



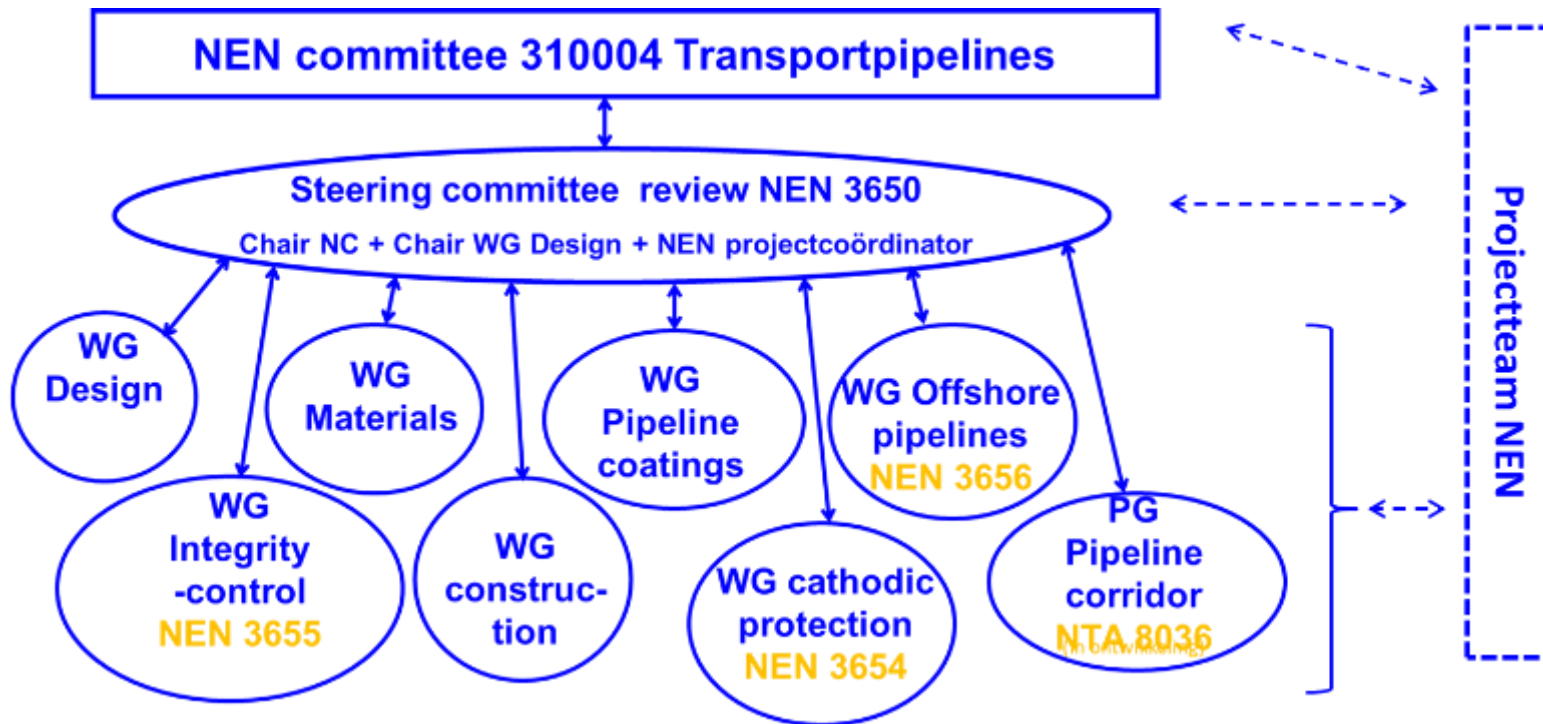
# Coatings for Pipeline Transportation Systems

Helen Boyd, Beyond Coatings



# Content

- NEN committee on Pipeline Transportation Systems and the coating standards, an overview
- Coatings, current and future developments



Intrinsically dangerous fluids  
Crossings and groundwater all fluids  
Complete life cycle  
On- and offshore



# Members committee



## – Pipeline owners and representing organizations

Neptune Energy , N.V. Nederlandse Gasunie, ZEBRA Gasnetwerk B.V., Defensie Materieel Organisatie, Shell Global Solutions Int. B.V, NAM, PPS, Oranje Nassau Energie, Total E&P, Wintershall, TAQA, BBL Company, Petrogas E&P, LSNED, VEWIN (PWN),,), Netbeheer Nederland (Liander) , Energie Nederland (Eneco Warmte B.V.) VELIN, NOGEPA

## – Other infrastructure management organizations (water defense, rail, roads, grid,waterways)

Rijkswaterstaat, ProRail, (STOWA – ELW (Waterschap Hollandse Delta), LS Ned-buisleidingenstraat., Tennet TSO

## – Government national, provincial, local

Ministry of infrastructure and environment, Ministry of Economic affairs, Municipal Rotterdam, Rijkswaterstaat, Governmental law-enforcement agencies

## – Engineering/consultancy firms and Notified body

Bilfinger-Tebodin, Geoconsult, Rotterdam Engineering, RPS advies- en ingenieursbureau bv,, Beyond Coatings Consultancy, Petersburg Consultans BV, Wolfsakker Advies BV,, Applus-RTD, Lloyd's Register Nederland B.V.

