

GAS PIPELINE MATERIAL

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PIPELINES

❖ TRANSMISSION PIPELINES

- YATANA GAS PIPE LINE
- ZAWTIKA
- SHWE
- YETAGUN(4.1 BILLION CUBIC METER NATURAL GAS/YR

❖ DISTRIBUTION PIPELINES

- MEDIUM TO LOW PRESSURE PIPELINES

❖ EXPORT PIPELINES

PIPELINES



CARBON STEEL PIPE



PIPES



ONSHORE PIPELINE



Pipeline used material

- LPG, CNG,LNG,H₂,BIOGAS

- PROPANE

- BUTANE

- METHANE

- PETROLEUM GAS

- Mixed hydrocarbon gas

- STEAM

- HOTWATER

- COLD/COOLING WATER

- COMPRESSED AIR

- NATURAL GAS

- OTHER GASES

- ACIDS ALKALIES

- FIRE PROTECTION WATER

- WASTE WATER DRAIN

SILVER-GREY

RED OR ORANGE

GREEN

LIGHT BLUE

YELLOW

YELLOW OXYGEN GREEN

VIOLET OR PURPLE

RED(BRIGHT)

BROWN OR GREY



1. **LPG (Liquefied Petroleum Gas)**

- Main components: Propane (C_3H_8) and butane (C_4H_{10})
- Storage: Stored as a liquid under moderate pressure
- Uses: Cooking, heating, automotive fuel
- Energy content: ~ 46 MJ/kg

2. **CNG (Compressed Natural Gas)**

- Main component: Methane (CH_4)
- Storage: Compressed to high pressure (~ 200 – 250 bar)
- Uses: Automotive fuel, industrial fuel
- Energy content: ~ 50 MJ/kg

3. **LNG (Liquefied Natural Gas)**

- Main component: Methane
- Storage: Cooled to $-162^\circ C$ to become a liquid







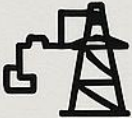





- Uses: Transport over long distances, power generation
- Energy content: ~ 55 MJ/kg

4. **Hydrogen (H_2)**

- Storage: High-pressure gas or cryogenic liquid
- Uses: Fuel cells, combustion engines, industrial processes
- Energy content: ~ 120 MJ/kg (very high by mass)

5. **Biogas**

- Main components: Methane (50–70%) and CO_2
- Source: Anaerobic digestion of organic matter
- Uses: Cooking, power generation, upgraded to biomethane for vehicles
- Energy content: ~ 20 – 25 MJ/m³

 LPG		 CNG	  HYDROGEN	 BIOGAS
MAIN COMPONENTS	Propane (C_3H_8)	Methane	Methane	Methane (50–70%) CO_2
STORAGE	Stored as a liquid under moderate pressure	Compressed to high pressure (200–250 bar)	Cooling to $-162^\circ C$ to become a liquid	Anaerobic digestion of organic matter
USES	Cooking heating automotive fuel	Automotive fuel industrial fuel	Transport over long distances Power generation	Cooking, power generation, upgrade to biomethane for vehicles
ENERGY CONTENT	at 46 MJ/kg	 	 	  

Pipeline Colors

- There are six categories of pipe content, *flammable, combustible, toxic/corrosive, fire quenching, other water, and compressed air*, that are assigned a specific color combination.
- For instance, a pipe carrying nitrogen would be marked with an orange label with black text while a pipe transporting propane gas would require a label with black text on a yellow background.
- Using these color combos will ensure people can identify the type of liquid or gas in the pipe, even when standing from a distance

COLOR CODE

Content Type	Description	Required Colors	Example
FLAMMABLE	Fluids that are a vapor or produce vapors that can ignite and continue to burn in air.	Black on Yellow	
COMBUSTIBLE	Fluids that may burn but are not flammable.	White on Brown	
TOXIC/CORROSIVE	Fluids that are corrosive or toxic or will produce corrosive or toxic substances.	Black on Orange	
FIRE QUENCHING	Water and other substances used in sprinkler fire-fighting piping systems.	White on Red	
OTHER WATER	Any other water except for water used in sprinkler & fire-fighting piping systems.	White on Green	
COMPRESSED AIR	Any vapor or gas under pressure that does not fit a category above.	White on Blue	
OTHER	Definable by user.	White on Purple	
OTHER	Definable by user.	White on Black	
OTHER	Definable by user.	Black on White	
OTHER	Definable by user.	White on Gray	

PIPE MATERIAL

❖ CARBON STEEL (API 5L standard, grade X65/X70)

- Prefer strength for high pressure , HIGH TENSILE STRENGTH, TOUGHNESS AND DUCTILITY
- CORROSION RESISTANCE
- Cost effective
- Proven safety record
- Easily available and weldable

❖ CORROSION RESISTANT ALLOY (CLAD PIPE)

- Carbon Steel Base + internal Layer of Stainless Steel Or Nickel Alloy

❖ STAINLESS STEEL 316, 304 high corrosion environment , offshore parts

❖ HDPE

- Light weight, corrosion proof, flexible, not suitable for high temperature, short distance

