

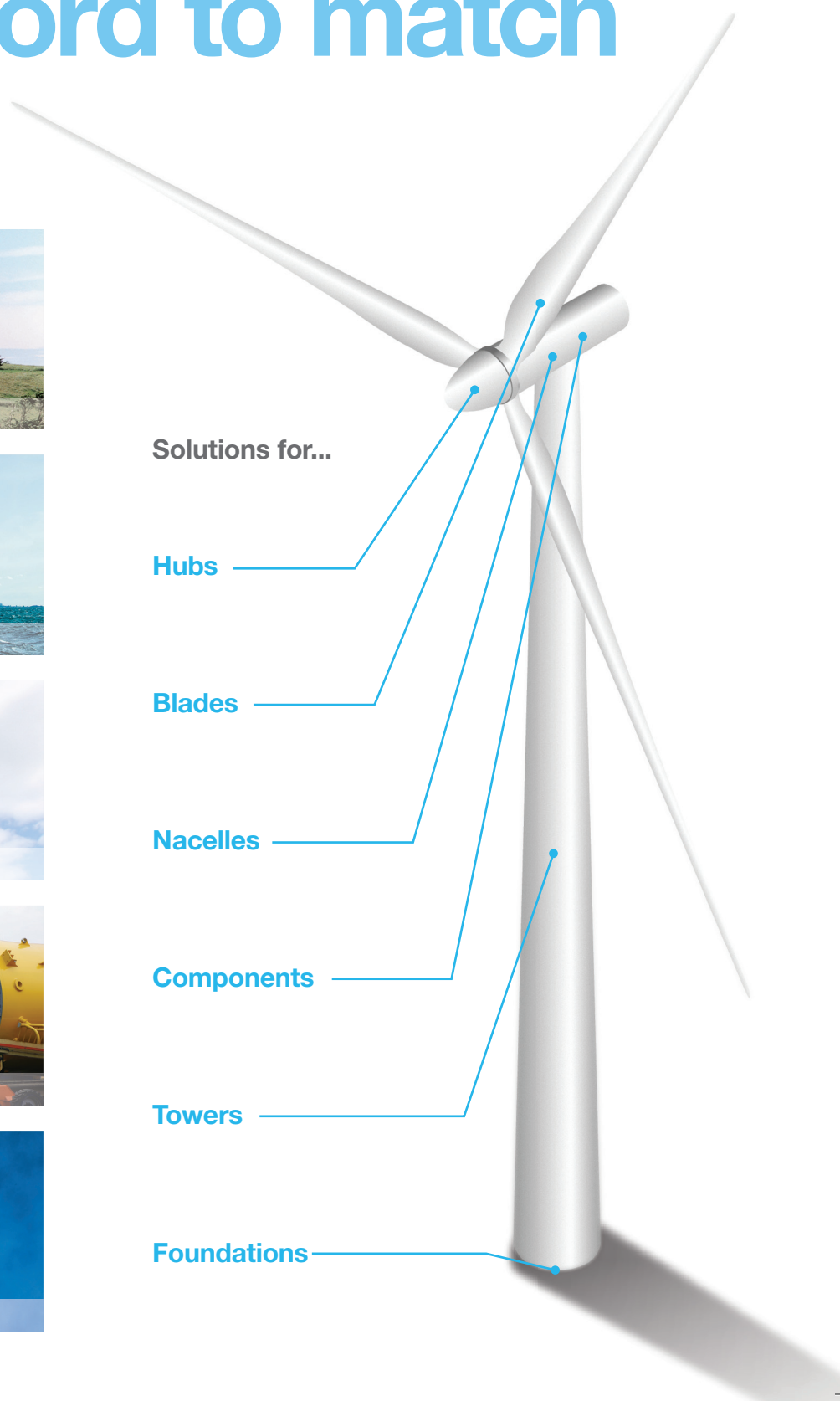
# Protective coatings for wind power assets

Onshore wind, offshore wind and substations



# Complete coating solutions for wind power assets, with a track record to match

## Contents



## Track record

More than 40,000 towers coated worldwide, supporting the growth of the industry

● MANUFACTURING LOCATIONS  
● OFFICE LOCATIONS



## Complete coating solutions

### A product range developed with our customers in mind

With coatings for every aspect of your wind asset why trust anything else but the International® range of protective coatings from AkzoNobel.

