

Hot Tapping on GRP/FRP Piping System.

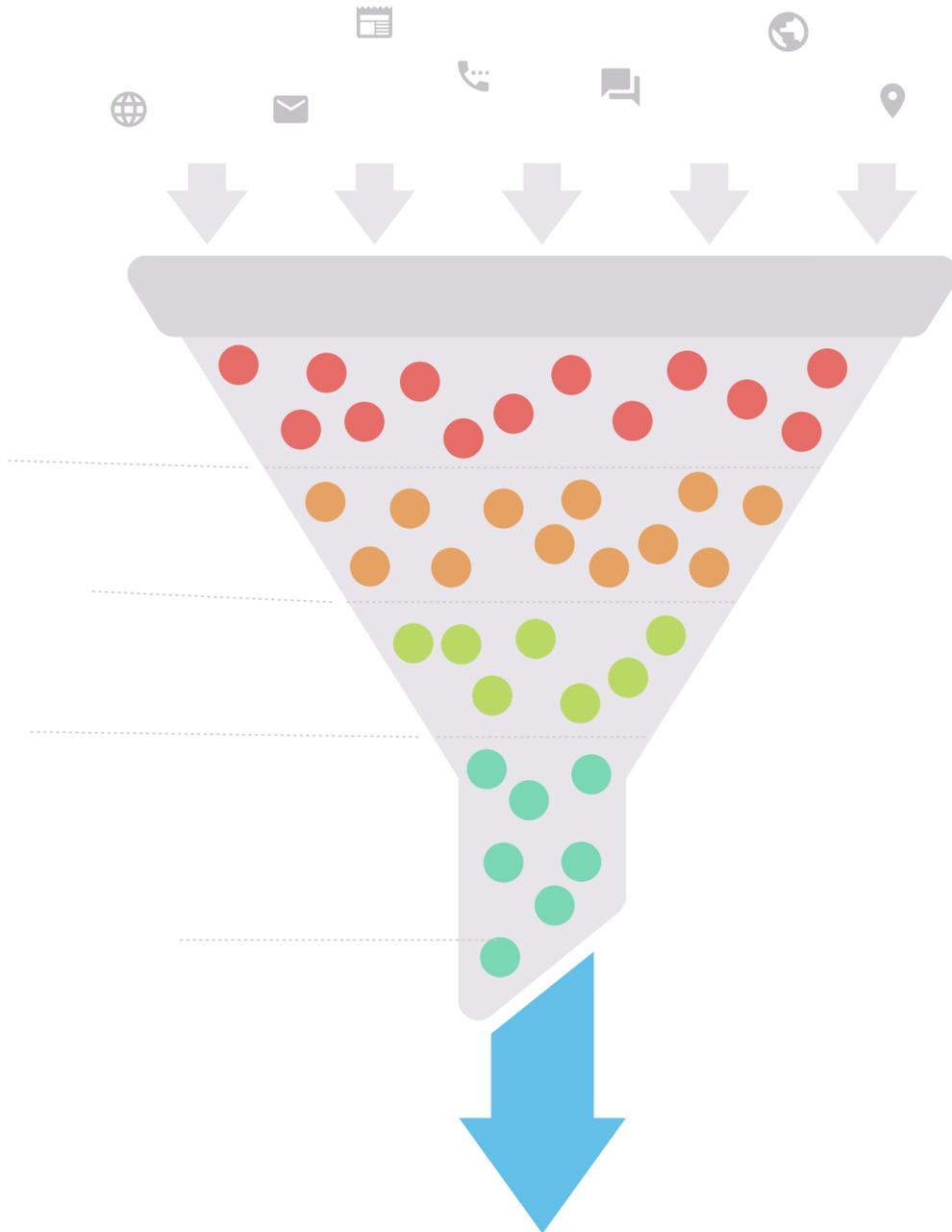


FIBER REINFORCED PLASTIC
FORUM & EXPO

Nonmetallic Application Challenges and Solutions

AMPP CHAPTER, JUBAIL, KSA

Outline & Target



- 1 Introduction
- 2 General View of Fiberglass
- 3 Hot Tapping On Fiberglass piping system
- 4 Project history
- 5 Discussion

Amiantit Group

❖ Established in 1968. In Dammam , Saudi Arabia

❖ Public listed company. 2004 

❖ Presence in more than 12 countries

❖ Pioneer in water network technology.

❖ R&D center in KSA/Norway.