## – Contractors

Stichting Bouwend Nederland - Vakgroep Ondergrondse Netwerken en Grondwaterbeheer (Visser & Smit Hanab bv), A. HAK, Qirion, Hommema Kathodische Bescherming B.V. , Van der Heide, Vandervelde Protection

## – Knowledge institutes

TNO, TU Delft

## – Manufactures

## – Sea for life industries, Kleiss & co.



# The NEN 3650 series, coatings integrated



## Parts of the series:

- **General section** (NEN 3650-1)
- **Material specific sections**
  - > Steel (NEN 3650-2)
  - > Polymers (NEN 3650-3)
  - > Concrete (NEN 3650-4)
  - > Cast iron (NEN 3650-5)
- **Crossings** (NEN 3651)
- **Non-Destructive Examination** (NEN 3653)
- **Mutual influence of pipelines and high-voltage circuits**(NEN 3654)
- **Safety management system** (NEN 3655)
- **Offshore pipelines** (NEN 3656)
- **Pipeline corridors** (NTA 8036)
- **Basic principles for strength calculation** (NPR 3659)

# CEN TC 459 SC 10 WG 4 (1)

## Coatings for steel tubes (former Eciss TC 110 WG 4)



- Published standards:
  - EN 10240:1997 Internal and/or external protective coatings for steel tubes – Specification for hot dip galvanized coatings applied in automatic plants
  - EN 10300:2005 Steel tubes and fittings for onshore and offshore pipelines – Bituminous hot applied materials for external coating
  - EN 10301:2003 Steel tubes and fittings for on and offshore pipelines – Internal coating for the reduction of friction for conveyance of non corrosive gas NC
  - EN 10310:2003 Steel tubes and fittings for onshore and offshore pipelines – Internal and external polyamide powder based coatings

# CEN TC 459 SC 10 WG 4 (2)



- Published standards (continued):
  - EN 10339:2007 Steel tubes for onshore and offshore water pipelines - Internal liquid applied epoxy linings for corrosion protection
  - EN ISO 21809-1:2018 Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 1: Polyolefin coatings (3-layer PE and 3-layer PP) (ISO 21809-1:2018)
  - EN ISO 21809-2:2014 Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 2: Single layer fusion-bonded epoxy coatings (ISO 21809-2:2014)

# CEN TC 459 SC 10 WG 4 (3)



- Published Standards (continued):
  - EN ISO 21809-3:2016 Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 3: Field joint coatings (*ISO 21809-3*)
  - EN ISO 21809-5:2017 Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 5: External concrete coatings (*ISO 21809-5:2017*)
- Standards under development
  - EN ISO 21809-3:2016/prA1 (Field joint coatings - Amendment 1)
  - EN ISO 21809-2 (Single layer fusion-bonded epoxy coatings)
  - EN ISO 21809-6 Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 6: Multilayer fusion-bonded coatings



# ISO/TC 67/SC 2

## Pipeline transportation systems (1)



- Published standards:
  - ISO 21809-1:2018 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 1: Polyolefin coatings (3-layer PE and 3-layer PP)
  - ISO 21809-2:2014 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 2: Single layer fusion-bonded epoxy coatings
  - ISO 21809-3:2016 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 3: Field joint coatings
  - ISO 21809-4:2009 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 4: Polyethylene coatings (2-layer PE) check datum

# ISO/TC 67/SC 2 (2)



- Published standards (continued):
  - ISO 21809-5:2017 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 5: External concrete coatings
  - ISO 21809-11:2019 Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 11: Coatings for in-field application, coating repairs and rehabilitation
  - ISO 12736:2014 Petroleum and natural gas industries – Wet thermal insulation coatings for pipelines, flow lines, equipment and subsea structures (NC 310 004 + NC 310 008)

