R | - | - |
| Turpentine |  | NR | NR | NR |
|  |  |  |  |  |
| Urea | S.s | R | R | - |
|  |  |  |  |  |
| Vinegar |  | R | R | - |
|  |  |  |  |  |
| Water brackish, mineral, potable |  | R | R | R |
| Whiskey |  | R | R | - |
| Wines |  | R | R | - |
|  |  |  |  |  |
| Xylene | 100\% | NR | NR | NR |
|  |  |  |  |  |
| Yeast | W.s | R | R | R |
|  |  |  |  |  |
| Zinc chloride | Sat.w.s | R | R | - |
| Zinc chloride | S.s | R | R | - |

## Exposed Installation

Cold Water Risers
There is no need for expansion joint as there will be no linear expansion for Tahweel cold water pipes. Vertical Support is necessary like all other piping system.

## Ceiling Walls

During the planning and laying of visible pipes for hot water on ceiling or walls, besides taking into account the support intervals, special attention must be given to the linear expansion due to temperature. This will also prevent sagging and snaking of pipe lines. Fixed and Sliding supports secure external pipelines to the masonry structure of the building to prevent the movements generated by thermal expansion, totally or partially.

Fixed Supports:- are used when the axial expansion of the pipe line should be limited. Fixed support provides a rigid connection between external pipeline installations with masonry structure. The fixed supports must normally be positioned where the system changes direction (Elbows, Tees, etc.) \& near to Valves, Cocks, Water meter, etc. to ensure that expansion forces are not discharged in these points. In all cases, fixed support should always be provided next to any joint in the pipeline created using any welded fitting. Obviously the fixed supports limit the length of section of pipe free to expand, and reduce the relative change in length value.

Sliding Supports:-are used to allow the pipe to move axially in both directions. They have to be positioned well away from joints made using welded fittings, on a free length of the pipes surface. The sliding support collar must be absolutely free from pipe diameter otherwise it may damage the surface of the pipe where it is installed.

Sliding support also ensures that the pipeline remain straight in spite of thermal stresses.


Free flexible pipe segment (Expansion Arm): with the help of free flexible pipe segment, provided at the position of change in direction, the change in length of pipeline is totally compensated. The length of free flexible pipe segment is calculated using following formula:


Length of free flexible segment $=\mathbf{L S}=\mathbf{C} \mathbf{d} \mathbf{X} \sqrt{ } \mathbf{L} \mathbf{L}$
Where
LS = Length of free flexible segment (mm)
$\mathbf{C}=$ Constant of material (for PP-R, $\mathrm{C}=30$ )
$\mathbf{D}=$ pipe outer diameter (mm)
$\Delta \mathbf{L}=$ Expansion or contraction length (mm)
Free Flexible pipe loop (Compensation Loop): if the change in length of the pipe can't be compensated using the expansion arm, it is necessary to install a free flexible loop. Free flexible loop can easily be prepared on site by using required length of pipes and 490 Degrees elbows.


To prepare the free flexible loop, you need to calculate the LS, length of flexible segment using the formula above. The minimum width between two arms of the loop $=10$ times the outside diameter of the pipe.

## Bending

During installation of pipeline, PPR pipes may be required to be bent. Bending shall be done by using hot air blowing at 140C. Direct heating by open flame must/should be avoided. Radius for PPR pipe bend should be minimum 8 times its diameter. The table indicates minimum bending radius for each size of pipe.


## Thermal insulation for hot \& cold water pipes

Thaweel Pipes PN 20 standard pipes offer excellent insulation properties compared to other pipe systems, as illustrated in the table below, where a low 0.24 W / mK values means that in cold water pipe lines, formation of condensation on the external pipe surfaces has been virtually eliminated.

| PP | $0,24 \mathrm{~W} / \mathrm{MK}$ |
| :--- | :--- |
| PE | $0,35 \mathrm{~W} / \mathrm{MK}$ |
| Steel | $50 \mathrm{w} / \mathrm{MK}$ |
| Copper | $400 \mathrm{w} / \mathrm{MK}$ |

The temperature of the flow water, room temperature, type of installation, relative humidity and the condensation point will determine the type of insulation required. The thickness of insulation is based on the degree of condensation, thermal conductivity of insulating material and the threshold $\Delta t$ above which the PP-R pipe begins to form condensation.
In hot water carrying system the thickness of insulation depends on the temperature of the flow water, type of installation, thermal leakage, OD of pipe and thermal conductivity of insulating material.

