



**INTERNATIONAL
INDUSTRIES LTD.**

Promising Reliability, For Now and Tomorrow

©IIL HDPE WATER PIPE 1600X94.10MM 324-17



megaflo

The Highest Quality HDPE Water Pipe

20mm to 1600mm

Company Profile

International Industries Limited (IIL) is Pakistan's largest manufacturer of steel, stainless steel and plastic pipes with an annual manufacturing capacity of 750,000 tons and annual revenues of almost Rs. 25 billion.

IIL was incorporated in Pakistan in 1948, is quoted on the Pakistan Stock Exchange, has an equity of over Rs. 8.8 billion and has featured on the Pakistan Stock Exchange's listing of the Top 25 Companies consecutively for more than 10 years.

IIL is part of a group of Companies that includes:

- **International Steels Limited (ISL):** Pakistan's largest manufacturer of galvanized, cold rolled and color coated steel sheets and coils. ISL has an annual manufacturing capacity of 1,000,000 tons and annual revenues of over Rs. 47 billion.
- **Pakistan Cables Limited (PCL):** is Pakistan's premium manufacturer of electrical cables, wires, copper rod, PVC compound and aluminum sections with annual revenues of over Rs. 9.5 billion.
- **IIL Australia Pty Limited:** IIL's wholly owned Australian subsidiary which represents the Group's interest in the Asia Pacific region.

IIL is a proud recipient of numerous accolades including the Management Association of Pakistan's "Corporate Excellence Award" for the Industrial Metals & Mining Sector, the National Forum for Environment & Health's "Environment Excellence Award" and the Employers Federation of Pakistan's "OHSE award".

IIL also has a credible export pedigree with an ever-expanding footprint in 60 countries across 6 continents. As a result, IIL has been awarded the "FPCCI Export Performance Award" consecutively for 18 years.

With an unshakeable focus on health, safety & environment, IIL is a reputable corporate citizen and signatory to the United Nations Global Compact. The Company is ISO 9001, ISO 14001, ISO 45001, OHSAS 18001, API 5L, API 15LE, PSQCA, UL, PNAC/ILAC and CE certified and manufactures its products according to the highest international standards and specifications. IIL is the first company in Pakistan to achieve ISO 45001 certified by Lloyds Register Quality Assurance.

For further information, please visit our website, www.iil.com.pk

THE LARGEST HDPE PIPE MANUFACTURED IN PAKISTAN



megaflo

The Highest Quality HDPE Water Pipe

International Presence

Having exported over 800,000 tons to date, IIL has a credible export pedigree, an ever-expanding footprint in 60 countries across 6 continents and has won several export awards at various highly prominent forums.

Keeping in view the growing demand in Australia, IIL has incorporated a wholly owned subsidiary based in Australia which enables IIL to service this developed market as well as the Oceania region at large.