From tip to transition piece we have the solution for you, whether that be coating offshore foundations for your substation, a single coat, direct-to-metal coating for ISO 12944 C3 environments, a rapid cure blade coating or tower coatings for some of the harshest environments in the world.

Choosing AkzoNobel as your single source supplier could drive down costs, increase productivity, ensure consistency and simplify the specification process.

Our testing program includes coatings systems that are rigorously tested in-house and at world renowned external test houses to ISO 12944, ISO 20340 and NORSOK M-501 standards. Our extensive track record of 25 years in the wind industry and over 40 years in protecting structures offshore means you can be confident that we have the solutions to meet your needs.

## Truly global

### Infrastructure developed to support you across the globe

What else can the International® range and AkzoNobel bring to your business?

We strive to add value to the services which we can offer alongside our coatings and strengthening our global infrastructure is a key part of that. With representatives in over 80 countries and in excess of 20 key International® coatings manufacturing facilities, AkzoNobel can bring consistency and competency to every corner of the globe. Whether that is ensuring consistent product quality from Beijing to Berlin through our global product range or by offering a global network of NACE and FROSIO qualified technical sales representatives, bringing vast knowledge to every one of your coating projects.

We have a proud history of environmental leadership, ensuring we are always ahead of legislation, removing hazardous raw materials from our products through our product stewardship program and keeping pace with the most stringent of environmental regulations.

## Total customer support

### The benefits of working as partners

At AkzoNobel not only can we supply coating solutions for your wind assets regardless of location, but we also have a world class support structure in place to back this up.

From a centrally dedicated power market team to experienced sales and NACE and FROSIO qualified technical sales representatives local to your business, AkzoNobel is in a position to assist with your project from the specification writing phase, through construction, surface preparation and paint application to ongoing maintenance and repair.

In addition to this we work tirelessly to build real relationships with our customers, learning and growing alongside your business, matching changing requirements stride for stride. If specifications need writing, new products are required or training is needed, you can be sure that AkzoNobel will deliver.

# Onshore

## Global capability

### Track record

### Paracuru | Brazil



**Project year:** 2010  
**Project size:** 24.4MW  
**Products:** Interzinc 52  
 Intercure 420  
 Interthane 990

**Our International® range has been utilized in the wind industry from the very beginning, giving us the technical know-how, to provide the best coating solutions. Backed up by a track record which includes coating over 40,000 turbines worldwide over the past 20 years; true global capability from the Americas to Australasia.**

In these financially testing times it is key that paint manufacturers look at methods and means of improving the economics of wind projects. AkzoNobel has a global network of sales and manufacturing locations which means real economies of scale can be brought about through close working partnerships. This could be through the creation of global specifications, ensuring consistency, or through utilizing some of the market leading products from the International® range which can cut the number of coats required or extend the lifetime of your turbines.

We are supporting our customers to enter new markets such as South America and Africa as well as using our product range and industry experience to deliver long term, cost effective solutions for their wind turbines. Get in touch with your local representative to find out how we could help you.



## Intercure 4500

Our high performance Intercure 4500 semi-gloss primer finish can vastly improve your productivity. Excellent anticorrosion and aesthetic properties allow you to replace a two coat system for ISO 12944 C3 environments with a single coat. Or replace a three coat system with a two coat system for ISO 12944 C5 environments when applied over a zinc rich primer.

### Rapid cure even at low temperatures

A feature of Intercure 4500 is its rapid cure, with hard dry times as low as two hours at 25°C (77°F). This maximizes productivity, allows use in colder climates and reduces the need for forced drying equipment, meaning facilities can cut heating costs and reduce environmental impact.

### Benefits throughout the contract chain

Intercure 4500 has been engineered to boost productivity while offering outstanding performance:

- maximizing output from paint shops
- allowing contractors to meet deadlines
- giving owners long term corrosion protection

### Lower VOC emissions

Intercure 4500 can help to reduce the total overall Volatile Organic Compound (VOC) of a system as it reduces the number of coats required to complete the system and has less than 250 g/l (2.08 lb/gal) itself.