The table bellow shows the minimum thickness of insulation required for Thaweel Pipes - PN 20 standard pipes.

| Normal width (1) of <br> pipe lines in mm | Uncovered pipe <br> line | Pipe and fittings in wall or ceiling <br> passages, in cross section of pipe lines <br> at pipe connections, for central pipe net <br> distributors \& radiator connecting pipes <br> with maximum 8m length |
| :--- | :--- | :--- |
| Up to t-20 | 20 mm | 10 mm |
| From t-22 to 35 | 30 mm | 15 mm |
| From t-40 to 100 | Equal to t | 0.5 t |
| t is above 100 | 100 mm | 50 mm |

Minimum thickness of insulation for cold water lines shown in the table bellow:

| Type of insulation | Insulation Thickness |
| :--- | :---: |
| Open installation in non heated rooms | 4 mm |
| Open installation in the heated rooms | 9 mm |
| Installation in ducts without neighboring hot water pipes | 4 mm |
| Installation in ducts with neighboring hot water pipes | 13 mm |
| Concealed installation, pipe chase risers | 4 mm |
| Installation in the walls nearing the hot water pipes | 13 mm |
| Installation on the concrete flooring | 4 mm |

## Condensation factor

Following table shows the sensitivity threshold $\Delta t$ above which Tahweel Pipes begin to form condensation.

| Pipe outside diameter $\boldsymbol{\varnothing}$ | $\boldsymbol{\Delta} \mathbf{t}$ |
| :---: | :---: |
| $20 \times 3.4 \mathrm{~mm}$ | $7.2^{\circ} \mathrm{C}$ |
| $25 \times 4.2 \mathrm{~mm}$ | $7.4^{\circ} \mathrm{C}$ |
| $32 \times 5.4 \mathrm{~mm}$ | $8.0^{\circ} \mathrm{C}$ |
| $40 \times 6.7 \mathrm{~mm}$ | $8.5^{\circ} \mathrm{C}$ |
| $50 \times 8.3 \mathrm{~mm}$ | $10.0^{\circ} \mathrm{C}$ |
| $63 \times 10.5 \mathrm{~mm}$ | $10.5^{\circ} \mathrm{C}$ |
| $75 \times 12.52 \mathrm{~mm}$ | $10.8^{\circ} \mathrm{C}$ |
| $90 \times 15.0 \mathrm{~mm}$ | $11.0^{\circ} \mathrm{C}$ |
| $110 \times 18.3 \mathrm{~mm}$ | $11.5^{\circ} \mathrm{C}$ |
| $125 \times 20.8 \mathrm{~mm}$ | $12.0^{\circ} \mathrm{C}$ |

## Pressure Test

After installing Tahweel piping system, it is necessary to go through a pressure test. Unlike metal pipes, Tahweel like all other plastic pipe systems, has to follow different pressure test procedure owing to their mechanical properties of expansion when subject to pressure, temperature difference and coefficient of expansion. A change in temperature of 10 K corresponds to a pressure change of 0.5-1.0 bar. Thus, the test medium shall as far as possible, be kept at a constant temperature throughout the test.
Test Procedure (According to DIN 1988 Part 2 or BS 6700: 1977)

Finished pipe work must be completely fitted with filtered water and vented. Technology

## Procedure

After pipe work is filled with water and completely vented to release air locks in the system, testing can begin:
(a) Test pressure $=($ permissible working pressure +5 bars ) shall be produced 2 times within 30 minutes at 10 minute intervals.

Note: restore by hand pump to required test pressure after the 10 minute interval if the pressure drops. If leakage is detected, rectify the leakage are and repeat procedure.
(b) If no leakage is detected, for the next 30 minutes, check if the pressure has dropped by more than 0.6 bars and if there is any visible signs of leakage.
Note: If leakage is detected, rectify the leakage area and repeat procedure.

If pressure drops by more than 0.6 bars within this period, leakage must have occurred. Detect and rectify.
(c) If pressure drop is within 0.6 bars and no leakage detected, continue the test without restoring the required pressure for the next 120 minutes. During this time, it shall be checked if the pressure drop is more than 0.2 bars and no leakage is detected.

Note: If leakage is detected, rectify the leakage area and repeat procedure.

If pressure drops by more than 0.2 bars within this period, leakage must have occurred. Detect, rectify and repeat procedure.
(d) Pressure test is successful when all the above are met and the readings should be recorded.

## Flushing Pipe Systems

The Technical Regulations for Drinking Water Installations, TRWI

* DIN 1988, Sec. 2, must be observed when flushing pipe systems. Flushing is performed with an air/water mixture intermittently under pressure.