# ISO/TC 67/SC 2 (3)



- Standards under development:
  - ISO/DIS 15589-1 Petroleum, petrochemical and natural gas industries – Cathodic protection of pipeline systems – Part 1: On-land pipelines
  - ISO 21809-3:2016/DA1 (Field joint coatings - Amendment 1)
  - ISO 21809-2 NP (Single layer fusion-bonded epoxy coatings)
  - ISO/AWI 21809-6 Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems – Part 6: Multilayer fusion-bonded epoxy coatings (FBE)

# Coatings for Pipeline Transportation Systems

- ISO 21809-1 Polyolefin Coatings (3-Layer PE and 3-Layer PP)

Today



# Coatings for Pipeline Transportation Systems

- ISO/TC67/SC2/WG14-2 Single Layer Fusion Bonded Epoxy (ISO 21809-2) and WG-6 MultiLayer Fusion Bonded Epoxy (ISO 21809-6)

Today



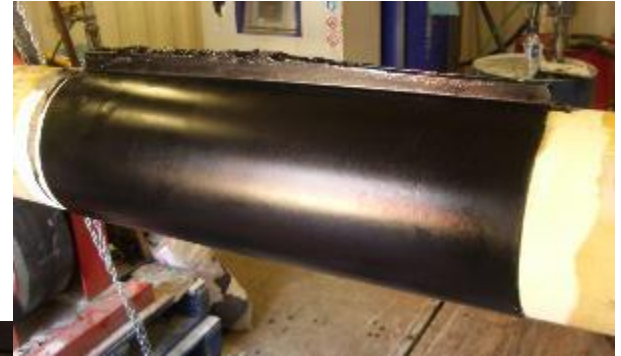


# Coatings for Pipeline Transportation Systems

- ISO/TC67/SC2/WG14-3 Field Joint Coating (ISO 21809-3)



Today



# Coatings for Pipeline Transportation Systems

- ISO/TC67/SC2/WG19 Wet Thermal Insulation Coatings (ISO 12736)

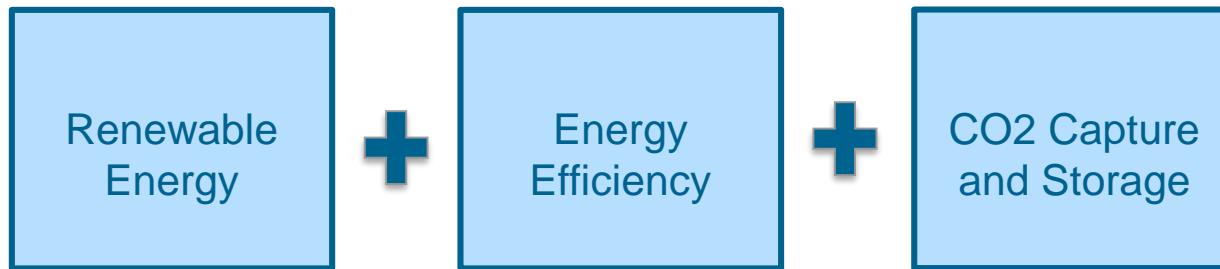


Today

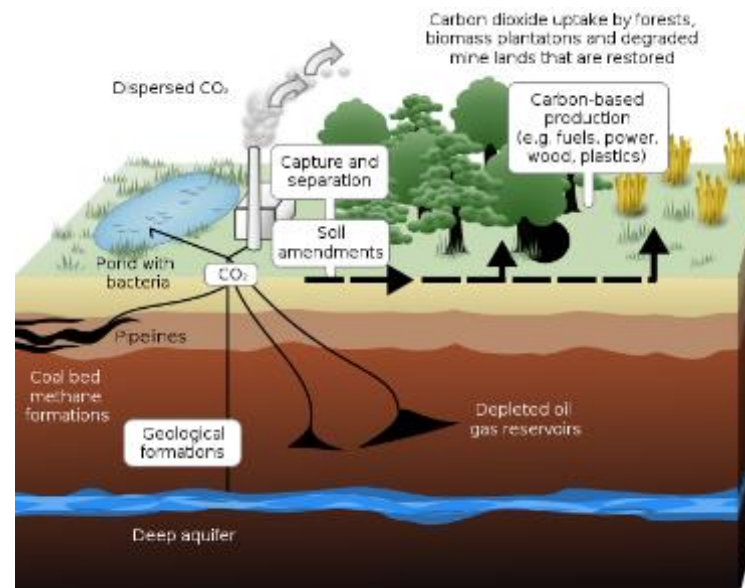


# Coatings for Pipeline Transportation Systems

- CCS (Carbon Capture and Storage)



Tomorrow



# Coatings for Pipeline Transportation Systems

- Offshore Wind Farms



Tomorrow

Use the knowledge from the offshore oil and gas industry