### Challicum Hills | Australia



**Project year:** 2003

**Project size:** 52.5MW

**Products:** Interzinc 52 | Intercure 420 | Interthane 990

### Jersey Atlantic | USA



**Project year:** 2005

**Project size:** 7.5MW

**Products:** Interzinc 52 | Intergard 345 | Interthane 870

## Some highlights from our track record

Project name	Location	Products	Project size
Beinn an Tuirc	Scotland	Intergard 405   Intercure 420   Interthane 990	31MW
Bowbeat Wind Farm	Scotland	Interzinc 52   Intercure 420   Interthane 870	31.2MW
Cemmaes Wind Farm	Wales	Intergard 405   Intercure 420   Interthane 990	15.3MW
Challicum Hills Wind Farm	Australia	Interzinc 52   Intercure 420   Interthane 990	52.5MW
Dun Law Wind Farm	UK	Intercure 420   Intergard 405   Interthane 990	17MW
Hare Hill Wind Farm	Scotland	Intergard 405   Intercure 420   Interthane 990	13MW
Hasaki Wind Farm	Japan	Interzinc 52   Intergard 345   Interthane 870	16MW
Hebei Zhangbei	China	Interzinc 52   Intergard 475HS   Interthane 870	100.5MW
Hermanville and Clear Springs	Canada	Interzinc 52   Intergard 345   Interfine 878	30MW
Jersey Atlantic	USA	Interzinc 52   Intergard 345   Interthane 870	7.5MW
Jilin Taobei	China	Interzinc 52   Intergard 475HS   Interthane 990   Interzinc 42   Intergard 410	49.5MW
Kings Mountain Wind Farm	Ireland	Interzinc 52   Intercure 420	25MW
Le Nordais - Wind Farm - Gaspé Quebec	Canada	Interzinc 52 Winter   Intergard 345   Interthane 990	99MW
Lowca Wind Farm	England	Intergard 405   Intercure 420   Interthane 990	4.62MW
Maebongsan Wind Farm	Korea	Interzinc 52   Intergard 400	7MW
Meenadreen Wind Farm	Ireland	Intergard 405   Intercure 420   Interthane 990	3.4MW
Paracuru	Brazil	Interzinc 52   Intercure 420   Interthane 990   Interseal 670HS	24.4MW
Regen Powertech	India	Interzinc 52   Intergard 410	15MW
University of Minnesota Turbine	USA	Intercure 99	2.5MW
Woolnorth Wind Farm	Tasmania	Interzinc 52   Interthane 990	140MW
Xinjiang Tuoli	China	Interzinc 42   Intergard 475HS   Interthane 870   Interzinc 52	30MW

# Offshore

## An enviable track record

### Track record

### London Array | United Kingdom



Photo © London Array

**Project year:** 2010  
**Project size:** 630MW  
**Products:** Interzone 954  
Interthane 990

**Typical conditions for offshore wind assets vary significantly from onshore wind farms; knowledge and experience of these conditions is key in meeting the lifetime expectations for offshore assets. The International® coatings range has a 40 year track record protecting offshore structures and we understand what is required to protect your assets.**

Whether your wind turbines will be in the birthplace of offshore wind in North Western Europe or in a growing area of the industry such as China or the USA, the environmental conditions differ greatly from onshore wind farms.

Forget the glossy pictures and serene seas, offshore wind farms can face waves 20 metres (65 feet) high and winds in excess of 200 km/h (120 mph). Understanding how to protect the turbines from corrosion and

erosion in these environments is what makes AkzoNobel the perfect coatings partner.

We use this in-field experience with a huge range of testing to industry standards such as ISO 20340 and NORSOK M-501 to provide coatings that can be specified with confidence (see opposite page).

Over the past 40 years, the International® coatings range has delivered some of the best products available for offshore assets.

## Interzone 954

The star of our offshore range is Interzone 954. A favorite of specifiers and applicators alike, it has been protecting steel for over 25 years; the trusted industry solution for protecting and maintaining structures operating in the most severe environments. A unique blend of properties

gives Interzone 954 long term performance in environments that combine a high potential for mechanical damage, chemical attack, atmospheric corrosion and immersion conditions. This versatility makes Interzone 954 the all-round heavy duty coating of choice.



Beatrice | United Kingdom



**Project year:** 2006  
**Project size:** 10MW  
**Products:** Interzinc 52 | Intergard 475HS  
 Interfine 629HS | Interzone 505

Donghai | China



**Project year:** 2010  
**Project size:** 102MW  
**Products:** Interzinc 52 | Intergard 475HS | Interthane 990

## Testing for offshore structures

**ISO 12944** This sets the baseline for performance assessment for specification of coating systems across onshore environments. However, when it comes to offshore environments, our extensive real world experience has taught us that ISO 12944 is not indicative of actual offshore performance.