AMIANTIT H.Q. in Dammam, Saudi Arabia

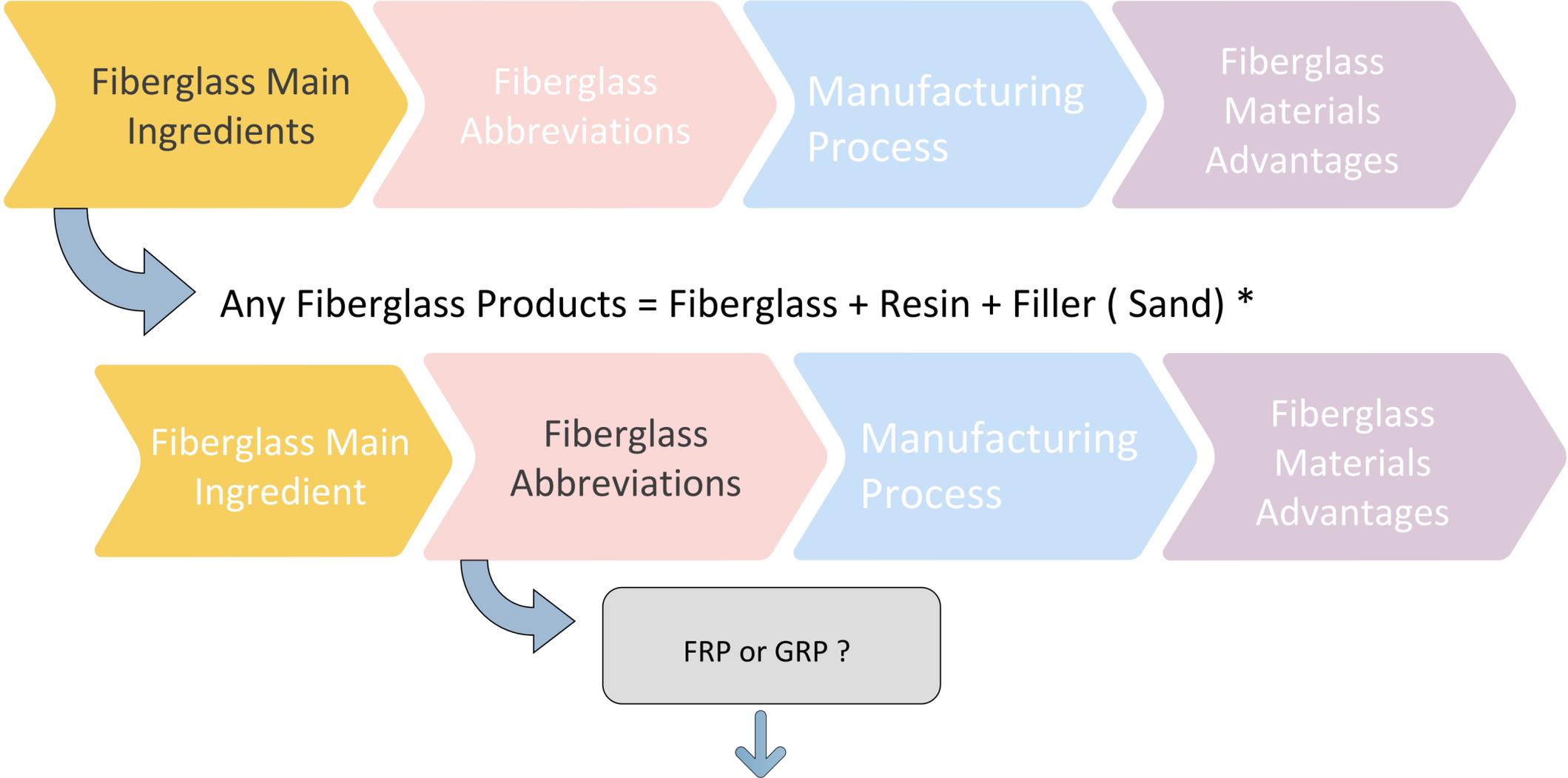


AMIANTIT R&D in Dharan, Saudi Arabia



General View of Fiberglass Pipe

From the Piping Perspective we will be focusing on



Any Fiberglass Products = Fiberglass + Resin + Filler (Sand) *

Both Are same, Where FRP is based on European Standard, and GRP is based on British Standard

GRP, GRV & GRE

→ Where the last letter Indicate the type Resin {
If Filler Is used called RPMP – Sand/Mortar Pipe
If Filler Is NOT used called RTRP - Full Glass Pipe

General View of Fiberglass Pipe

From the Piping Perspective we will be focusing on



Continues Filament Winding Process



Helical Winding Process



Material

- > WARS,NSF and FDA approved
- > Noncorrosive material
- > Thermoset product
- > Low thermal conductivities
- > Smooth inner Surface