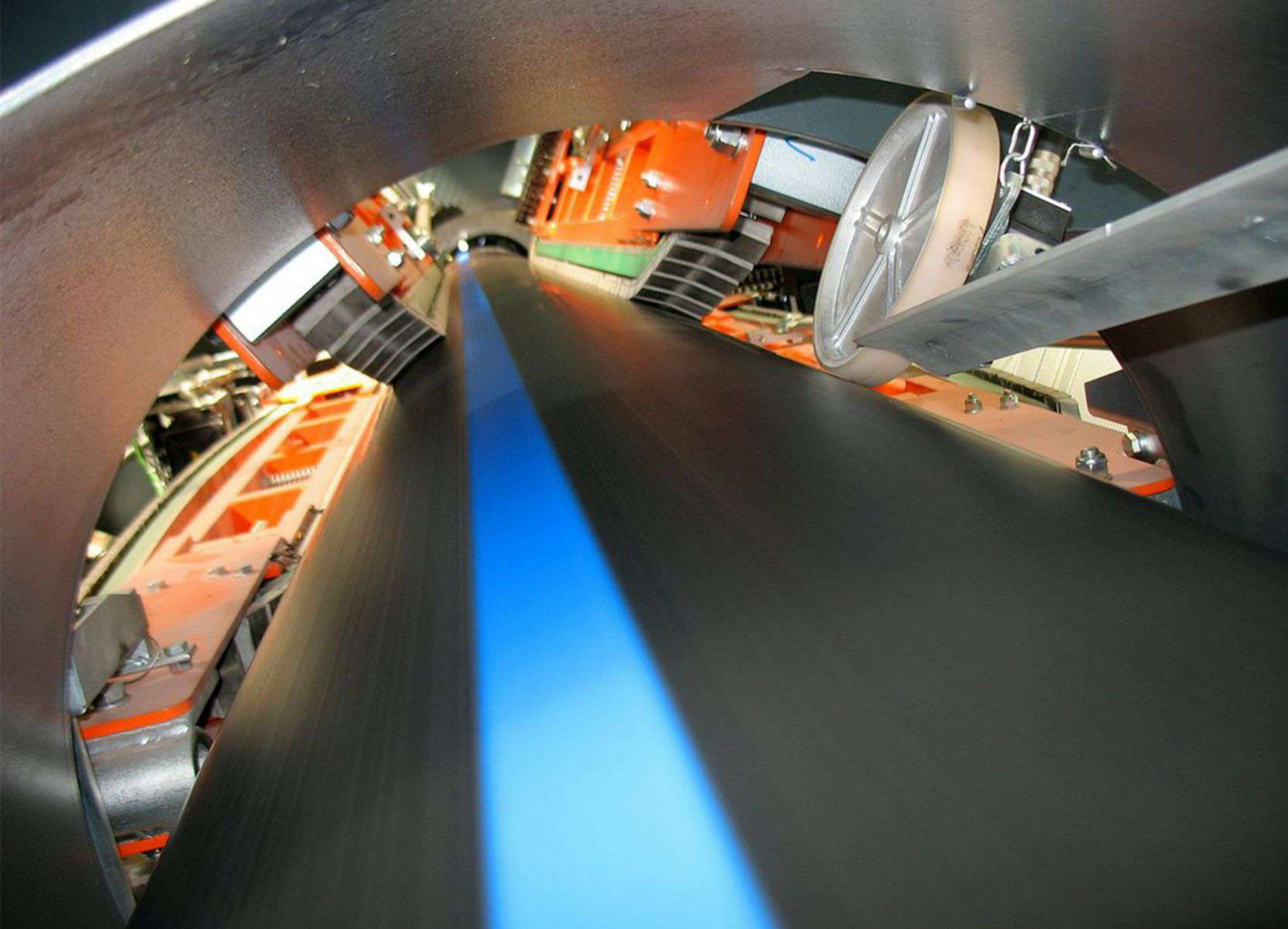
National Recognition

IIL is a proud recipient of numerous accolades including the “FPCCI Export Performance Award” and the Management Association of Pakistan’s “Corporate Excellence Award” for the Industrial Metals & Mining Sector. Additionally, IIL has featured on the Karachi Stock Exchange’s listing of the “Top 25 companies” consecutively for 10 years.

IIL was also awarded the 2015 “Environment Excellence Award” by the National Forum for Environment & Health and the 2nd position in a nationwide OSH&E Best Practices Competition organized by the Employers Federation of Pakistan in 2015.







IIL's Market Edge

- Internationally certified
- 50 years of pipe making experience
- Premium quality product
- Stringent compliance with international standards
- State-of-the-art manufacturing process
- In house testing facilities
- Highly skilled work force
- Short lead time
- Highly responsive sales force
- Nationwide dealers network
- International recognition as preferred pipe manufacturer

Quality and Reliability

Our Corporate Slogan - "Promising Reliability, For Now and Tomorrow" reflects the fact that International Industries Limited (IIL) is firmly committed to quality. By adhering to globally recognized standards and regulations, IIL ensures that each of its products stand up to the quality expectations of its valued clients.

A comprehensive quality assurance and control system is employed throughout the production process; from production planning and specification and raw material inventory control all the way through production, packing, storage and shipping.

IIL uses the highest quality raw materials and state-of-the-art machinery operated by fully trained and highly skilled professionals in an environment of continuous improvement and R&D.

Furthermore, our fully capable in-house testing & quality control labs ensure that the dimensional, physical and chemical elements of our products meet and exceed the most stringent of global quality standards.

Certifications

Standard	Description	Location	Certified by	Since	License #
ISO 9001	Quality Management System	Head Office, Lahore Office, Factory 1, 2 & 3.	Lloyds Register Quality Assurance (UK)	1997	ISO 9001 – 0049981
ISO 14001	Environment Management System	Head Office		2000	ISO 14001 – 0049980-002
		Lahore Office			14001 – 0049980-001
		Factory 1			ISO 14001 – 0049980-002
		Factory 2			ISO 14001 – 0049980-003
		Factory 3			ISO 14001 – 0049980-004
ISO 45001 (Old Standard OHSAS 18001)	Occupational Health & Safety Management Systems	Head Office		2007	ISO 45001 – 0049979
		Lahore Office			ISO 45001– ISO 45001 – 0049979-001
		Factory 1			ISO 45001 – 0049979-002
		Factory 2			ISO 45001 – 0049979-003
API Specification Q1 ® & 5L	Manufacturing of Steel Line Pipe (Factory # 1)	Factory 1, 2 & 3	American Petroleum Institute (USA)	2000	5L-0391
	Manufacturing of Steel Line Pipe (Factory # 2)			2016	5L-1104
API Specification Q1 ® & 15LE	Manufacturing of Polyethylene Line Pipe			2006	15LE-0014
BS EN 10255 & 10266	CE Mark for Hot Dip Galvanized ERW Carbon Steel Pipes	Factory 1 & 2	CNC Services (Germany)	Oct-11	CNC/EEC/4112/11
	CE Mark for ERW Tubes from Cold Rolled Carbon Steel			Oct-11	CNC/EEC/4113/11
UL-852 ASTM 795	Certificate of Compliance (by Civil Defense UAE)	Factory 1	Underwriter Laboratories UL (United States)	Apr-17	20170425-EX27362
ISO / IEC 17025	Certificate of Lab Accreditation	Factory 1	Pakistan National Accreditation Council (PNAC)	Apr-17	ISO-17025-Certificate
PS:4533-34/1999 (R)	License for the use of Pakistan Standard Mark	Factory 3	Pakistan Quality Control Authority (PSQCA)	18-May	CML/N/1287/2018
				18-May	CML/N/1288/2018
DIN 16962 / 1980	License for the use of Pakistan Standard Mark for PPRC Fittings			15-Feb	CSDC/L-170/2015 (R)
PS:3580-2014(R)	Polyethylene Pipe for water Supply "MEGAFLO" Brand			17-Mar	CSDC/L-205/2017
ASTM A53/2012	MS Pipe (Mild Steel Pipe) - FACTORY-1			17-Mar	CSDC/L-205/2017
ASTM A53/2012	MS Pipe (Mild Steel Pipe) - FACTORY-2			17-Jul	CSDC/L-206/2017



HDPE Pressure Pipe Systems

High density polyethylene pipe (HDPE) has been used extensively around the world since the 1950's. The unique properties of high density polyethylene pipe have offered an alternative to traditional material like steel and copper and also in non pressure applications where clay and fibre cement pipes were used.

The material has been developed internationally from PE 80 to today's PE 100 material which has shown a saving of approximately 30% on the wall thickness from the early days of polyethylene. This mass saving relates back to a cost saving and a better performance as the internal diameter of the pipe is bigger. In many cases, because of the excellent flow characteristics of polyethylene, pipes could be down sized while still performing within the expected parameters.

Piping made from polyethylene is a cost effective solution for a broad range of piping applications in the municipal, industrial, marine, mining, landfill, duct and agricultural industries. It has been tested and proven effective for above ground, surface, buried, slip-lined, floating and sub-surface marine applications. HDPE pipe is also impact and abrasion resistant.

HDPE can carry potable water, waste water, slurries, chemicals, hazardous wastes, and compressed gases. In fact, polyethylene pipe has a long and distinguished history of service in the gas, oil, mining and other industries. It has the lowest repair frequency per kilometer of pipe per year compared with all other pressure pipe materials used.

