Amiantit Qatar LLC

FiberTiex

SERVICES FOR NON METALIC PIPING

Piping Integrity cycle

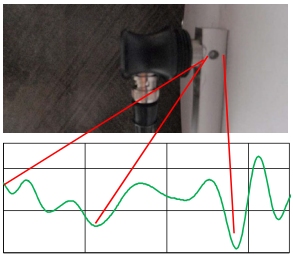
UltraAnalytix™

- Non-destructive, non-intrusive, ultrasonic method.
- Quantifies current condition of FRP.
- Repeatable, Reproducible
  - Validated by Swerea KIMAB, University of Alabama, York University – Toronto, Customers, and UTComp
- Used on New and In-Service Equipment
- No plant shut-down required
- Ongoing updating of Remaining Service Life and database
- Cost Effective
- Mobile
- Available since 2008

UT Comp
ENGINEERING – INSPECTION – CONFIDENCE

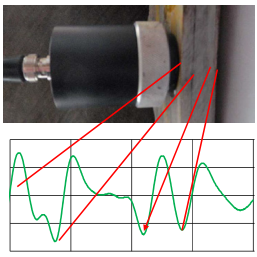
Very Basic Ultrasound

- Metal



Identifies defects.
Material properties are constant, therefore constant UT responses

- FRP



Many features are not defects.
Material properties affect UT responses. Changes in material properties determined from UT.

The complexity of FRP (e.g. glass, matrix, etc.) does not allow for recommendations to be given from the information on the screen.

UltraAnalytix Post-Processing of the *raw* data reveals valuable information about

- Remaining Service Life
- Corrosion Barrier
- Strength
- Thickness

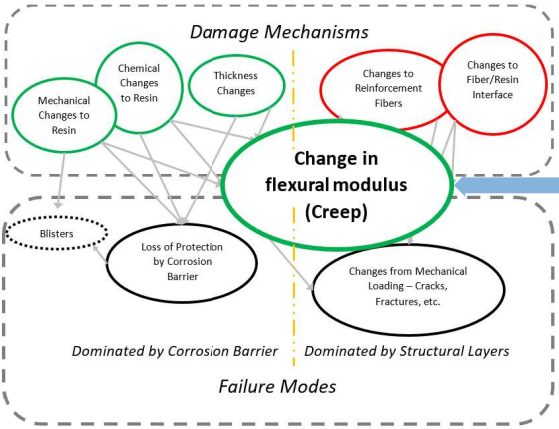
UT Comp
ENGINEERING – INSPECTION – CONFIDENCE

Calibration

Conventional	UltraAnalytix™
▸ Constant sonic velocity ▸ Focussed on flaw and discontinuity detection and classification ▸ Primary results determined from classifying flaws and defects.	▸ Sonic velocity not constant ◦ 15% variation can occur within inches ▸ Focussed on attenuation along signal path. ▸ Primary results are determined only from backwall reflection. ▸ Conventional calibration samples do not provide relevant data.

UT Comp ENGINEERING – INSPECTION – CONFIDENCE

FRP Damage & Failure



ULTRAAnalytix measures changes in laminate flexural modulus

UT Comp ENGINEERING – INSPECTION – CONFIDENCE

Root Cause Analysis

Using Fishbone Diagram

Materials

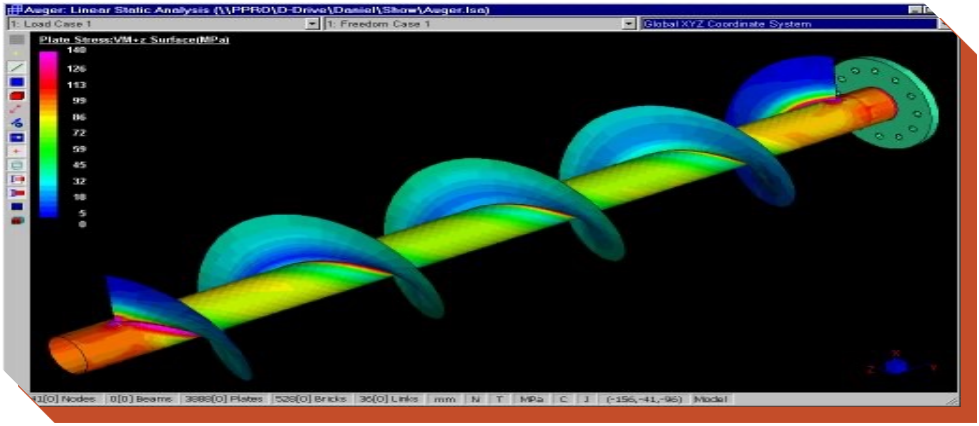
- Mechanical Test.
- Visual inspection.
- Dye Penetrant
- Ultrasound.
- Quality Documents.
- Raw Materials.