Installation / On-Site

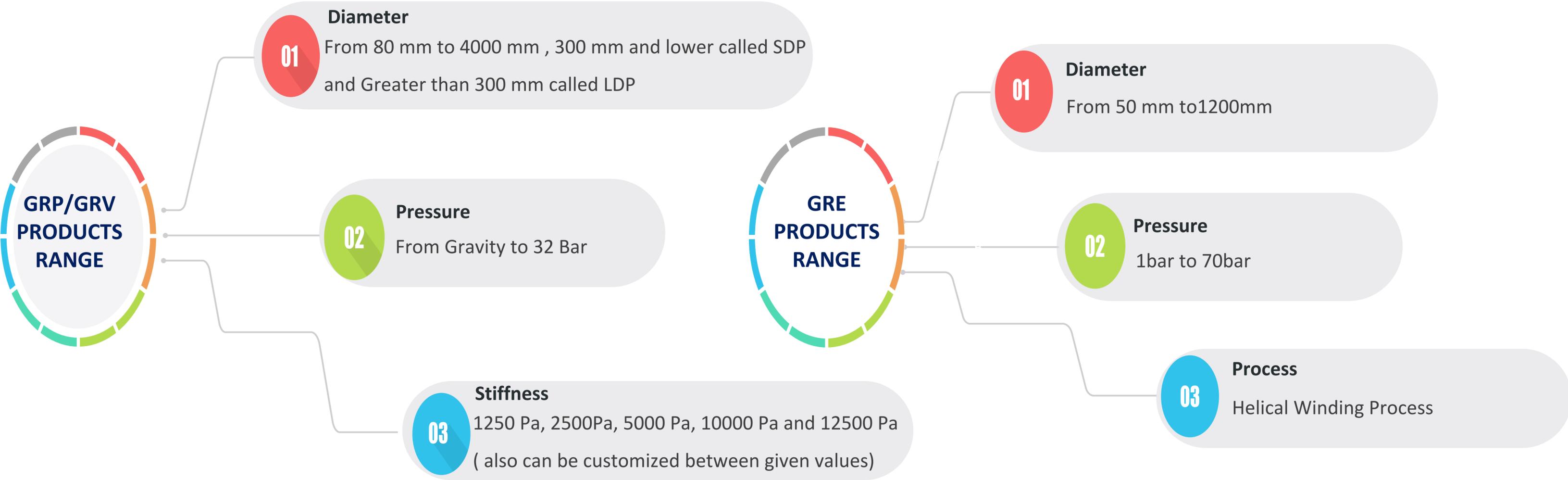
- > Light weight
- > Easy assembly
- > Lower risk potential

Under Operation

- > No need for lining or coating
- > Good electrical resistance
- > No corrosion
- > Minimum maintenance
- > Lower pressure loses

Amiantit Fiberglass Pipe Products

Amiantit is one of the largest Fiberglass pipes producer



Hot Tapping on Fiberglass Piping System



➤ Hot tapping is a method of making connection to existing piping without interrupting their operation or system at that location of pipe.

➤ Hot Tapping Classification

A. Hot Tapping W/o Isolation:

(A new instrument or inspection equipment)

B. Hot Tapping With Isolation (*in collaboration with STATS Group*):

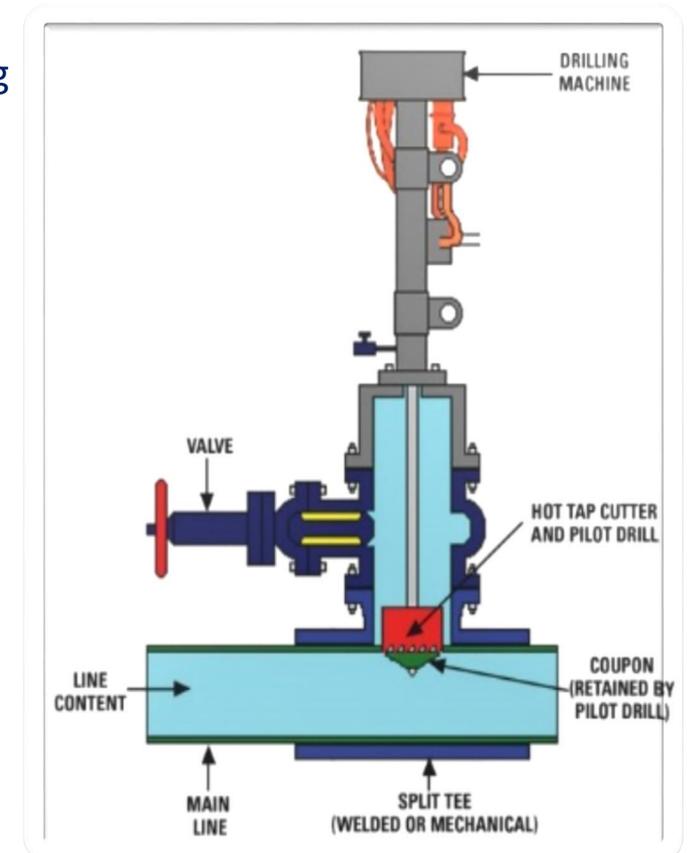
(Repair/replacement/maintenance or bypass on the existing damaged line)