Polyethylene is a strong, extremely tough, very durable product which offers long service and trouble-free installation.



Applications

III. Megaflo High Density Polyethylene pipes are specified with confidence in the following applications:

- **Civil engineering**
Water mains and reticulation systems
- **Building**
House connections and cold water reticulation systems
- **Agriculture**
Irrigation and water supply schemes
- **Industrial**
Sewer effluent control and water purification. Conveyance of chemicals and water in most industrial plants
- **Mining**
Conveyance of water and air in underground operations. Used extensively in treatment and recovery plants

HDPE is generally used for high pressure applications ranging from 3.2 to 25 bar, in conjunction with compression, butt weld or electrofusion fittings.





Characteristics of IIL Megaflo HDPE pipe

IIL Megaflo Polyethylene pressure pipe systems offer many advantages when compared to traditional products, namely:

- Weather resistance in above ground applications
- Highly corrosion resistant
- Ease of handling and installation
- Exceptional toughness
- Excellent abrasion resistance
- Manufactured in long lengths and coils
- Manufactured to internationally accepted standards
- Service performance in excess of 50 years

Resistance to Weather Degradation

The high percentage of carbon black in the formulation of the pipe raw material enables HDPE pipe to resist degradation by ultraviolet rays. The pipe is impervious to rain and wind conditions.

Chemical Resistance

HDPE pipes are chemically inert except few chemicals. As the product is also not electrically conductive, reactions cannot take place within the pipe and affect its performance. HDPE has excellent corrosion resistance and is virtually inert so it does not need expensive cathodic protection. It offers better resistance to corrosive acids, bases and salts than most piping materials and also has good resistance to many organic substances such as solvents and fuels. Natural soil chemicals cannot degrade the pipe in any way.

Ease of Handling

Conventional materials are much heavier than HDPE and will require cranes and lifting gear. Handling of the product can often be done by hand allowing ease of installation in confined spaces and difficult terrain.

High Strength and Flexibility

HDPE material has a high degree of impact resistance and is robust and ductile. Pipes can bend quite easily allowing for savings in design as less critical angle changes can be made without bends. HDPE pipe can be laid across uneven surfaces and in narrow trenches. Pipe can be joined outside of the trench before installation into the trench. The ability to absorb pressure surges makes the product superior to other plastic pipe materials. Even in sub zero temperatures HDPE can still perform to expectation.

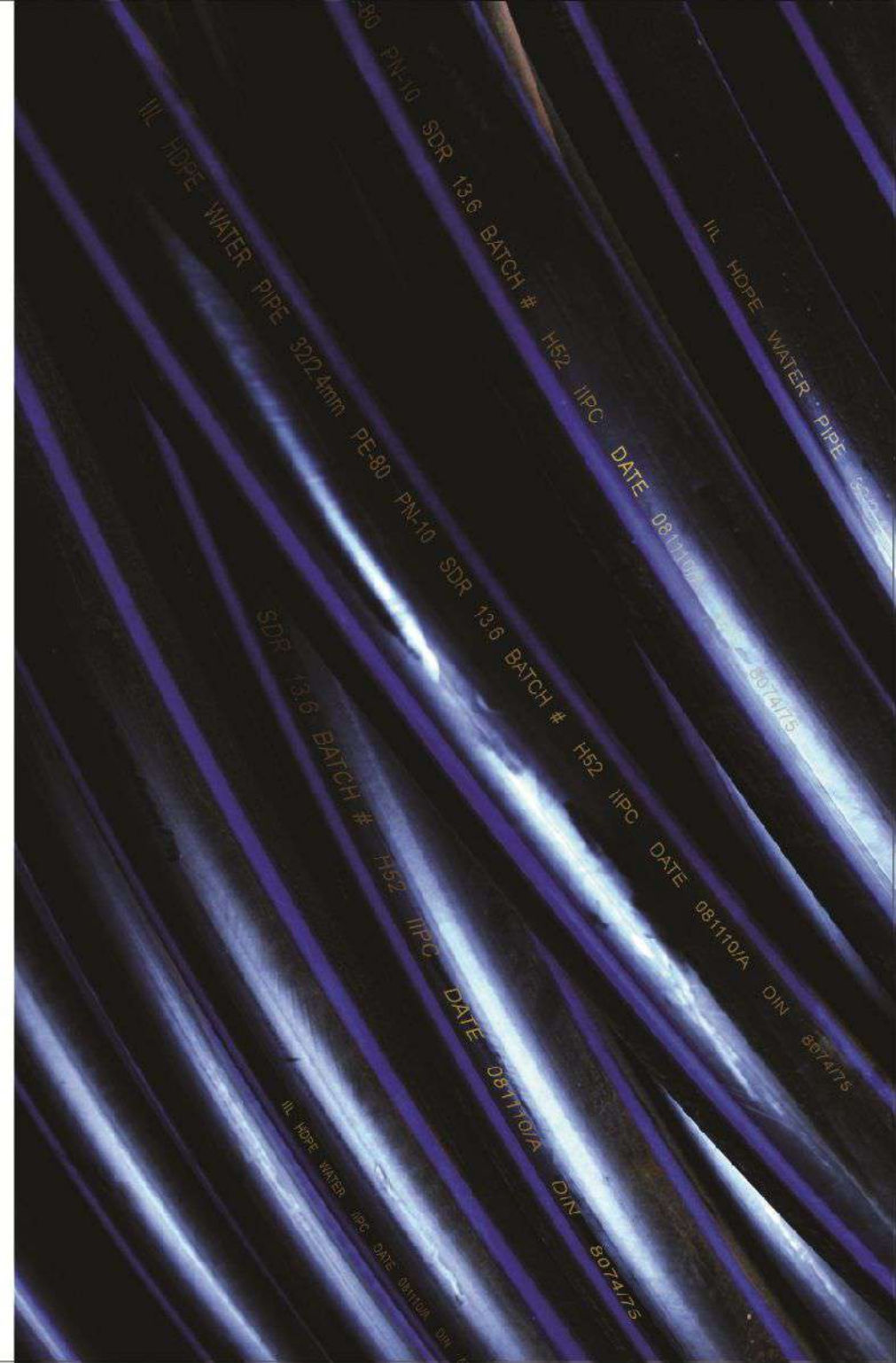
Resistance to Abrasion

Where very abrasive mediums have to be transported HDPE has proved it self to be the pipe product of choice. HDPE out performs traditional pipe materials such as steel and steel with sacrificial layers (rubber lined steel). The product is used extensively in mine tailings and washing plants.