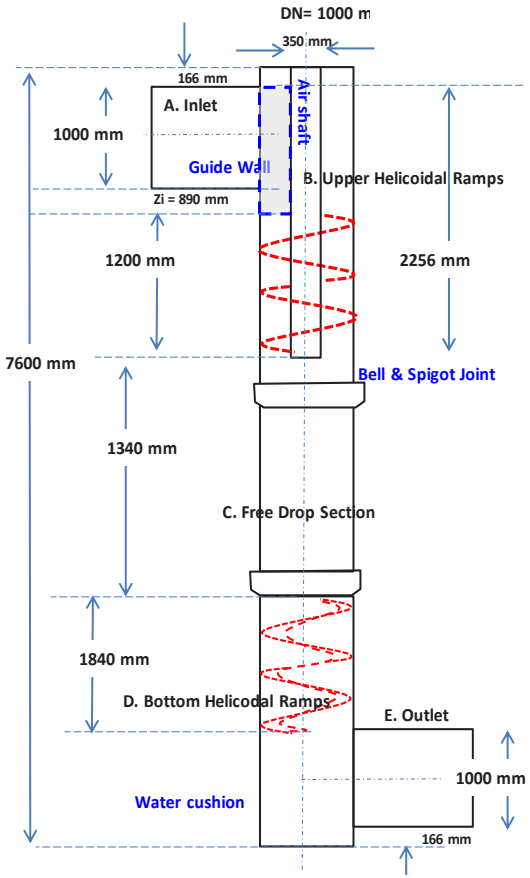
Engineering

- Thickness calculation.
- Derating .
- Stress Analysis.
- Surge Analysis.
- Buried Calculation.
- FEA if any.

- Site procedures
- Geotechnical data
- Site survey
- Chambers, rigid design
- Supports
- Tie ins.

- Pump data
- Failure modes
- Surge scenarios
- Valve operation
- Settlement handling
- Repair procedure


Auger: Linear Static Analysis (\\PPRO\D-Drive\Daniel\Show\Auger.fea)
1: Load Case 1
1: Freedom Case 1
Global XYZ Coordinate System
Plate Stress:VM+z Surface(MPa)
168
126
113
99
86
72
59
45
32
18
5
0


DN= 1000 m
350 mm
166 mm
A. Inlet
Air shaft
1000 mm
Guide Wall
B. Upper Helicoidal Ramps
Zi = 890 mm
1200 mm
2256 mm
7600 mm
Bell & Spigot Joint
1340 mm
C. Free Drop Section
1840 mm
D. Bottom Helicoidal Ramps
E. Outlet
1000 mm
Water cushion
166 mm

Engineering services

We specialize in delivering expert engineering solutions across the piping industry, tailored for both industrial and specialty applications:

- **Piping Isometric Drawings & 3D Modeling**
  Accurate and efficient layouts for fabrication and installation.

- **Stress Analysis (Caesar II)**
  Static and dynamic analysis, including vibration and surge loads for system integrity.

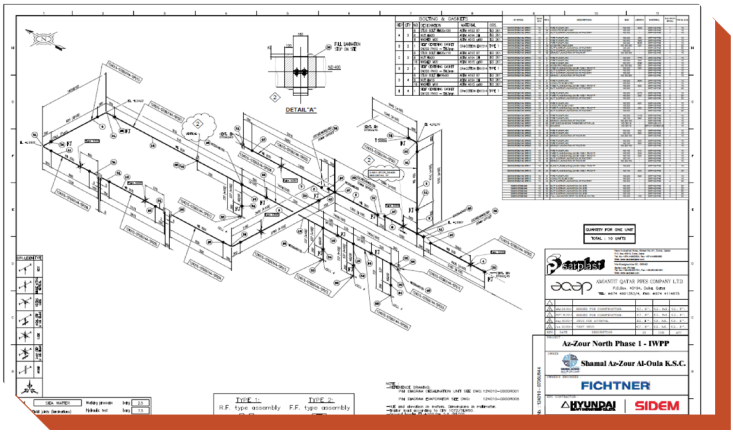
- **Surge Analysis**
  Advanced simulations using AFT Impulse and Pipenet to prevent hydraulic transients.