➤ Max Allowable operating : 10 bars or 145 psi

➤ Velocity up to 4.5 m/s

ASSEMBLY CHART FOR TAPPING

	Min Size (inch)	Max Size (inch)
Main Line Pipe	4	40
Branch Line Pipe	1.5	40



Hot Tapping on Fiberglass Piping System

Hot Tapping Intro

Fiberglass Pipe Engineering for Hot Tapping

Isolation using Biceps

Procedure Overview & Equipment's

Sample Video

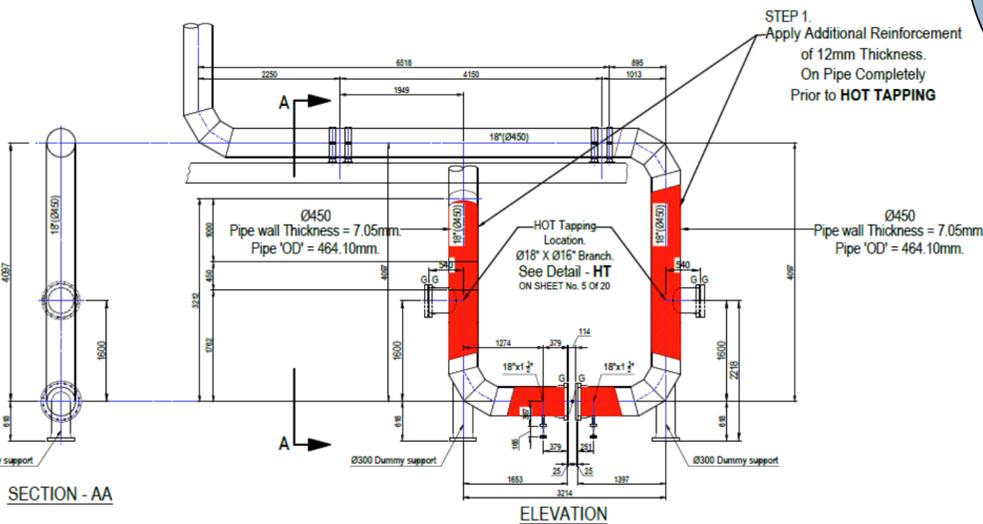
STEP 1:
Apply Additional Reinforcement
of 12mm Thickness
On Pipe Completely
Prior to HOT TAPPING

➤ Fiberglass Pipe Engineering Needed for Hot Tapping can be mainly divided as below.

A. Saddle Design

B. Stress Analysis

C. Support/Structure Design

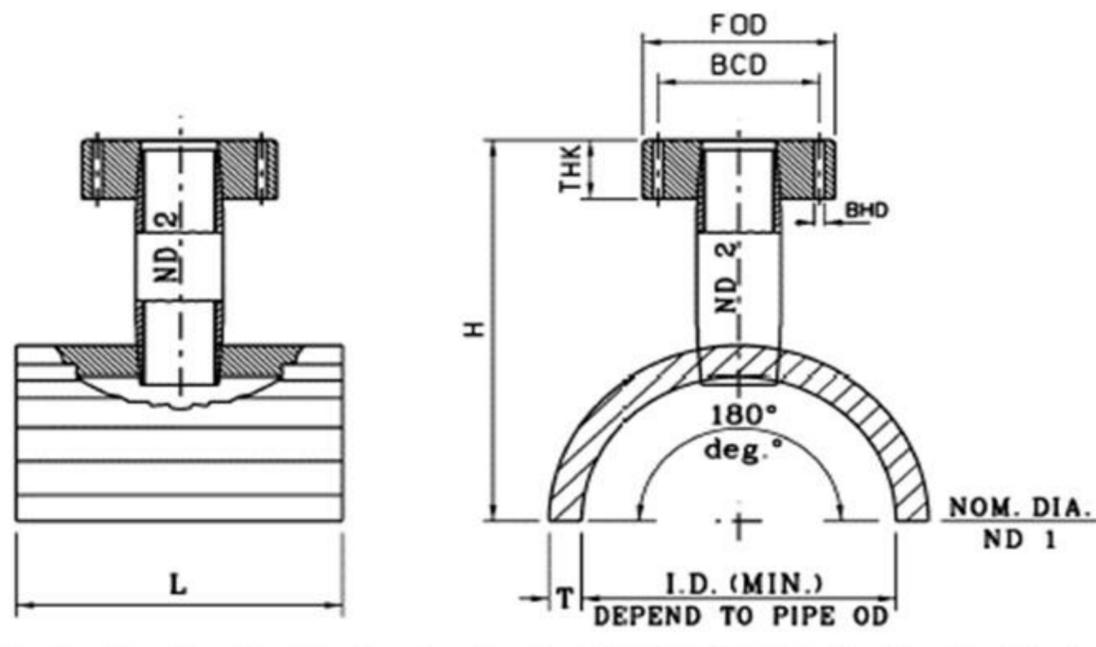


Hot Tapping on Fiberglass Piping System



➤ **SADDLE DESIGN:** The design for saddles will be done considering below parameters