**ISO 20340** In order to more accurately predict offshore coatings' performance, we turn to another internationally recognized test standard, ISO 20340. This adds a cyclic test to better replicate real world conditions. The cyclic test subjects the coating system to alternating condensation and UV exposure periods, salt spray and low temperature to put more corrosive pressure on the coating system.

The length in terms of exposure hours is also increased compared to ISO 12944 and extra dimensions, such as cathodic disbondment and adhesion, are added for the immersion test. The high regard for the ISO 20340 test method has led to its adoption as a fundamental part of the internationally recognized Norwegian NORSOK M-501 rev 5 standard.

We actively participated in the committee of experts who created the ISO 20340 standard, bringing our extensive experience in the offshore environment to the industry.

However, it's important not to rely purely on testing as this can only give an indication of real life performance. The most important measure for a coatings performance is through extensive in-field operation.

## Some highlights from our track record

Project name	Location	Asset	Area	Products	Year	Project size
Alpha Ventus	Germany	Foundation	Jackets, Decks, Transition pieces	Interzone 1000   Interzone 954	2009	60MW
Amrumbank	Germany	Foundation	Transition pieces	Interzone 954   Interthane 990 Interzinc 52   Intergard 475HS	2013	288MW
Anholt	Denmark	Foundation	Transition pieces	Interzone 954   Interthane 990	2011	400MW
Beatrice Demonstrator	UK	Turbine and foundations	Towers, Jackets	Interzinc 52   Intergard 475HS Interfine 629HS   Interzone 505	2006	10MW
Belwind Offshore Wind Farm	Belgium	Foundation	Transition pieces	Interzone 954   Interthane 990	2009	165MW
Borkum Riffgrund	Germany	Foundation	Transition pieces, Monopiles	Interzone 954   Interthane 990	2013	277.2MW
DanTysk	Germany	Foundation	Transition pieces	Interzone 954   Interfine 878	2012	288MW
Donghai Bridge	China	Turbine	Towers	Interzinc 52   Intergard 475HS   Interthane 990	2010	102MW
Eneco Luchterduinen	Netherlands	Foundation	Transition pieces	Interzone 954   Interthane 990   Interzinc 553	2013	129MW
Fukushima Recovery Floating Turbine	Japan	Turbine and foundation	Towers, Semi-submersible floating foundation	Intershield 300   Interfine 878	2013	2MW
Gunfleet Sands	UK	Foundation	Transition pieces	Interzone 954   Interthane 990	2011	12MW
Hornsea	UK	Met mast	Jacket - twisted	Interzone 954	2011	1500MW
Humber Gateway	UK	Foundation	Transition pieces	Interzone 1000   Interthane 990 Interzinc 52   Intergard 475HS	2013	219MW
London Array	UK	Foundation	Transition pieces	Interzone 954   Interthane 990	2010	630MW
Ormonde	UK	Foundation	Jackets, Decks, Ambient steel	Interzone 1000   Interzone 954   Interzinc 52 Intergard 475HS   Interfine 691	2010	150MW
Rudong	China	5MW turbine	Towers	Interzinc 52   Intergard 475HS   Interthane 990	2012	5MW
Westermost Rough	UK	Foundation	Transition pieces, Monopiles	Interzone 954   Interthane 990	2013	210MW

# Substations

## Coatings for every surface

Track record

Lincolnshire | UK



**Project year:** 2007

**Project size:** 250MW

**Products:** Interzinc 52 | Interzure 384  
Interfine 691 | Interzone 1000  
Interzone 954

**As well as protecting your wind turbines offshore, you will need to ensure that supporting structures such as substations are also protected. With a longstanding and successful track record our International® coatings range is highly regarded throughout the offshore industry.**

Not only do you need protection against corrosion and erosion but also consideration must be given to fire protection and access areas. With a wide range of coatings available, many developed specifically for the offshore market, you can be confident that AkzoNobel has the coatings you require.