- **Finite Element Analysis (FEA)**
  Detailed assessments for pipe supports and custom FRP components to ensure safety and performance.

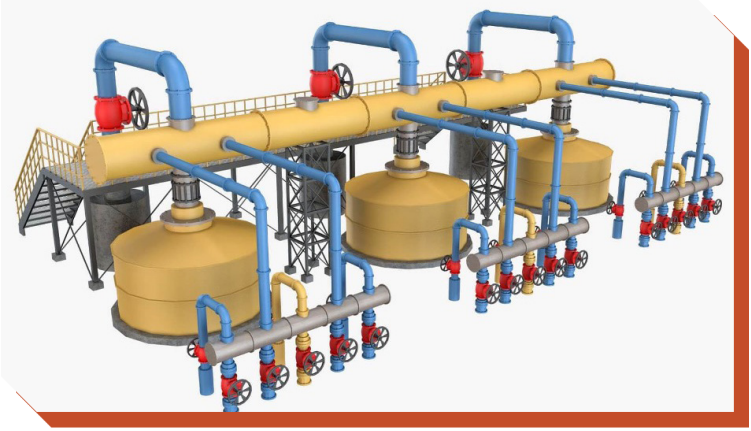
- **Pipe Support Design**
  Custom and standard support solutions optimized for structural and operational needs.

- **Site Failure Investigation & Consultation**
  Root cause analysis and expert advice to resolve operational challenges and prevent recurrence.