- A. Pressure Ratings
- B. Flange Ratings
- C. Existing Pipe Dimension



FLANGE DESIGN CALCULATION for RESTRAINED JOINTS

Allowable stress = S = 34.5 Mpa ; Based on flexural strength of Hand Layup laminate i.e., 276 MPa (Refer attachment)

Dia	D Pr	Class	Rubber Gasket and Groove Details			Flange Drilling (As per Process)			Bolt Torque Calculations							Flange Thickness		Offered Flange thickness		
			"O" Dia	G Depth	G Width	GG Dia	No of BH	BHD	BCD	Cb	Fc	Min BT	(Fbt)1	(Fbt)2	(Fbt)	Fb	Effective		Total	
mm	Bars		mm	GD-mm	GW-mm	G- mm		mm	mm	in	lb/in	ft-lb	lb	lb	lb	N	tef- mm	TF- mm	Ft , mm	
DESIGN PRESSURE -10 Bars G																				
450	10	Cl.150	16.30	9.78	21.34	485.3	16	34.80	577.9	0.2972	306.7	25	18409	1346.099	18409	81883.23	43	53	60	

Hot Tapping on Fiberglass Piping System

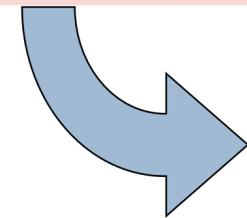
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Fiberglass Pipe Engineering for Hot Tapping

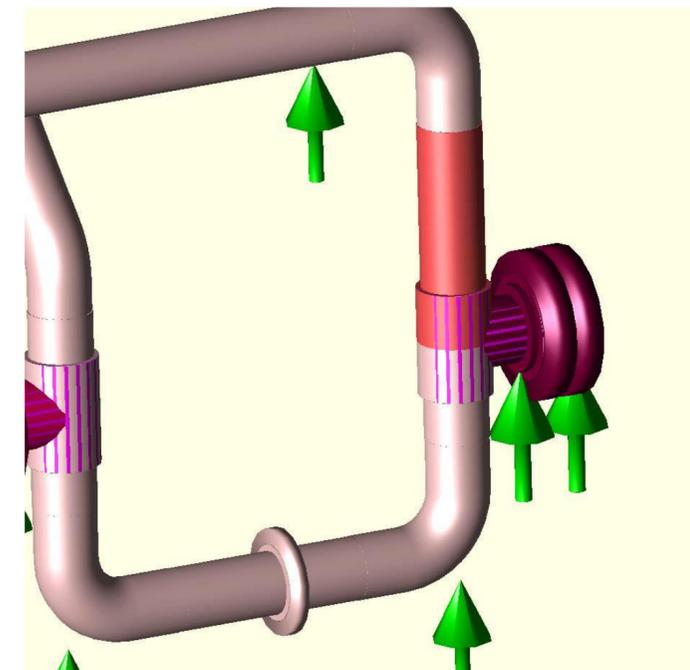
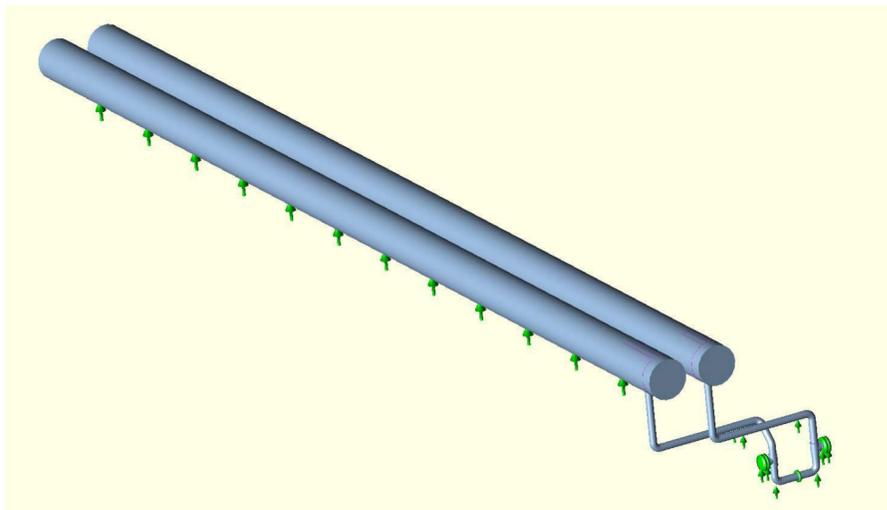
Isolation using Biceps

Procedure Overview & Equipment's

Sample Video



- **Stress Analysis** is done to simulate the actual scenarios of the Hot tapping/isolation job.
- Different scenarios are simulated in the CEASAR model for the existing arrangement, forces during the cutting, deployment of biceps and the impact on the existing pipe wall are studied and necessary recommendations are provided in the **STRESS REPORTS**.
- It also provides the necessary support arrangements required with the detailing of the loads at support for support/structure design accordingly.



