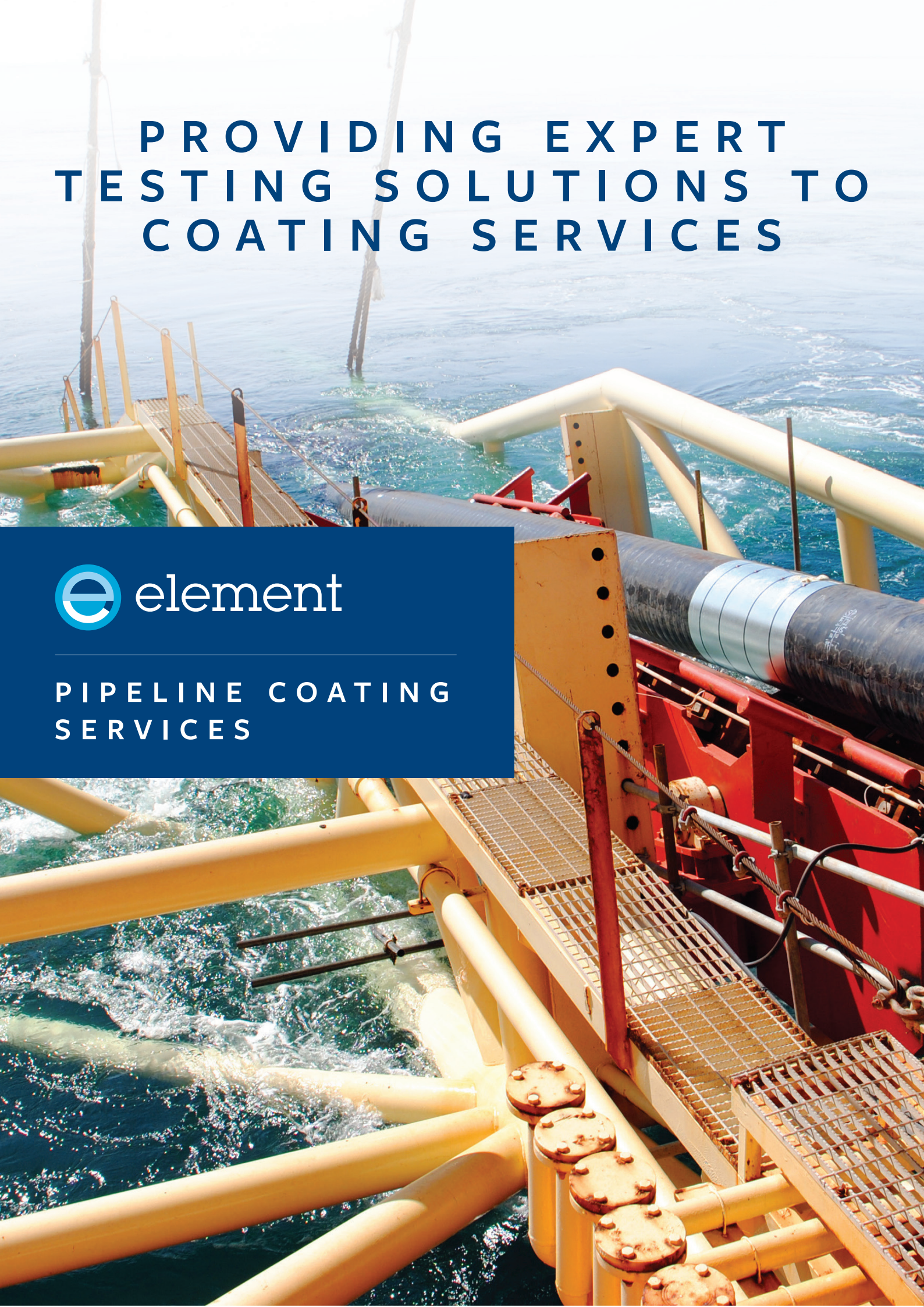
PROVIDING EXPERT TESTING SOLUTIONS TO COATING SERVICES



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PIPELINE COATING SERVICES

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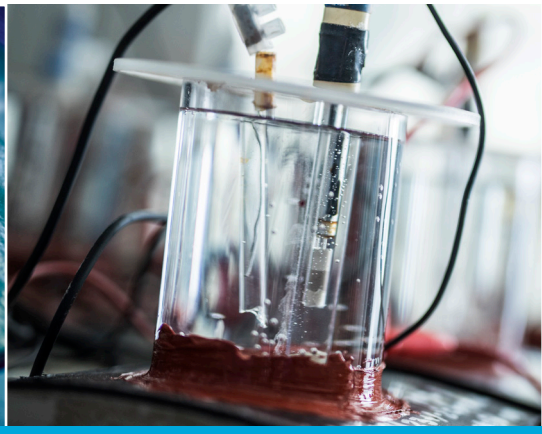


WE HELP TO DETERMINE THE PERFORMANCE OF SUITABLE PIPELINE COATING PROTECTION

Coatings provide critical asset protection in some of the harshest operating environments within the global Energy sector. As a recognized leader in the provision of coatings testing, inspection and advisory services, Element helps you understand how your coating products and systems will perform once deployed in the field.

OVERVIEW

Pipeline coating systems comprise of a number of layers each with their own functional property:

- Anti-corrosion
- Thermal Insulation
- Adhesive layers
- Impact and abrasion

As modern coating technology and techniques advance, the resultant coated products become technically more complex and require additional support to meet the increasingly stringent compliance requirements. Applying a Field Joint Coating is a critical process used in the pipe laying industry to protect the welds of a pipe line from corrosion. Through its global network of testing laboratories Element Materials Technology provides an extensive range of coating testing services and environmental simulations following functional standards.