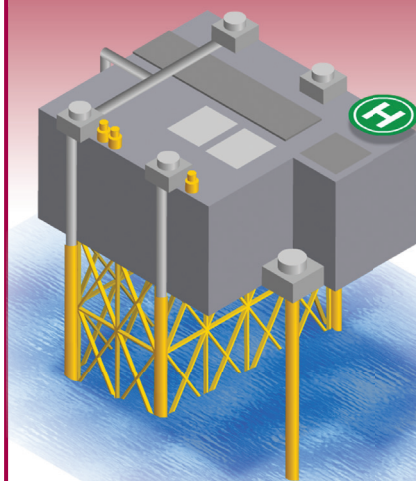
Access areas, such as decks and walkways, also need particular attention to ensure they are protected and safe. This will include corrosion protection, potentially fire protection and also non-slip surfaces, provided by aggregates from the International® coatings range. However, the products at the core of our success offshore are from the Interzone range, with up to 25 years lifetime, for use above and below the waterline.

With manned or frequently serviced assets, fire protection could be a requirement. With our industry-renowned Chartek and Interchar ranges, our dedicated fire protection team, a recently opened €7 million fire protection research facility and extensive track record in fire protection, we are the ideal partner to protect your offshore asset from the effects of fire.



### Substations

Coatings characteristics



#### Deck coatings

- Durable
- Abrasion resistant

#### Fire protection

- Employee safety
- Asset protection

#### Splash zone and immersed

- Anticorrosive barrier protection



**Belwind Wind Farm | Belgium**



**Project year:** 2010  
**Project size:** 165MW  
**Products:** Interzinc 52 | Intergard 475HS | Interthane 990

**Dolwin Alpha | Netherlands**



**Project year:** 2013  
**Project size:** 800MW  
**Products:** Interzinc 52 | Intergard 475HS | Interthane 990  
 Intershield 300 | Intergard 740

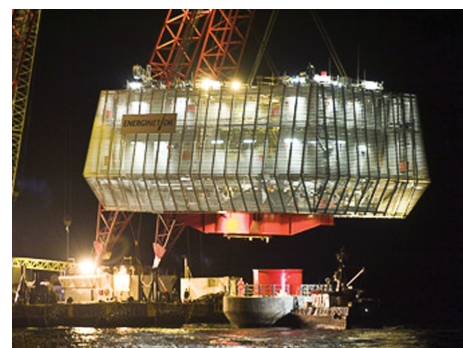
## The Interzone series

In addition to the ever popular Interzone 954, there are two other key members of the Interzone family for offshore wind.

Interzone 1000 is the workhorse of the Interzone range and is a glass reinforced epoxy coating which contains greater than 30% chemically resistant glass flake in the dry film. Excellent resistance to cathodic disbondment, abrasion and corrosion makes Interzone 1000 the choice for long term protection of offshore structures, up to and beyond 25 years.

Interzone 485 is an ultra-high build, high volume solids, two component catalyzed epoxy, capable of being applied up to 3000 microns (120 mils) dry film thickness, and providing excellent impact resistance, abrasion resistance and adhesion properties.

All of this makes the Interzone series the most appropriate solution to problems found in splash zones, tidal areas and the harsh offshore environment in general.



## Some highlights from our track record

Project name	Location	Asset	Area	Products	Year	Project size
Amrumbank	Germany	Substation	Topsides, Jacket	Interzinc 52   Intergard 475HS Interthane 990   Interzone 954	2013	288MW
Belwind Offshore Wind Farm	Belgium	Substation	Topsides	Interzinc 52   Intergard 475HS   Interthane 990	2009	165MW
Butendiek	Germany	Substation	Topsides, Jacket	Interzone 954   Interthane 990 Interzinc 52   Intergard 475HS	2013	288MW
Dolwin Alpha	Netherlands	Converter Platform	Topsides, Jacket	Interzinc 52   Intergard 475HS   Interthane 990 Intershield 300   Intergard 740	2013	800MW
Galloper	UK	Substation	Topside	Interzinc 52   Intergard 475HS   Interfine 691	2010	504MW
Greater Gabbard	UK	Substation	Topsides, Jacket	Interzinc 52   Intergard 475HS   Interfine 691 Interzone 954   Chartek 7	2009	500MW
Helwin Beta	Netherlands	Converter Platform	Topsides, Jacket	Interzone 1000   Interthane 990   Interzinc 52 Intergard 475HS   Intershield 300	2013	690MW
Humber Gateway	UK	Substation	Topsides, Jacket	Interzone 1000   Interthane 990   Interzinc 52 Intergard 475HS	2013	219MW
Lincs	UK	Substation	Topsides, Jacket	Interzinc 52   Intercure 384   Interfine 691 Interzone 1000   Interzone 954	2010	250MW
Nordsee Ost	Germany	Substation	Topsides, Jacket	Interzinc 52   Intergard 475HS   Interthane 990 Interzone 954	2013	295.2MW
Rødsand	Denmark	Substation	Jacket	Interzone 1000	2002	166MW
Sheringham Shoal	UK	Substations	Topsides	Interzinc 52   Intergard 475HS   Interfine 629HS	2010	317MW
Thanet	UK	Substation	Jacket	Interzone 1000	2008	300MW
West Of Duddon Sands	UK	Substation	Topsides, Jacket	Intercure 200   Intergard 269   Intergard 475HS Interplus 256   Interseal 670HS   Interthane 870 Interzinc 52   Interzone 954	2012	389MW

