

# RESICOAT®

functional powder coatings for pipelines

## CORROSION PROTECTION FOR ON- AND OFFSHORE PIPELINE SYSTEMS

Pipelines are the energy highways of the world. They are the most important medium for the transportation of oil, natural gas, petrochemicals and water.

It is important that pipelines will perform safely and efficiently during their Engineered Design Life (EDL). This is achieved most effectively by the combination of cathodic protection and protective coatings to avoid high maintenance costs and potential environmental damage, should there be leakage from corrosion breakdown.

RESICOAT® powder coatings for pipelines have long been established in the oil and gas industry to provide corrosion protection for pipeline investments. AkzoNobel is a world leader in the supply of powder coatings. Our worldwide presence assures easy supply and the right service at any time.

## MAIN BENEFITS OF RESICOAT® POWDERS FOR PIPELINE COATING

- ▶ Resistance to cathodic disbondment, providing long term corrosion protection under a wide range of service conditions.
- ▶ Excellent chemical resistance under various soil conditions.
- ▶ Optimised reactivity to provide coating continuity and application with excellent coverage on weld seams.
- ▶ Powder particle size and dry flow properties are carefully controlled in order to achieve extremely consistent application continuity under coating plant conditions.
- ▶ Wide application windows.
- ▶ Repair paints can easily be used at the plant or in the field.

## COATINGS WITH HIGHER GLASS TRANSITION TEMPERATURE

RESICOAT® powder coatings are available with Glass Transition Temperatures (T<sub>g</sub>) up to 150° C (302° F). They are suitable for Single Layer or as primer for Three Layer Polypropylene (PP) Systems.

The powders show important properties such as:

- ▶ Good adhesion with PP as primer.
- ▶ High peeling strength at higher temperatures.
- ▶ Excellent flexibility at -30° C acc. CSA Z245.20-06.
- ▶ Good impact resistance.
- ▶ High corrosion protection.



# GLOBAL

RESICOAT® global connections

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*As part of AkzoNobel, the world's largest coatings company, we are committed to the highest possible standards of quality in all aspects of our business – in over 25 manufacturing plants world-wide and sales operations in more than 50 countries. Drawing on 30 years experience as world leader in powder coatings, we are uniquely placed to meet the needs of our customers locally and globally.*

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# RESICOAT®

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## PIPELINE COATINGS



# RESICOAT®

## single layer pipe coatings



Photo: EUROPIPE GmbH



### RESICOAT® SINGLE LAYER PIPE COATINGS

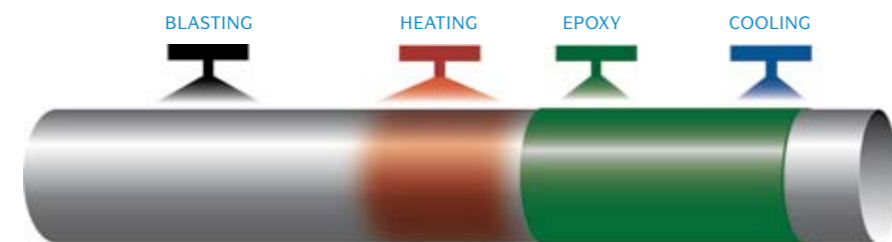
RESICOAT® Single Layer Pipe Coatings comprise a range of stand-alone pipeline protection coatings. They are the most cost-effective coatings for general pipeline operations.

Some of their outstanding performance features are:

- ▶ Excellent adhesion to metal substrate.
- ▶ High resistance to cathodic disbonding.
- ▶ Excellent corrosion resistance and mechanical properties.
- ▶ High bendability, even at higher film thickness.

### APPLICATION PROCESS

RESICOAT® pipe powders should be applied to cleaned Near-White Metal (e.g. acc. SSPC-SP 10) steel pipe surfaces having an open and angular anchor pattern and a surface profile of 50–100 µm (2–4 mils). Appropriate chemical treatments are recommended.



The application temperature for FBE powders should be between 210–240° C (410–465° F). A film thickness between 300–700 µm (12–28 mils) is recommended.

### TECHNICAL DATA RESICOAT® SINGLE LAYER PIPE COATINGS

POWDER CHARACTERISTICS	STANDARD	PROPERTIES
Colour		grey, green, yellow, blue
Gel time at 200° C	ISO 8130-6	25–45 sec.
Storage stability		12 months ≤ 23° C
Impact resistance	CSA Z245.20-06 12.12	2.5 Joule
Cathodic disbondment	CSA Z245.20-06 12.8 20° C, -1.5V, 28 d 65° C, -3.5V, 24 h	4 mm 2 mm
Cathodic disbondment of 2.5° strained coating	CSA Z245.20-06 12.13	pass
Flexibility	CSA Z245.20-06 12.11 3° at -30° C	no cracking
Adhesion of the coating	CSA Z245.20-06 12.14 75° C, 24 h 75° C, 28 d (modified CSA)	rating max. 2 rating max. 2
Taber abrasion resistance	ASTM D 4060-01	< 50 mg loss per 1000 cycles

# RESICOAT®

## dual layer pipe coatings



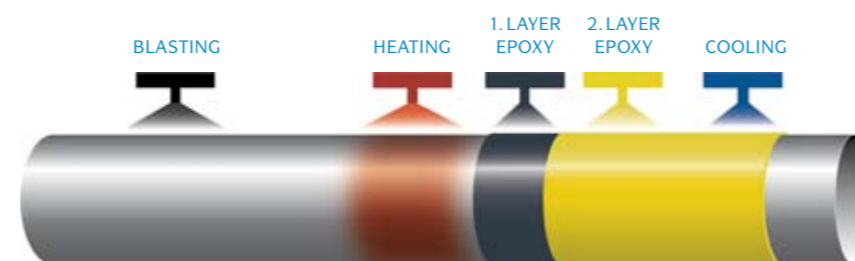
### RESICOAT® DL DUAL LAYER PIPE COATINGS

Dual Layer FBE Coatings were introduced as an alternative to other multi-layer systems for directional drilling applications. Through the application of two stand-alone FBE Coatings the resulting film performance characteristics are better than the sum of the individual coatings.