Co-efficient of Friction

The smooth internal surface of the pipe and the impermeability of HDPE allows a greater flow capacity and minimal friction loss. It has less drag and a lower tendency for turbulence at high velocity.

Its superior chemical resistance and non-stick surface combines to eliminate scaling and pitting. This preserves the excellent hydraulic characteristics throughout the pipe's service life. When designing pipelines, use the Hazen-Williams 'C' factor of 150 and an 'n' factor of 0.009, when using the Manning formula.



Product Specifications

IIL Megaflo HDPE pipes conform to the following international & national standards:

ISO 4427:

Plastics Piping Systems for Water Supply - Polyethylene (PE)

DIN 8074:

Polyethylene (PE)
Pipes-Dimensions

DIN 8075:

Polyethylene (PE) Pipes - General
Quality Requirements & Testing

PS 3580:

Polyethylene Pipes for Water Supply



Product Range

PE-100, Hydrostatic Design Strength = 8 Mpa

Dimension Ratio	SDR-11	SDR-13.6	SDR-17	SDR-21	Standard Length (m)	Maximum Length (m)
Working Pressure (Bar)	PN-16	PN-12.5	PN-10	PN-08		
Outer Diameter (mm)	Minimum Wall Thickness (mm)	Minimum Wall Thickness (mm)	Minimum Wall Thickness (mm)	Minimum Wall Thickness (mm)		
20	1.9	1.8	-	-	100	1000
25	2.3	1.9	1.8	-	100	1000
32	2.9	2.4	1.9	-	100	1000
40	3.7	3.0	2.4	1.9	100	1000
50	4.6	3.7	3.0	2.4	100	500
63	5.8	4.7	3.8	3.0	100	250
75	6.8	5.6	4.5	3.6	100	250
90	8.2	6.7	5.4	4.3	100	250
110	10.0	8.1	6.6	5.3	12	12
125	11.4	9.2	7.4	6.0	12	12
160	14.6	11.8	9.5	7.7	12	12
180	16.4	13.3	10.7	8.6	12	12
200	18.2	14.7	11.9	9.6	12	12
225	20.5	16.6	13.4	10.8	12	12
250	22.7	18.4	14.8	11.9	12	12
280	25.4	20.6	16.6	13.4	12	12
315	28.6	23.2	18.7	15.0	12	12
355	32.2	26.1	21.1	16.9	12	12
400	36.3	29.4	23.7	19.1	12	12
450	40.9	33.1	26.7	21.5	12	12
500	45.4	36.8	29.7	23.9	12	12
560	50.8	41.2	33.2	26.7	12	12
630	57.2	46.3	37.4	30.0	12	12
710	64.5	52.2	42.1	33.9	12	12
800	72.7	58.8	47.4	38.1	12	12
900	81.8	66.1	53.3	42.9	12	12
1000	-	-	59.3	47.7	12	12
1200	-	-	70.6	57.2	12	12
1400	-	-	82.4	66.7	12	12
1600	-	-	94.1	76.2	12	12

Note:

- Tolerance in diameter & wall thickness will apply as per standard
- Other sizes can be produced & supplied upon request
- Product test reports are available upon request

Temperature & Pressure De-Rating

The rated working pressure of an HDPE pipe is determined at 20°C. Where the operating temperature of the fluid in the pipe exceeds 20°C, the pressure rating of the pipe has to be de-rated in order to maintain the designed safety factors of the pipe. HDPE pipe is not recommended in applications where the fluid temperature exceeds 50°C.

Temperature of Fluid in Pipe	De-rating factor apply to MOP
0 - 20 °C	1.0
20 - 25 °C	0.9
25 - 30 °C	0.8
30 - 35 °C	0.7
35 - 40 °C	0.6
40 - 45 °C	0.5
45 - 50 °C	0.4

Fluid Flow

III Megaflo HDPE pipe is used to transport fluids that may be liquid or slurry, where solid particles are entrained in a liquid, or gas. This section provides general information for Hazen-Williams and Manning water flow. The flow information in this section may apply to certain conditions and applications, but it is not suitable for all applications. The user should determine applicability before use.

Air Binding & Vacuum Release

In rolling or mountainous country, additional drag due to air binding must be avoided. Air binding occurs when air in the system accumulates at local high spots. This reduces the effective pipe bore, and restricts flow. Vents such as standpipes or air release valves may be installed at high points to avoid air binding. If the pipeline has a high point above that of either end, vacuum venting may be required to prevent vacuum collapse, siphoning, or to allow drainage.

Design Guidelines

Physical and mechanical properties

Physical Properties	Units	Value
Density	g/cc	> 0.930
Co-efficient of linear expansion	K-1	16 x 10 ⁻⁵
Thermal conductivity at 20 °C	W/m/K	0.5
Specific Heat	J/kg/K	2.3 x 10 ³
Softening Point (Vicat)	°C	67
Flammability	`--	flammable

Mechanical Properties	Units	Value
Tensile Strength at Yield	Mpa	> 22
Elongation at Yield	%	10
Modulus of Elasticity	MPa	> 800
Roackwell Hardness (Shore)	`---	60
Dielectric Strength	kV/mm	70

Inside Diameter

OD controlled IIL Megaflo pipe is made using an extrusion process that controls the outside diameter and wall thickness. As a result, the inside diameter will vary according to the combined OD and wall thickness tolerances and other variables including toe-in, out of roundness, ovality, installation quality, temperature. An inside diameter for flow calculations is typically determined by deducting two times the average wall thickness from the average OD. Average wall thickness is minimum wall thickness plus 6%. When an actual ID is required for devices such as inserts or stiffeners that must fit precisely in the pipe ID, please refer to the manufacturing standard (ISO 4427, DIN 8074/75) or take actual measurements from the pipe.