# Some highlights from our track record

Track record

Nordex Wind Towers | Turkey



**Project year:** 2014

**Applicator:** Gestamp Wind Steel

**Products:** Interzinc 52, Intergard 345 and Interthane 3230SG

Gode Wind | German North Sea

Track record



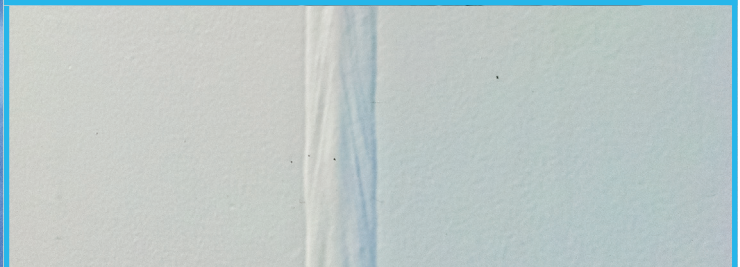
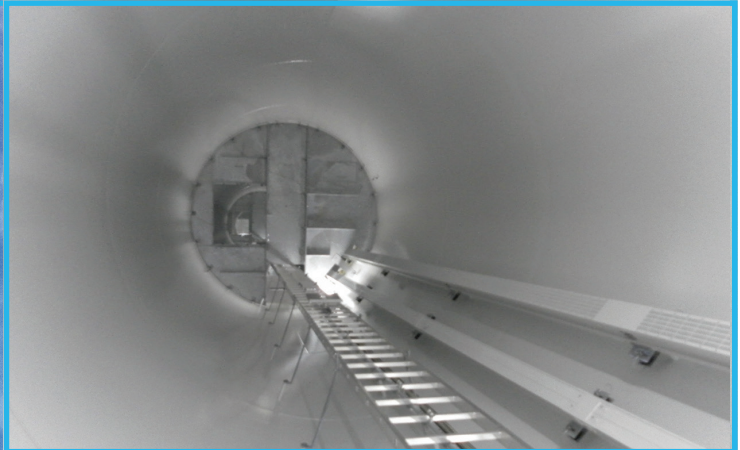
**Project year:** 2015

**Project size:** 582MW

**Products:** Interzone 954, Interzinc 52, Interthane 870, Interzinc 553 and Intergard 475HS

## Senvion Demonstration Turbine | Germany

## Case history



**Inspected:** 2012  
**Application:** 2008  
**Fabricator:** SIAG  
**Products:** Turbine Internals - Intercure 99,  
Turbine Externals - Interzinc 52 and Intercure 99

**Five years in-field performance with no coating breakdown, rusting, flaking or delamination. The coating looks 'good as new' even on welds, edges and corners.**

## Track record | Dan Tysk | German North Sea



**Project year:** 2013  
**Project size:** 288MW  
**Products:** Interzone 954 and Interfine 878

# Complete solutions

## Total protection from tip to transition piece

Protecting your complete wind asset is what the International® range does best.

- Over 40 years offshore track record
- Over 25 years wind track record
- Global manufacturing and supply
- Products for applications in any environment

**Intercure** Fast cure, low VOC

**Interzone** Offshore coatings with a pedigree

**Interthane** Top coat of choice

**Intergard** High build protection for your asset

**Interzinc** Anticorrosive zinc rich primers



## Solutions for the entire contract chain



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