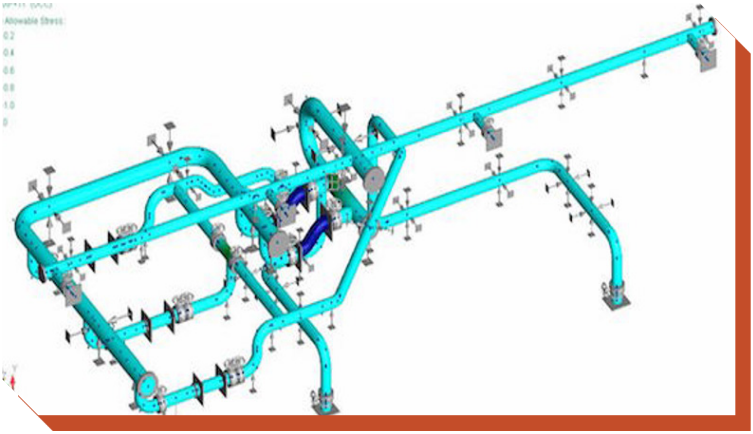
ISOmetrics drawings

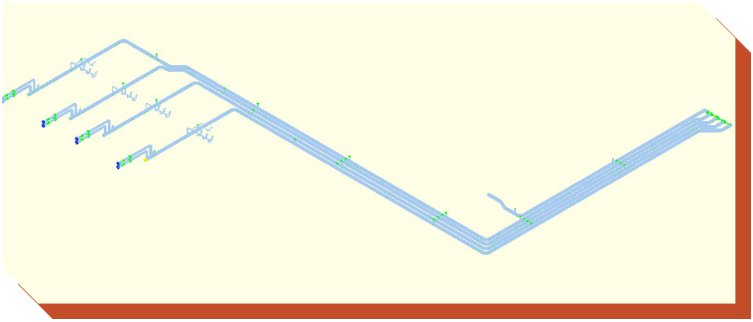


3D Modeling

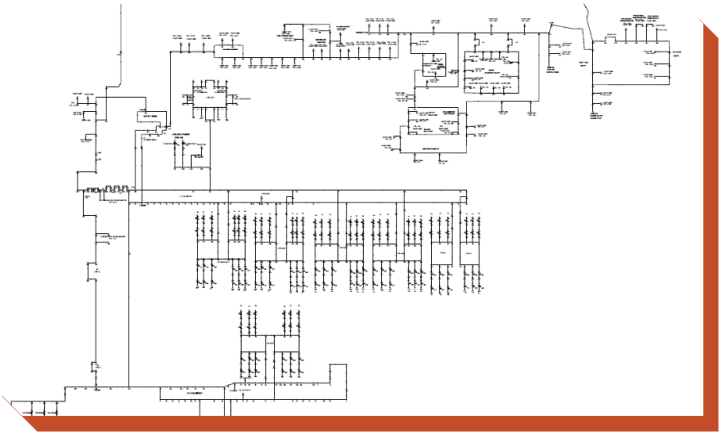


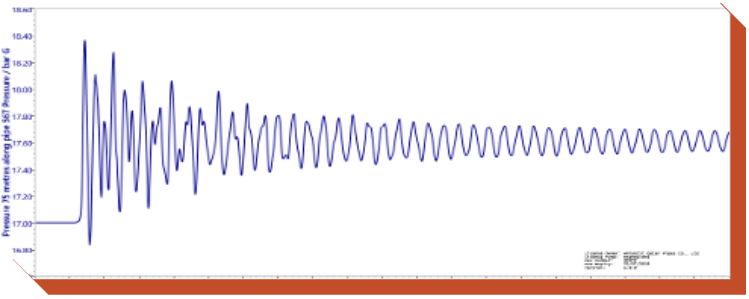
Stress Analysis



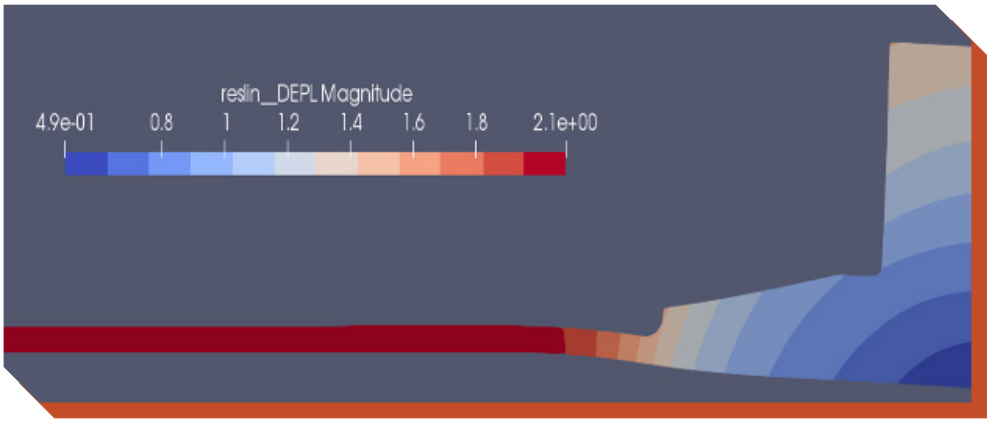


Surge Analysis

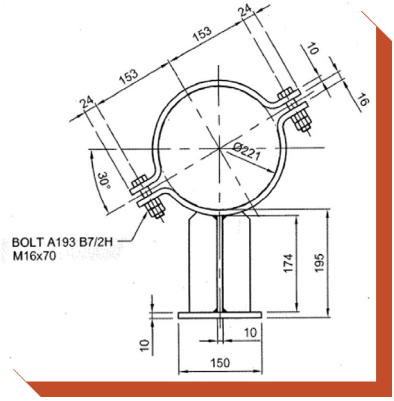


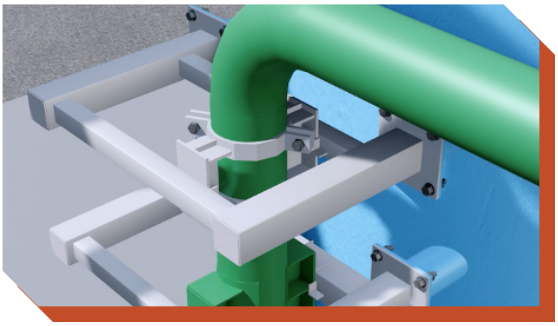


FEA



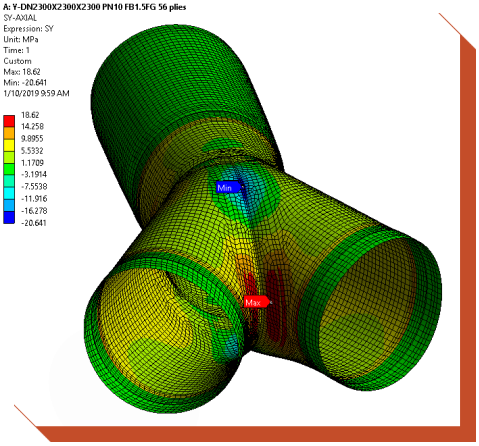
Pipe support design





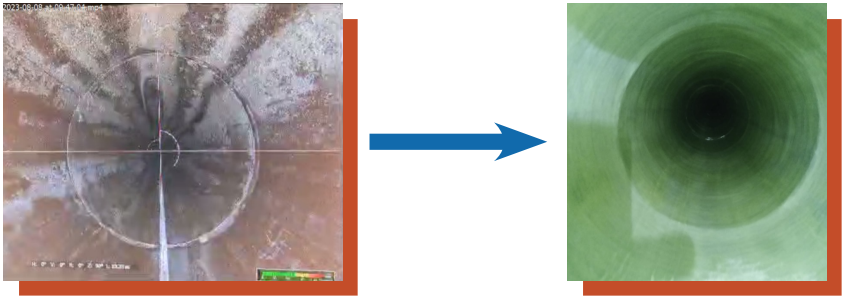
Installation, Commissioning,

Operation, Maintenance

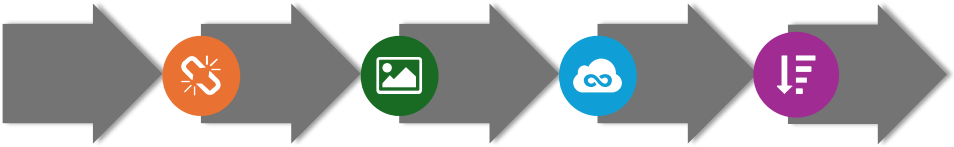


Pipe Rehabilitation with CIPP(Cured In Place Pipe)