Hazen-Williams Equation

The Hazen-Williams Equation is applicable to water pipes under conditions of full turbulent flow. It has gained wide acceptance in the water and waste water industries because of its simplicity.

$$v = 0.85 C R^{0.63} J^{0.54}$$

where,

v = velocity, m/s

C = Hazen-Williams Coefficient

R = Hydraulic mean radius, m

J = Hydraulic gradient, m/m

Hazen-Williams coefficient, 'C' for HDPE pipe is taken as 150.



Manning Equation

The Manning equation typically solves gravity flow problems where the pipe is only partially full and is under the influence of an elevation head only.

$$v = (1/n) R^{0.667} J^{0.5}$$

where,

v = velocity, m/s

n = Manning's Coefficient

R = Hydraulic mean radius, m

J = Hydraulic gradient, m/m

Manning's Coefficient, 'n' for HDPE pipe is taken as 0.01

Head Loss in Fittings

Wherever a change to pipe cross section or a change in the direction of flow occurs in a pipeline, energy is lost and this must be accounted for in the hydraulic design. Under normal circumstances involving long pipelines these head losses are small in relation to the head losses due to pipe wall friction. However, geometry and inlet/exit condition head losses may be significant in short pipe runs or in complex installations where a large number of fittings are included in the design. The general relationship for head losses in fittings may be expressed as:

$$H = K \left(\frac{V^2}{2g} \right)$$

where

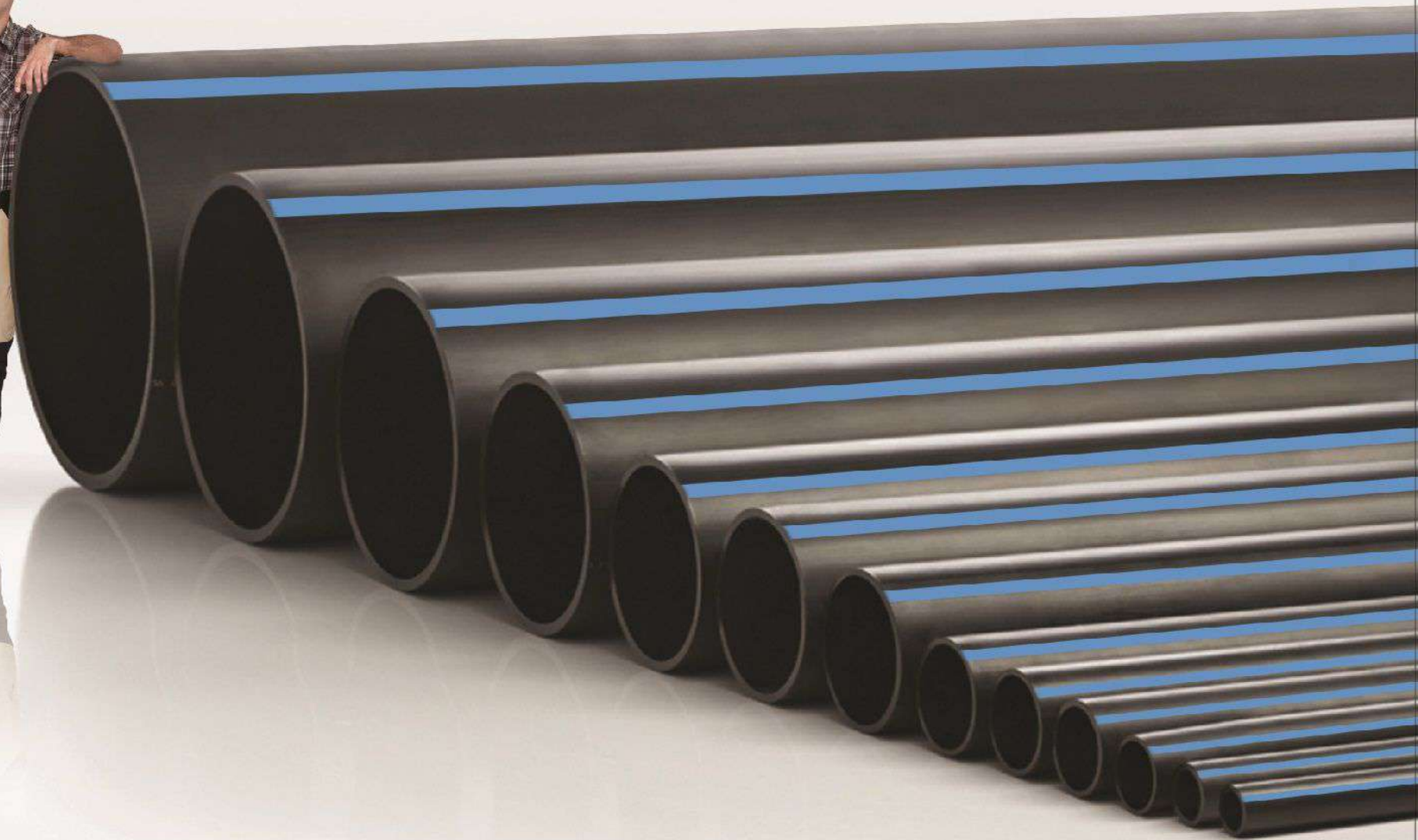
H = head loss (m)

V = velocity of flow (m/s)

K = head loss coefficient

g = gravitational acceleration (9.81 m/s²)

The value of the head loss coefficient K is dependent on the particular geometry of each fitting, and values for specific cases are listed in the table on the next page. The total head loss in the pipeline network is then obtained by adding together the calculations performed for each fitting in the system, the head loss in the pipes, and any other design head losses.