Generally, all drinking water systems, regardless of materials used, should be thoroughly flushed after completion. The following requirements are necessary for optimal service readiness:

- securing of drinking water quality
- prevention of corrosion damage
- prevention of functional damage to fittings and equipment
- cleaning of interior pipe surfaces.

These requirements are achieved using two flushing procedures:

1. Flushing with water
2. Flushing with an air/water mixture.

The experience of the plumber, client requirements and manufacturer's instructions are decisive in the eye of flushing procedure used.

For drinking water systems in accordance with DIN 1988 assembled consisting exclusively of the Tahweel Pipe system, Procedure 1, "Flushing with water", is sufficient.

For thermal processing of Tahweel Pipe systems, no additional materials are needed such as adhesives, fluxing agents, etc. The bond is produced solely through fusion. The system materials are and remain pure during bonding.

Thus, simple flushing with water after system installation in accordance with procedure " 1 " is completely sufficient.

## Installation

Cuttings

1. Cut the pipe right angle to its axis using burr free cutter.
2. Ensure that pipes is free from burrs or cutting chip
3. Clean the pipe \& fitting perfectly before welding.
4. Mark welding depth at the end of pipes.


## Heating

1. Mount the suitable dies on heating element of welding machine according to the diameter of Pipe and fitting to be welded.
2. Connect the welding machine to $220 / 230$ volts A.C. power supply.
3. Select 260 Deg. C. temperature on the welding machine thermostat.
4. Wait for reaching the required working temperature.
5. Insert the pipe and the fitting in the dies by exerting light pressure.
6. For heating time, refer the table bellow for different sizes of Pipes.


Welding

1. After heating, quickly insert pipe into the fitting by exerting light pressure.
2. Any misalignment should be corrected immediately after insertion to avoid any Stress in the weld.
3. Allow the joint to cool as per cooling time given in table.


This type of connection ensures perfect sealing even under the severe working Conditions.

## Welding Depth,Heating,Welding and Cooling Time

The table below provides the necessary information for a good welding joint for various Thaweel Pipes pipe and fitting size (applies to Stable pipes also).

| Pipe <br> Diameter <br> $(\mathbf{m m})$ | Welding <br> Depth <br> $(\mathbf{m m})$ | Heating <br> Time <br> (sec.) | Welding <br> Time <br> (sec.) | Cooling <br> Time <br> $(\mathbf{m i n})$. |
| :---: | :---: | :---: | :---: | :---: |
| 20 | 14.0 | 5 | 4 | 2 |
| 25 | 15.0 | 7 | 4 | 2 |
| 32 | 16.5 | 8 | 6 | 4 |
| 40 | 18.0 | 12 | 6 | 4 |
| 50 | 20.0 | 18 | 6 | 4 |
| 63 | 24.0 | 24 | 8 | 6 |
| 75 | 26.0 | 30 | 8 | 8 |
| 90 | 29.0 | 40 | 8 | 8 |
| 110 | 32.5 | 50 | 10 | 8 |

P.S:Heating time starts when both pipe and fitting are pushed into correct depth. Welding time begins when joints are connected. Cooling time is the time taken for the joint to be completely cured. never reduce cooling time by pouring water or by other means

## Transportation and Storage:

The system components must be protected against weather, UV radiation and contamination. The components must be stored at minimum temperature of $+5^{\circ} \mathrm{C}$. Storerooms of plastic components must be separated from such areas where solvents, adhesives, paints or similar products are stored.

A minimum one-metre distance between plastic components and radiators must be maintained when storage areas are moderately heated up to $+5^{\circ} \mathrm{C}$.

Plastic pipes in stock must be supported along their whole lengths or protected in another suitable way against deflection. Plastic pipe fittings are usually stored in sacks on palettes or freely loaded in boxes, containers, baskets, etc.

Maximum storage height of one metre must be respected if plastic pipes are stored in plastic sleeves and/or pipe fittings in plastic sacks. Each of the different types of pipes and fittings are stored separately. When dispatching from storage, the oldest stock should be dispatched first.

During their transport it is not allowed to drag pipes over the ground or lorry deck. The components/pipes must not be transported by throwing or letting them falloff the lorry to the ground. If they are transported to/on the site then they must be protected against mechanic damage and stored at the spot on a suitable underlay where protected against dirt, solvents, direct heat (a contact with a radiator, etc.). The components are supplied in protective covers (pipes in polyethylene bags, pipe fittings also in sacks or cardboard boxes) and it is desirable to let them in these as long as possible before the start of installation works (as a protection against dirt).

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