is a trenchless technology used to rehabilitate and repair underground pipelines, on All Types of Pipes (Metallic, Non- metallic, Bonna, etc....)
Without any Traffic distribution and minimum Shutdown time
It can be used for Water and Oil applications and can withstand temperatures -4 to +95C and pressures up to 120bar



Process Flow

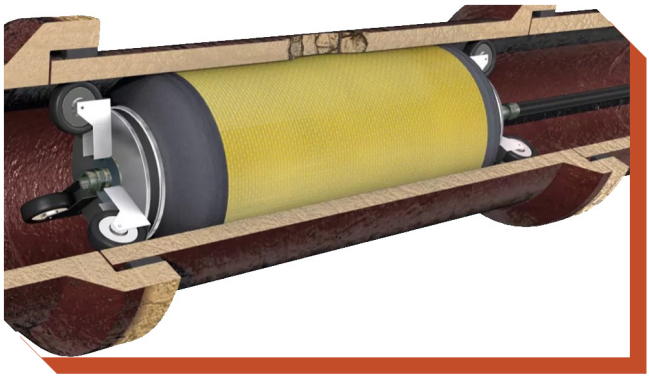


JET CLEANING | BLOCAKGE REMOVAL | CCTV | SHORT LINER REPAIRS | CIPP

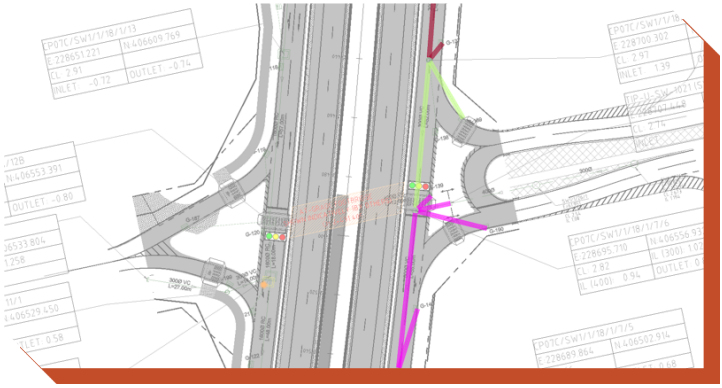
Advantages of CIPP

- Very Quick Process
- Less Excavation and Manpower
- Completely Trenchless and Cost-Effective Compared to Traditional Pipe Repaired
- Fix One Section At a Time
- Long Pipe Life (+50 years)
- Compatible With All Piping Materials And Shapes