### RANGE OF RESICOAT® DL DUAL LAYER SYSTEMS

- ▶ GOUGE RESISTING SYSTEM: For optimal protection against damage while laying, handling, backfill and during horizontal drilling.
- ▶ FLEXIBLE SYSTEM: For highest flexibility at highest film thickness.
- ▶ ANTI-SLIP SYSTEM: For prevention of the pipe slipping out of the concrete weight coating during laying from a laybarge.
- ▶ UV-RESISTANCE: A polyester powder on top of a Dual Layer System ensures excellent resistance to sunlight exposure.

### APPLICATION PROCESS FOR GOUGE- AND FLEXIBLE SYSTEMS



Two stand-alone FBE coatings are applied successively by electrostatic spray in one spray booth. The overspray of both layers can be recycled and sprayed between both layers. We recommend a film thickness of 600–1000 µm (24–40 mils).

### TECHNICAL DATA RESICOAT® DUAL LAYER PIPE COATINGS

TEST	STANDARD	PROPERTIES GOUGE SYSTEM	PROPERTIES FLEXIBLE SYSTEM
Colour		green, grey	yellow
Storage stability		12 months ≤ 23° C	12 months ≤ 23° C
Impact resistance	CSA Z245.20-06 12.12	5 Joule	7 Joule
Moisture content	CSA Z245.20-06 12.3	< 0.6 %	< 0.6 %
Flexibility	CSA Z245.20-06 12.11 0° C -30° C	6° 3°	9° 3.6°
Cathodic disbondment	CSA Z245.20-06 12.8 23° C, -1.5 V, 28 d 65° C, -1.5 V, 28 d	4 mm 8 mm	4 mm 8 mm
Gouge resistance	proposed NACE method	max. 25 % average depth	max. 50 % average depth

# RESICOAT®

## three layer pipe coatings

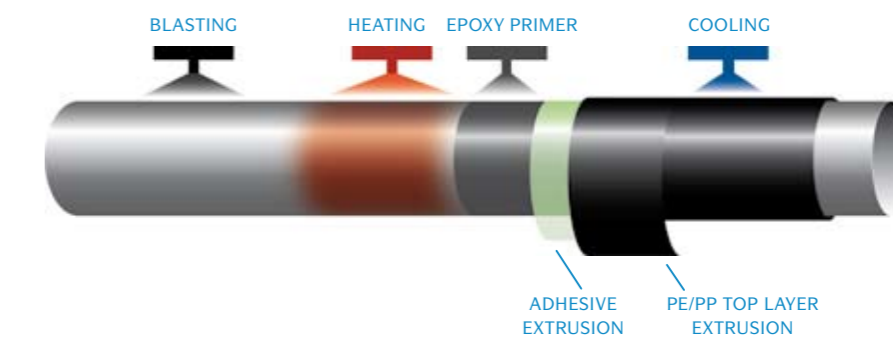
### EPOXY PRIMERS FOR THREE LAYER COATINGS

Three layer coatings are popular corrosion protection systems used in most parts of the world. This system guarantees high resistance to chemical attack, whilst ensuring perfect adhesion and outstanding resistance to cathodic disbondment. The low application temperature of some RESICOAT® powders in a range of 180–200° C (356–392° F) results in considerable cost savings of energy and polyethylene consumption.

A high level of performance can be achieved by combining the best features of FBE and stabilized PE (Polyethylene) and PP (Polypropylene).

- ▶ The FBE primer prevents cathodic disbondment.
- ▶ The copolymer adhesive provides a tight bond between the FBE primer and the outer PE/PP layer.
- ▶ The PE/PP layer provides a tough flexible coating with outstanding resistance to mechanical damage.

### APPLICATION PROCESS



The epoxy layer provides corrosion protection and offers a good adhesion to the mechanical resistant thermoplastic layer. Recommended film thickness is 150–300 µm (6–12 mils).

### TECHNICAL DATA RESICOAT® EPOXY PRIMERS FOR THREE LAYER COATINGS

POWDER CHARACTERISTICS	STANDARD	PROPERTIES
Colour		grey, green, brown, blue
Gel time at 200° C	ISO 8130-6	20–45 sec
Density	ISO 8130-2	1.2–1.6 g/cm³
Storage stability		12 months ≤ 23° C
Impact resistance	CSA Z245.20-06 12.12	fulfilled
Cathodic disbonding	CSA Z245.20-06 12.8 23° C, -1.5 V, 28 d 65° C, -3.5 V, 24 h	2 mm 2 mm
Glass transition temperature	DSC	Standard: 108±5° C Special.: 120–150° C