❖ DUCTILE IRON / GRP / COMPOSITE PIPES

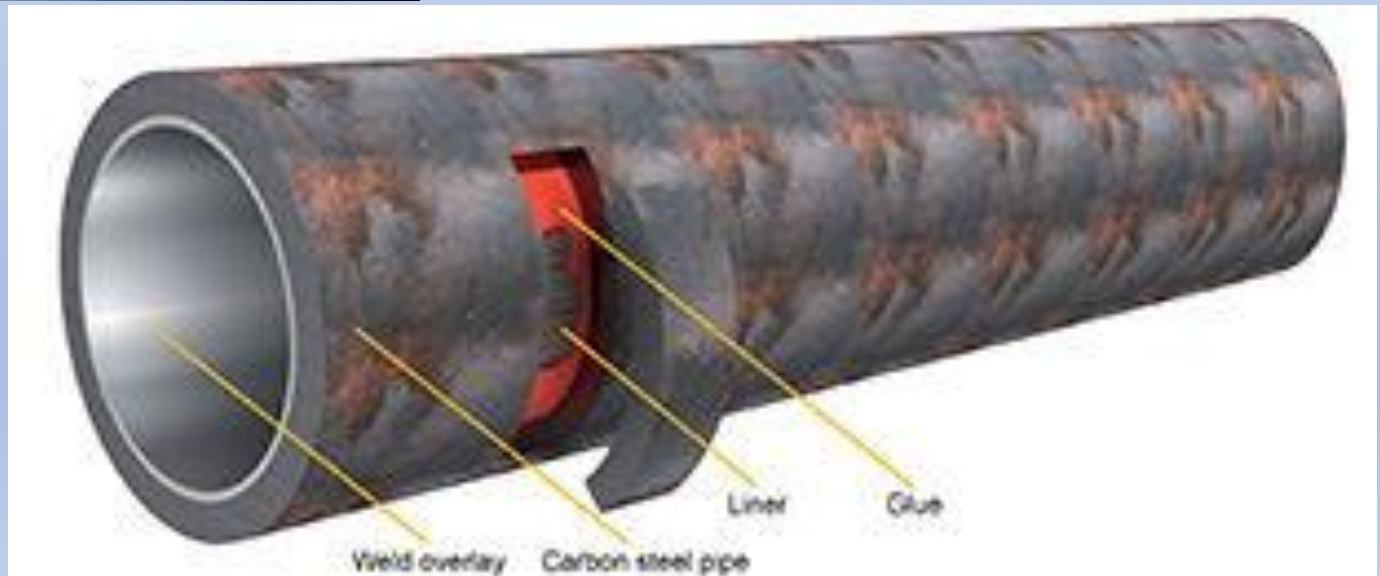
Choose Pipeline

- PRESSURE
- TEMPERATURE
- Fluid composition
- ENVIRONMENT
- CORROSION
- COST
- HIGH PRESSURE TRANSMISSION
- TERRAIN,ON SHORE
(JUNGLE,URBAN,RIVER CROSSING)
- CORROSION RISKS,HUMID
CLIMATE,POTENTIAL H₂S IN GAS
- REGULATORY STANDARDS
- MOGE GUIDELINE
- ASME
- HIGH PRESSURE
- EXTERNAL COATING
- SOUR GAS
- OFF SHORE
- ONSHORE
- CLAD PIPE
- LOW PRESSURE DISTRIBUTION
- WELDING AND JOINING METHODS

CLAD PIPE

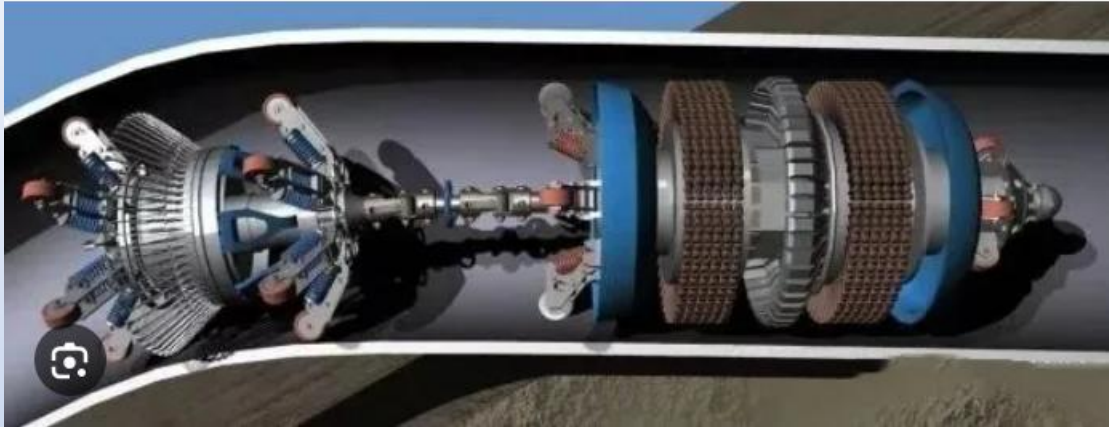
- Base-Carbon steel or low alloy steel
- Inner corrosion resistance alloy
- Layer stainless steel or titanium

CLAD PIPE



PIGGING TOOLS

- For pipeline maintenance
- Clean, inspect, separate, increase flow efficient
- Cleaning pigs (scrapers, brush)
- Inspection pigs—sensors,
- intelligence pigs
- Sealing pigs



Inside Cleaning Pig

Pipeline Pigging System



EARTHQUAKES ARE MAJOR CONCERN FOR LONG DISTANCE PIPELINES

- BEND,TWIST,OR CRACK THE PIPE
- JOINT FAILURE OR WELD RUPTURE
- DISRUPT BURIED SECTIONS
- YETAGUN
- HIGH DUCTILITY STEEL(API X 65)
- SCADA SYSTEMS(PRESSURE,FLOW TEMP.,VALVE
- AUTOMATIC SHUTOFF VALVES
- PIGGING TOOLS AND STRAIN GAUGES



Thank You Very Much