COATING SERVICES

Our coating expertise covers a wide range of applications and client needs, utilizing state-of-the-art materials engineering, instrumentation and techniques for testing, consulting and investigation.

Our services include:

- DSC & DMA Testing
- Cathodic Disbondment Testing
- Material Characterization
- Mechanical Testing
- Simulated Service Testing
- Consulting and Bespoke Testing

Our experts consistently provide accurate and reliable data regarding material properties allowing clients to develop new types of coatings, validate the integrity of coatings and in the process help solve, mitigate and prevent coatings related problems occurring in service and application.

OUR ACCREDITATIONS AND STANDARDS

All of our facilities are ISO 17025 accredited and we operate in accordance with all applicable local, regional and international standards. In particular our laboratories comply with and test to all of the relevant ISO, ASTM, and EN standards. For example:

- NACE and EN
- ISO21809-1, 2, 3 and 4
- NACE RP0394
- CSA Z245.20 Series
- ISO 12736
- Client specific standards

WHERE DO WE TEST

Elements full range of coating testing services are available at these locations:

Europe

- Element Amsterdam
- Element Edinburgh
- Element Hitchin

North America

- Element Houston

Asia and Middle East

- Element Abu Dhabi
- Element Singapore

For a full list of the standards we operate to, as well as the individual accreditations and customer approvals, we hold, please visit: www.element.com/accreditations-approvals

PIPELINE COATING SERVICES

DSC & DMA TESTING

Using Differential Scanning Calorimetry (DSC), the heat flow and temperature of a sample can be measured to investigate the temperature dependent behavior as well as specific heat capacity. Dynamic Mechanical Analysis (DMA) is a technique for investigating the temperature and frequency depend behavior. DMA can be used to determine:

- Film/tension behavior
- Damping
- Glass transition temperature
- Softening temperature
- Cure behavior
- Rectangular torsion and shear modules

Element Materials Technology can also measure the thermal conductivity of insulation materials according to recognized international and industry standards.

CATHODIC DISBONDMENT TESTING

Cathodic disbondment testing is utilized to try and simulate conditions on pipelines where cathodic protection is being used. Temperature of the fluids in which the samples are immersed and the potential for the test can be varied in order to better simulate field conditions and determine the resistance of the coating to disbondment around the initial holiday.

Element has a variety of test capabilities in this area following some of the main recognized industry standards. Bespoke and modified testing can also be conducted to clients' requirements.

Test Methods we perform include:

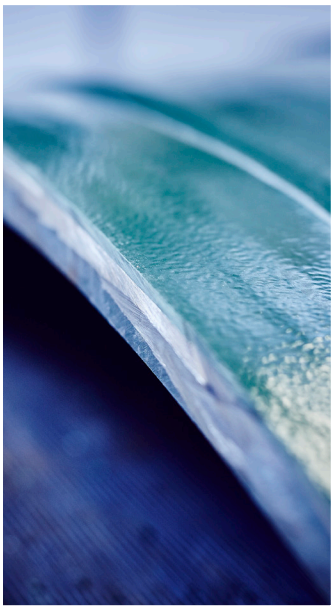
- ISO 21809 pt 1-3
- ASTM G8
- ASTM G42
- ASTM G95
- ISO 15711
- CSA Z245.20/.21
- Norsok M501– system 7C

MATERIAL CHARACTERIZATION

Because of the nature of thermal insulation coatings, their response to service conditions can be subtle but have considerable impact on functionality. Element has a suite of analytical instruments to compliment mechanical and fluid exposure testing which can reveal changes to many useful properties.

- Dynamic Mechanical Analysis (DMA)
- Differential Scanning Calorimetry (DSC)
- Thermomechanical Analysis (TMA)
- Thermogravimetric Analysis (TGA)
- Thermal conductivity

MECHANICAL TESTING



Mechanical testing characterizes the elastic and inelastic behavior of a material when force is applied. A mechanical test shows whether a material or part is suitable for this intended mechanical applications.Element can perform a number of material tests including:

- Elasticity
- Tensile and compression strength
- Elongation
- Hardness
- Fracture toughness
- Impact resistance
- Stress rupture
- Flexibility
- Adhesion strength
- Indentation resistance
- Abrasion resistance
- Fatigue limit

SIMULATED SERVICE TESTING

The properties of coatings can be influenced by aging and weathering conditions, for instance UV and water aging. These tests simulate real life operating conditions and by undertaking accelerated aging programs changes in the service life of a coating can be observed.

Element can also accommodate full scale pipe testing in our Simulated Service Vessel. Operating to maximum pressure of 250 bar, Element can accommodate full scale testing to most service requirements within the industry.

We can also accommodate bespoke and custom full scale and coupon exposure testing.

CONSULTING AND BESPOKE TESTING

With the extensive experience of testing coatings and non-metallics in the Oil and Gas industry, Element can offer consultancy of test programs, material selection and assist in research and development projects. Helping you get the best product to market, quickly.

COATINGS TYPES

- Bituminous tape coatings
- Petrolatum and wax tape coatings
- Polymeric tape coatings
- Heat shrinkable coatings
- Elastomeric coatings
- Fusion bonded epoxy powder coatings
- Liquid applied coatings
- Polyolefin based coatings (hot applied)
- Thermal spray aluminum

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2023.06