Hot Tapping on Fiberglass Piping System

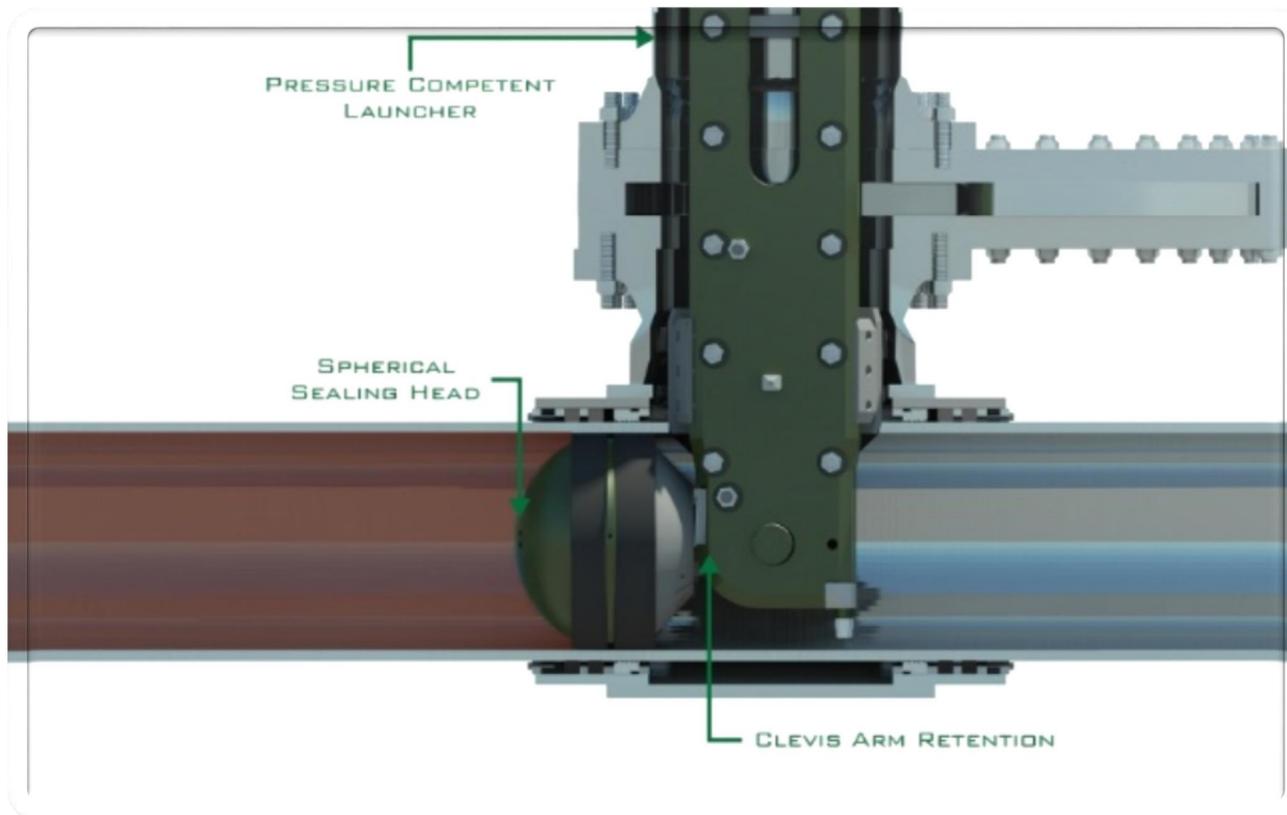
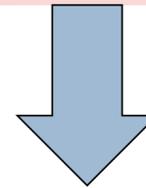
Hot Tapping Intro

Fiberglass Pipe Engineering for Hot Tapping

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- The high integrity isolation is provided by a double seal spherical rings which is hydraulically deployed on the pipeline. The seals are hydraulically compressed resulting in radial expansion against the RTR pipe ID. During isolation, each seal will act independently against the pipeline full pressure.

Hot Tapping on Fiberglass Piping System

Hot Tapping Intro

Fiberglass Pipe
Engineering for Hot
Tapping

Isolation using
Biceps

Procedure
Overview &
Equipment's

Sample Video



Procedure Overview

- › Tapping Point
- › Pipe Surface Preparation
- › Saddle Surface Preparation
- › Adhesive Preparation
- › Adhesive Application
- › Saddle Mounting
- › Curing
- › Hydrostatic test
- › Valve Installation
- › Hole Drilling

Hot Tapping on Fiberglass Piping System

Hot Tapping Intro

Fiberglass Pipe Engineering for Hot Tapping

Isolation using Biceps

Procedure Overview & Equipment's

Sample Video



Equipment's

- > White grease pencil
- > Level gauge
- > Duster Brush
- > Abrasive Disc Grinder
- > 60 grit Flapper Wheel sander
- > Heating Blankets (GRE piping)
- > Electric/pneumatic Drill driver (1700-2000 RPM)
- > Spanners
- > Special Tool Drilling set

Hot Tapping on Fiberglass Piping System

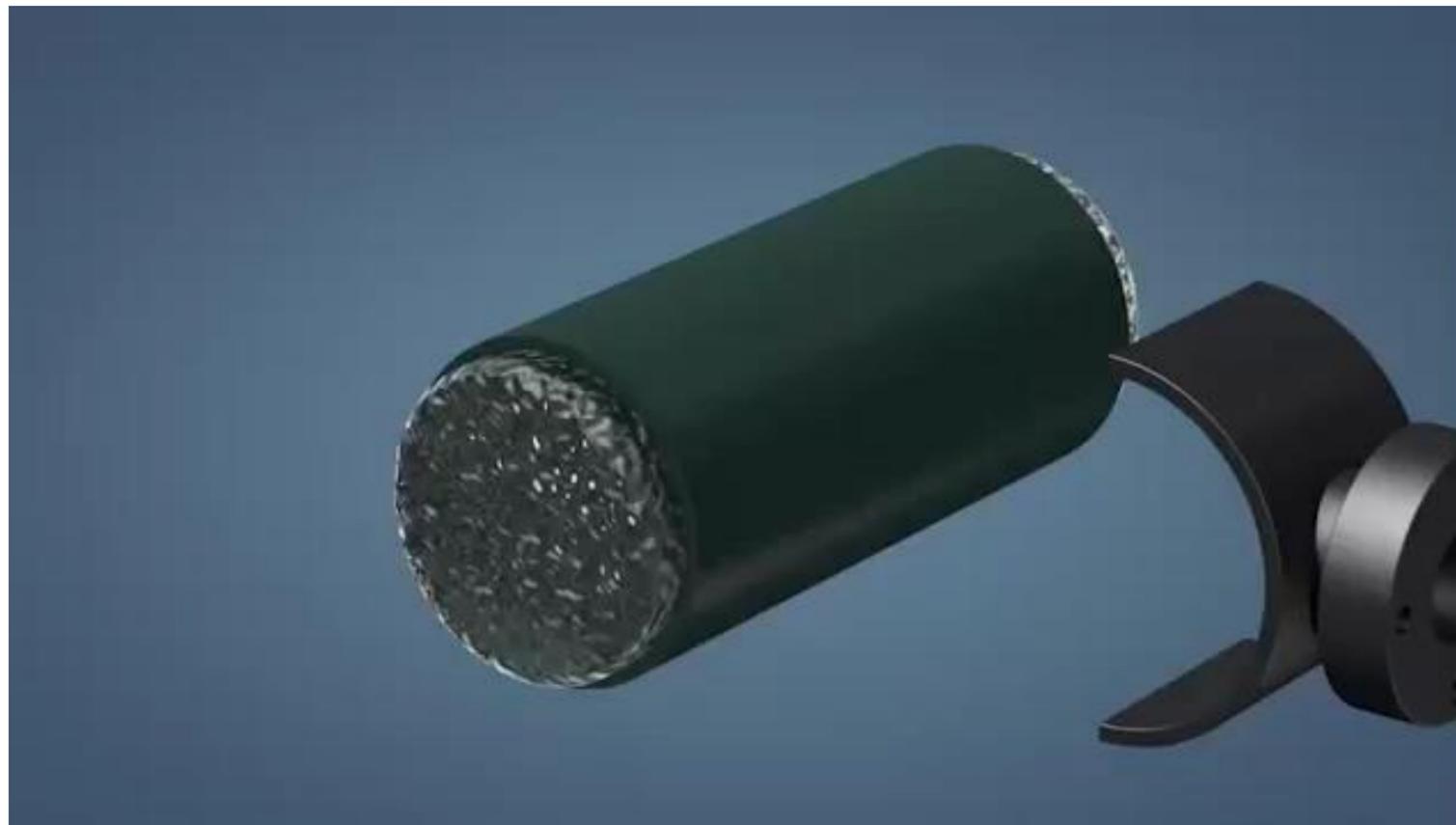
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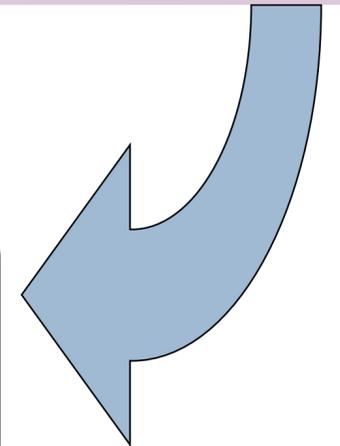


Hot Tapping using Reducing
saddle with Flange End

Hot Tapping on Fiberglass Piping System

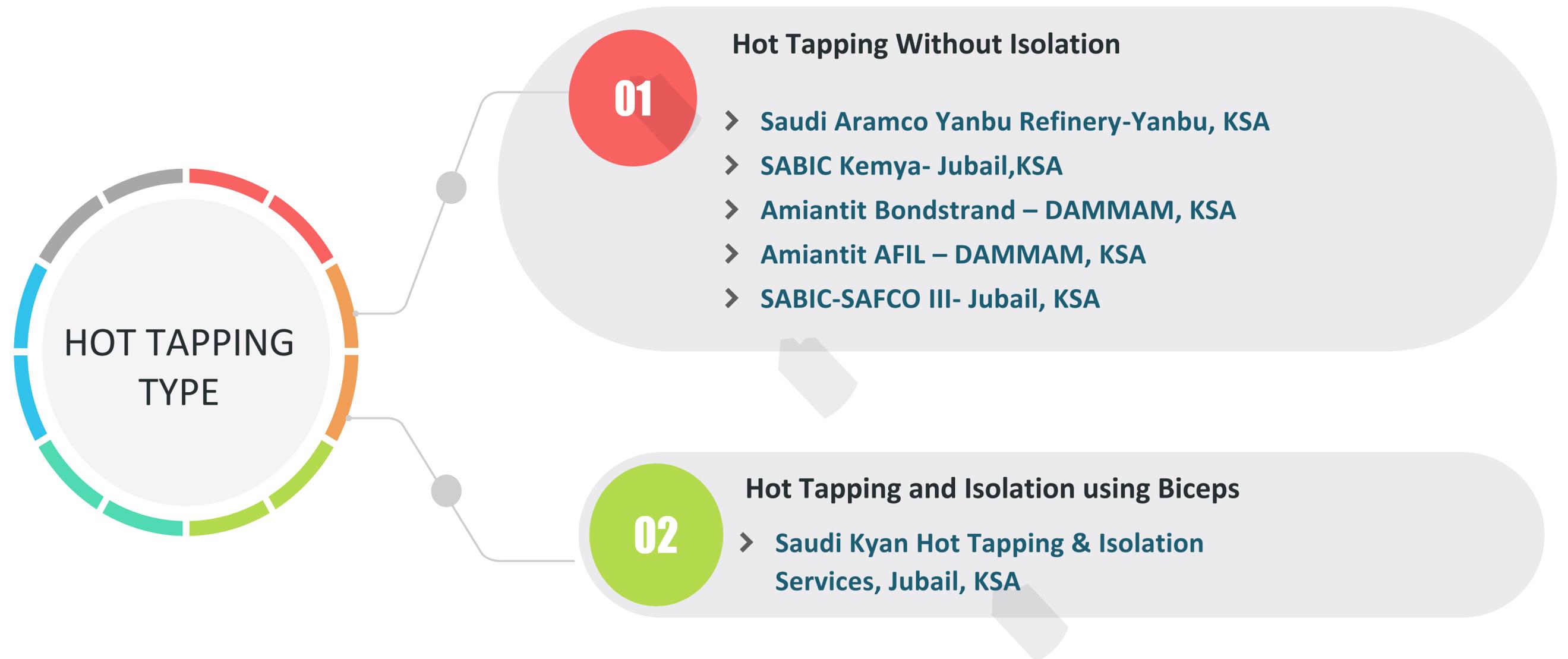


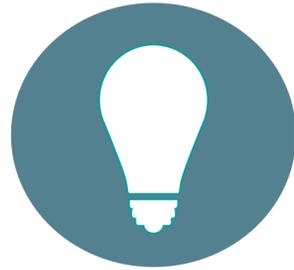
Hot Tapping and Isolation with our partner Stats Group.





Case History Hot Tapping & Isolation using Biceps Mechanism





Case History Hot Tapping & Isolation Saudi Kyan



Initial Setup of
Malfunctioning Butterfly
Valve.



Case History Hot Tapping & Isolation Saudi Kyan

Local Reinforcement and Support Erection for Gate Valve.





Case History Hot Tapping & Isolation Saudi Kyan



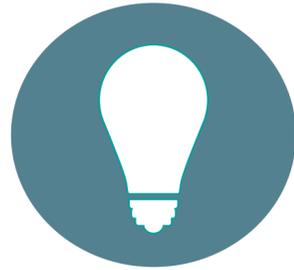
Sleeve Installation &
connection with Gate
valve/Hot tapping/Isolation
Machine setup



Case History Hot Tapping & Isolation Saudi Kyan



Successful Mockup test at Amaintit Facility Dammam prior to execution at Saudi Kyan



Case History Hot Tapping & Isolation Saudi Kyan



Coupon Cut piece after Hot tapping from the Parent Pipe.



AMPP CHAPTER, JUBAIL, KSA

Thank you

Open Discussion