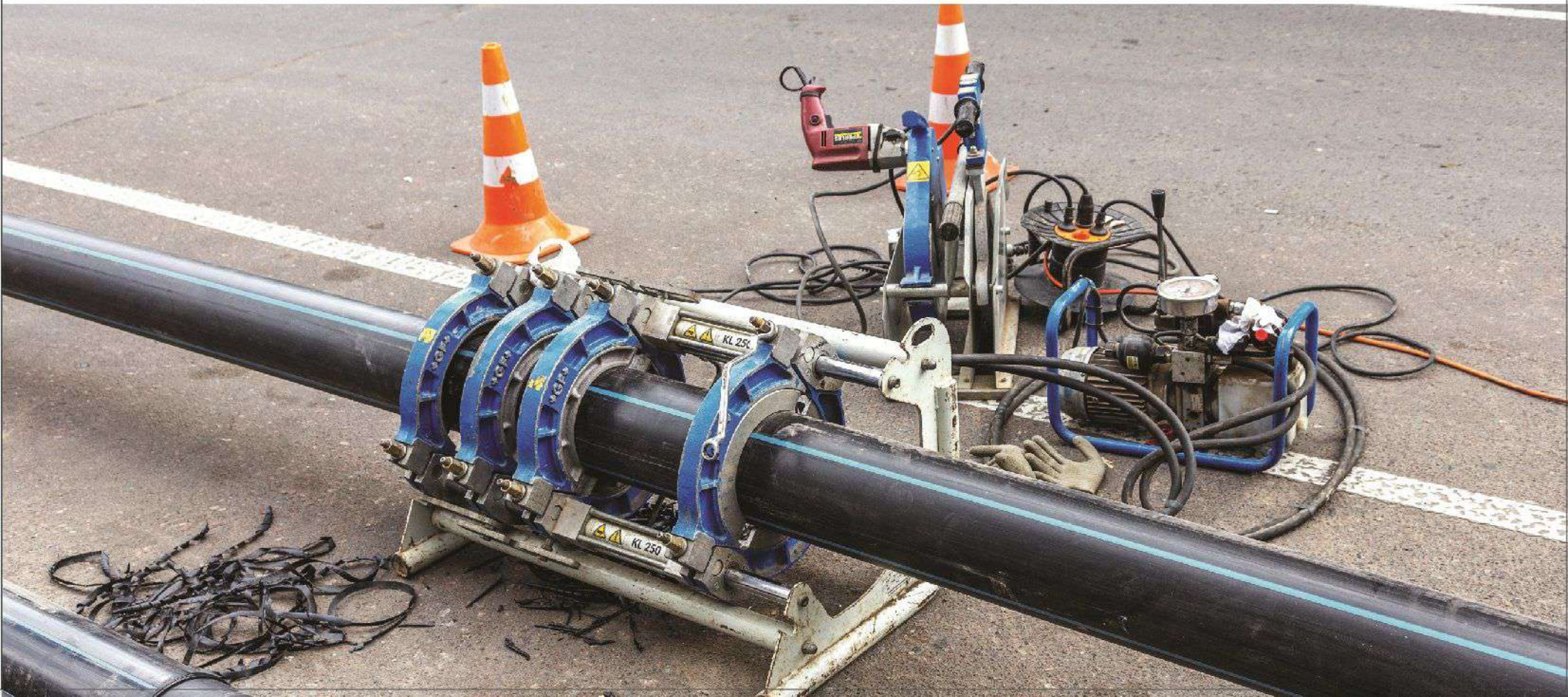
Manual Welding Procedure

- Place the pipes in the clamps with the ends against the trimming tool and with the pipe markings aligned
- Align and level the components using the support rollers
- Tighten the pipe clamps to grip and re-round the pipes
- Cover the free ends of the pipes to prevent cooling of the plate by internal draughts
- Switch on the trimming tool and close the clamps slowly so that the pipe ends are moved against the trimming tool until continuous shavings are cut from each surface
- Keep the trimming tool turning whilst opening the clamps to avoid steps on the trimmed surfaces
- Remove the trimming tool taking care not to touch the trimmed ends. Remove loose shavings from the machine and component ends
- Check that both surfaces are completely planed. If they are not then repeat the trimming process
- Close the clamps and check that there is no visible gap between the trimmed faces
- The maximum permitted outsider diameter mismatch is: 1.0mm for pipe sizes 90mm to 315mm, 2.0mm for pipe sizes 316mm to 800mm, If the mismatch is greater than these values then the pipe must be realigned and re-trimmed
- Open and then close the clamps and note the drag pressure needed to move the pipes together using the hydraulic system
- Remove the heater plate from its protective cover. Check that it is clean and up to temperature
- Place the heater plate in the machine and close the clamps so that the surfaces to be joined are touching the plate
- Using the hydraulic system apply the pressure previously determined. Maintain the applied pressure until the pipe begins to melt and a uniform bead of 2-3mm is formed on each end
- After the initial bead up, the pressure in the hydraulic system shall be released so that the pressure gauge registers between zero and the drag pressure so as to control the bead growth during the heat soak time
- Check that the pipe does not slip in the clamps. The pipe ends must maintain contact with the heater plates
- When the heat soak time is completed, open the clamps and remove the heater plate ensuring that the plate does not touch the melted surfaces. Immediately close the clamps (within 8 to 10 seconds of removing the plate) and bring the melted surfaces together at the previously determined pressure. Maintain the required pressure for the minimum cooling time. After this time the assembly can be removed from the machine but should not be handled for a further period equal to the cooling times. Examine the joint for cleanliness and uniformity and check that the bead width is within the specified limits

Rules for Butt-Fusion

Do Not:

- Attempt to weld together pipes of different SDR (wall thickness)
- Touch trimmed pipe ends
- Leave trimming swarf inside pipe or on welding machine
- Allow equipment to get wet or dusty
- Use non-approved machinery
- Remove a weld from the machine before cooling time has elapsed
- Allow untrained personnel to use welding equipment
- Cut corners in any part of the welding procedure
- Weld pipes of different material on site (In factory controlled conditions it may be possible to do this)
- Use a generator of inadequate capacity



Pre-Welding Checks

Before commencing a welding operation make sure that:

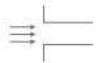

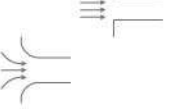


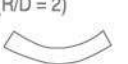





- There is sufficient fuel for the generator to complete the joint and that it is functioning correctly before it is connected to the machine
- The trimming tool and hydraulic pump are in working order
- The heater plate is clean and residues from previous welds have been removed
- A tent is available to provide shelter during welding
- The machine is complete and undamaged
- You know the correct welding parameters for the machine and pipe being welded
- The heater plate is at the correct temperature. (Connect the heater plate to the power supply and retain for at least 20 minutes inside the thermally insulated guard). To remove dirt deposits the heater plate may be washed, when cold, with copious quantities of clean water at the start of the jointing session. Only clean, lint free materials must be used to clean the plate. To remove grease and oily films the plate may be wiped with lint free material dampened by a suitable solvent, eg. Isopropanol
- Check that the pipes and / or fittings to be jointed are of the same size, SDR and material

Dummy Welds

Even though washing may remove large deposits of dirt, very fine particles of dust may still remain on the heater plate. To remove such dust it is necessary to make a dummy joint at the start of each jointing session, whenever the plate has been allowed to cool below 180°C, or at a change of pipe size. Two dummy joints will be made if the pipe size is greater than 180mm. A dummy joint can be made using pipe off cuts of the same size, SDR and material as the pipe being installed, It is not necessary to actually make a joint. The procedure can be discontinued after the full heat cycle.





Fitting Type		K
Pipe Entry Losses		
Square Inlet		0.50
Re-entrant Inlet		0.80
Slightly Rounded Inlet		0.25
		0.05
Pipe Intermediate Losses		
Elbows R/D < 0.6	 45°	0.35
	 90°	1.10
Long Radius Bends (R/D = 2)	 11 1/4°	0.05
	 22 1/2°	0.10
	 45°	0.20
	 90°	0.50
Tees		
(a) Flow in line		0.35
(b) Line to branch flow		1.00
Sudden Enlargements		
Ratio	d/D	
	0.9	0.04
	0.8	0.13
	0.7	0.23
	0.6	0.41
	0.5	0.56
	0.4	0.71
	0.3	0.83
	0.2	0.92
	<0.2	1.00
Sudden Contractions		
Ratio	d/D	
	0.9	0.10
	0.8	0.18
	0.7	0.26
	0.6	0.32
	0.5	0.38
	0.4	0.42
	0.3	0.46
	0.2	0.48
	<0.2	0.50

Fitting Type		K
Gradual Enlargements		
Ratio d/D	q = 10° typical	
	0.9	0.02
	0.7	0.13
	0.5	0.29
	0.3	0.42
Gradual Contractions		
Ratio d/D	q = 10° typical	
	0.9	
	0.7	
	0.5	
	0.3	
Pipe Exit Losses		
Square Outlet		1.00
Rounded Outlet		1.00
Valves		
Gate Valve (fully open)		0.20
Reflux Valve		2.50
Globe Valve		10.00
Butterfly Valve (fully open)		0.20
Angle Valve		5.00
Foot Valve with strainer		15.00
Air Valves		zero
Ball Valve		0.10

Butt Welding Principles

Butt-fusion jointing is a thermofusion process which involves the simultaneous heating of the ends of two components which are to be joined until a melt state is attained on each contact surface. The two surfaces are then brought together under controlled pressure for a specific cooling time and homogeneous fusion is formed upon cooling. The resultant joint is resistant to end thrust and has comparable performance under pressure to the pipe. This method of jointing requires an electrically heated plate to raise the temperature of the pipe ends to the required fusion temperature and is used for pipe of size 32mm and above of the same Standard Dimension Ratio (SDR). When joining pipes using buttfusion techniques, the heater plate recommended temperatures are 195°C to 200°C.



Chemical Resistance Chart

This information, based on experience to date, is believed to be reliable. It is intended as a guide for use at your own discretion and risk. All indications refer to room temperature

Resistance

E = Excellent G = Good F = Fair N = Not Recommended

CHEMICAL	HDPE	CHEMICAL	HDPE	CHEMICAL	HDPE
Acetaldehyde	G	Calcium Hypochlorite	E	Ethyl Benzoate	F
Acetamide	E	Carbazole	E	Ethyl Butyrate	G
Acetic Acid, 5%	E	Carbon Disulfide	N	Ethyl Chloride, Liquid	F
Acetic Acid, 50%	E	Carbon Tetrachloride	F	Ethyl Cyanoacetate	E
Acetone	E	Chlorine	G	Ethyl Lactate	E
Aluminum Hydroxide	E	Chloroacetic Acid	E	Ethylene Chloride	G
Ammonia	E	Chloroform	F	Ethylene Glycol	E
Ammonium Hydroxide	E	Chromic Acid	E	Ethylene Oxide	F
Ammonium Oxalate	E	Citric Acid	E	Fluorine	F
n-Amyl Acetate	G	Cresol	N	Formic Acid, 50%	E
Amyl Chloride	N	Cyclohexane	G	Formic Acid, 90-100%	E
Aniline	E	Decalin	G	Fuel Oil	F
Benzaldehyde	E	o-Dichlorobenzene	F	Gasoline	F
Benzene	F	p-Dichlorobenzene	F	Glycerine	E
Benzoic Acid, Sat.	E	Diethyl Benzene	N	n-Heptane	F
Benzyl Acetate	E	Diethyl Ether	N	Hexane	N
Boric Acid	E	Diethyl Ketone	G	Hydrochloric Acid, 1-5%	E
Bromine	N	Diethyl Malonate	E	Hydrochloric Acid, 35%	E
Bromobenzene	N	Dimethyl Formamide	E	Hydrofluoric Acid, 4%	E
n-Butyl Acetate	G	Ether	N	Hydrofluoric Acid, 48%	E
sec-Butyl Alcohol	E	Ethyl Acetate	E	Hydrogen	E
Butyric Acid	N	Ethyl Benzene	F	Hydrogen Peroxide	E