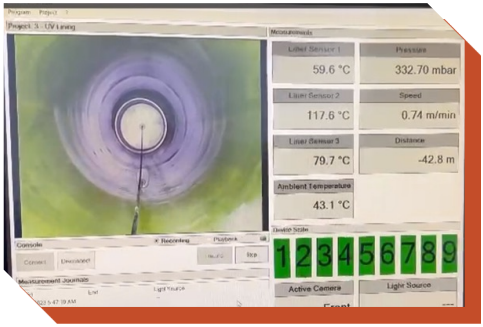
It can be used for Water and Oil applications and can withstand temperatures -4 to +95C and pressures up to 120bar



Short Liner Repair



CCTV 200-4000 mm 3D Panoramic



Fully Automated Lining

Pipe Wrapping

The Glass/Epoxy LT and HT repair systems are specifically designed for the repair of pipework. The repair systems are hand applied on-site, the composite repair being wrapped around and bonded to the pipework field application.
The constituents of the composite repair are an E-glass cloth constructed from a 0/+45/-45 directional fibrous reinforcement. The Epoxy matrix can be one of two types, either be a lower temperature (LT) or high temperature (HT) resin.
The reinforcement architecture of the fibres is designed to optimise the strength and stiffness of the repair for both through wall and non-through wall defects in pipework.
A primer, silane, is used to enhance the chemical bonding of the epoxy to the metallic pipe surface
The units used in the following are SI. The technical specification is based on the qualification requirements of ISO 248171 Without any Traffic distribution and minimum Shutdown time.

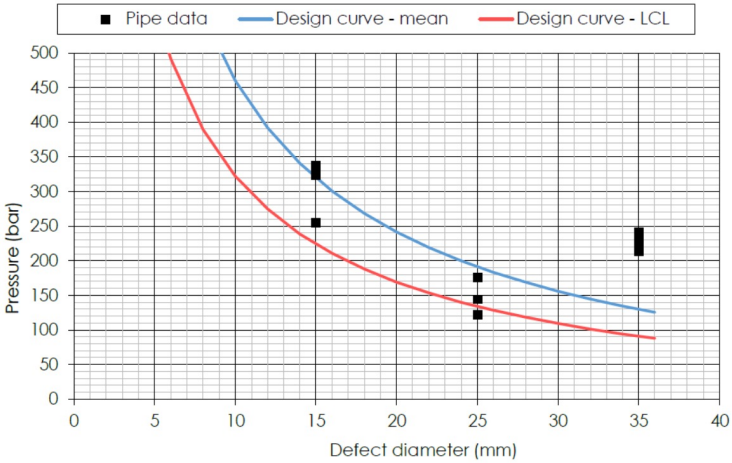


Figure 3: Curve fit to data for energy release rate

Pipework component - bend				
Data point	**Defect size (mm)**	**Repair thickness (mm)**	**Effective repair thickness (mm)**	**Failure pressure (bar)**
1	25	6.4	5.33	123.5
2	25	6.4	5.33	155.1
3	25	6.4	5.33	165.5
Mean energy release rate, γ_{mean} (J/m²)		1461		
LCL energy release rate, γ_{LCL} (J/m²)		717		
Is calculated energy release rate greater than energy release rate for straight pipe?		Yes		
Pipework component - tee				
Data point	**Defect size (mm)**	**Repair thickness (mm)**	**Effective repair thickness (mm)**	**Failure pressure (bar)**
1	25	6.4	3.2	78
2	25	6.4	3.2	131
3	25	6.4	3.2	144.8
Mean energy release rate, γ_{mean} (J/m²)		2137		
LCL energy release rate, γ_{LCL} (J/m²)		1049		
Is calculated energy release rate greater than energy release rate for straight pipe?		Yes		
Pipework component - flange				
Data point	**Defect size (mm)**	**Repair thickness (mm)**	**Effective repair thickness (mm)**	**Failure pressure (bar)**
1	25	6.4	5.82	120
2	25	6.4	5.82	103.1
Mean energy release rate, γ_{mean} (J/m²)		9132		
LCL energy release rate, γ_{LCL} (J/m²)		4483		
Is calculated energy release rate greater than energy release rate for straight pipe?		Yes		

Table 12: Experimental data points for pipework components, bend, tee and flange

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