CHEMICAL	HDPE	CHEMICAL	HDPE
Isopropyl Acetate	G	Propane Gas	N
Isopropyl Benzene	F	Propylene Glycol	E
Kerosene	F	Propylene Oxide	E
Lactic Acid, 3%	E	Resorcinol	E
Lactic Acid, 85%	E	Salicylaldehyde	E
Magnesium Salts	E	Sulfuric Acid, 1-6%	E
MethoxyethylOleate	E	Sulfuric Acid, 20%	E
Methyl Ethyl Ketone	E	Sulfuric Acid, 60%	E
Methyl Isobutyl Ketone	G	Sulfuric Acid, 98%	E
Methyl Propyl Ketone	G	Sulfur Dioxide, Liq.	N
Methylene Chloride	F	Sulfur Salts	F
Nitric Acid, 50%	E	Tartaric Acid	E
Nitric Acid, 70%	E	Tetrahydrofuran	F
Nitrobenzene	F	Thionyl Chloride	N
n-Octane	E	Toluene	F
Orange Oil	F	Trichloroethane	N
Perchloric Acid	G	Trichloroethylene	N
Perchloroethylene	N	Turpentine	F
Phenol, Crystals	G	Vinylidene Chloride	N
Phosphoric Acid, 1-5%	E	Xylene	G
Phosphoric Acid, 85%	E	Zinc Salts / Stearate	E
Potassium Hydroxide	E		

Comparison with Other Plastic Materials

Property	HDPE	PP	PVC	PVC-C*	PB*
Surface feel	Waxy	Waxy	Smooth	Smooth	Waxy
Appearance (water pipes)	Black	Pale grey-beige	Blue	Grey-beige	Black
Sound produced when dropped	Medium clatter	High clatter	High clatter	High clatter	Dull thud
Combustibility and appearance of name	Bright name: Drops continue to burn after falling	Bright name: Drops continue to burn after falling	Carbonises in name Extinguishes away for name	Carbonises in name Extinguishes away for name	Bright name: Drops continue to burn after falling
Odour of smoke	Like candles	Like resin	Pungent like hydrochloric acid	Pungent like hydrochloric acid	Like candles but more acrid than HDPE
Nail test (impression made by fingernail)	Impression possible	Very light Impression possible	Impression not possible	Impression not possible	Impression easily produced
Floats in water	Yes	Yes	No	No	Yes
Notch sensitivity	No	Slight	Yes	Yes	Yes
Weather resistance	Stabilised, good	Stabilised, good	Stabilised, good	Stabilised, good	Stabilised, good
Method of permanent joining	Fusion	Fusion	Solvent cement	Solvent cement	Fusion
Suitable for mechanical jointing	Yes	Yes	Yes	Yes	Yes
Stress crack sensitivity with regard to jointing with safe media, e.g water	Some	Slight	None	None	None
Thermal conductivity kcal/mh°C	0.4	0.19	0.14	0.14	0.2
Specific heat kcal/mh°C	0.42	0.4	0.23	0.23	0.47
Specific weight g/cm ³ C	0.955	0.905	1.42	1.5	0.97
Tensile strength at 20°C kp/cm ²	240	320	550	550	200
Modulus of elasticity at 20°C kp/cm ²	8000	15000	30000	30000	5000

Testimonials



Mr. Imran Akram
In-charge International Business
International Industries Limited
Chitroy House, 6-Bank Square
The Mall, Lahore

We have proudly been IIL's channel partner in KPK since 2015 and our experience has been more than excellent. The great quality and value of the HDPE pipes plus the excellent and fast service response has made IIL a highly relevant player in the KPK market in a short period of time supplying a wide range of HDPE pipes from 200mm dia to 1600mm dia in different pressure ratings. Their customer service is excellent, the material is always delivered on time and most important their pricing is competitive. IIL's faculty based human core can't be equaled, providing the best customer relations and business support you can get. We love the product, we love the services and we love the people.

Waseem Rehman
(Waseem Rehman)
Managing Director
Sales & Projects
May 13, 2016

Muzed Shah Market, Opposite KDA Gate # 3, Kohat, Phone: +92-822-819744, 8345-891944, 0344-8290344 0311-3977281
Email: rahman.business@gmail.com



Ref No: CA/IL/2015-LOG

Dated: May 13, 2016

To:

Mr. Imran Akram,
Deputy Managing Director,
International Business,
International Industries Ltd.,
Peshawar.

Dear Sir,

I would like to offer my thanks for all the efforts and support IIL has made in the successful testing and commissioning of different PULU projects in KPK. I have found IIL very professional, competent and extremely supportive and responsive to the project needs. We have received excellent technical support and service from IIL. They have never let us down under any circumstances. With great practical results and past experiences with IIL in using HDPE pipes, we would not hesitate to recommend IIL to any of our customers in the whole region.

Regards,

Saad Salim

Saad Salim
Project Director,
The Ingenium Pvt. Ltd.,
Peshawar
0333-8651387

FF-1, Abbas Computer Market, University Road, Peshawar
Ph: +92 (0)91 571 1667 www.theingenium.com.pk



21/ May, 2016

TO WHOM IT MAY CONCERN

We feel great pleasure in doing business with IIL (International Industries Limited). We have purchased different products (hot-dip galvanized iron pipe, scaffolding pipe & HDPE-100 water pipes) from IIL for different projects of high importance nationwide and have found the products fully complying with the quality requirements as received.

Moreover, we appreciate IIL's understanding & complete attention of our demand & application along with responsiveness, enabling us to meet our strict deadlines in executing our projects. It further enhances our trust & satisfaction.

We look forward to continue doing business with IIL for years to come.

Warm Regards,

Saleem Jaff
Saleem Jaff
Deputy Managing Director
Paragon Constructors Pvt. Ltd.

Head Office: 100-101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Enlistments

- Military Engineering Services (MES)
- Cantonment Boards
- Defence Housing Authority (DHA)
- Bahria Town
- Public Health & Engineering (PHE)
- Water & Sewerage Authority (WASA)
- Karachi Water & Sewerage Board (KWSB)
- Water & Power Development Authority (WAPDA)
- Department of Irrigation & Power

- Sindh Special Initiative Program (SSID)
- Town Municipal Authorities (TMA's)

Tested By:

