

Rev 09 (15/05/24)

Technical Data Sheet Humidur® FP

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HUMIDUR.

Let's face corrosion.

1. Product Description

Humidur FP is a two-component, solvent-free, modified polyamine cured epoxy system and comes in three different variants: Humidur FP single for spray applications, Humidur FP Brush for brush applications and Humidur FP Brush LT specifically designed for use by brush in colder environments.

Humidur FP offers the benefits below:

- Long term protection in highly corrosive environments: life expectancy over 30 years
- Single coat system, no primers required
- High chemical resistance to acids, alkalis, oils, lubricants, detergents, ...
- Environmentally friendly (100 % solids, no solvents, no heavy metals, no coal tar)
- Excellent abrasion resistance and impact resistance
- Surface tolerant & outstanding adhesion to substrate and interadhesion between layers
- Capable of curing under water: can be exposed to water immediately after application
- Capable of curing at freezing temperatures
- Unlimited overcoating
- Excellent cathodic disbondment resistance
- NDT inspection allowed
- Resistant to temperatures from -35 °C to 150 °C and to most fluids between pH 0 and pH 14 (contact your local Acotec representative for more information)
- Cost-effective (LCCA conducted by Royal Haskoning DHV)
- Tested and accepted for applications on sweating lines
- Tested and accepted for CUI applications

2. Composition

Humidur FP consists of two components:

A is the base component and contains:

- Non-crystallisable epoxy resins,
- High-tech modifying agents and elastifiers,
- Lamellar abrasion and impact resistant fillers,
- Colouring pigments

B is the hardener and contains:

- Polyamine hardener complex

3. Recommended Use

In the Humidur product range, Humidur FP has the highest chemical resistance offering solutions to:

- Marine structures in extreme corrosive environments: splash zone, atmospheric and submerged steel
- Offshore and petrochemical structures (submerged, splash zone and tidal movements)
- Storage tanks that hold petroleum, diesel and chemical products
- Pipelines in oil and gas or penstocks in hydropower facilities.



Humidur FP comes in three variants: FP Single, FP Brush and FP Brush LT.

Each has been developed for specific application means:

PRODUCT USE		HUMIDUR FP SINGLE	HUMIDUR FP BRUSH	HUMIDUR FP BRUSH LT
By brush	Stripe coat	Yes	Yes	Yes
	Thick layers	Yes	Yes	Yes
By spray (heated hoses)	One layer	Yes	/	/
	Multiple layers	Yes	/	/

4. Manufacturer's Information

Acotec NV, with registered offices at Aalst, Belgium, is the developer and sole manufacturer of the Humidur products, distributed worldwide through a wide network of agents and cooperative companies. The proven lifetime of the Humidur coatings in practice is more than 30 years.

Contact Acotec directly or visit www.humidur.com for reference projects.

5. Product Data

SPECIFIC DATA		HUMIDUR FP SINGLE	HUMIDUR FP BRUSH	HUMIDUR FP BRUSH LT
Density @ 23 °C	Component A	± 1.43 g/cm ³	± 1.15 g/cm ³	± 1.15 g/cm ³
	Component B	± 1.08 g/cm ³	± 1.08 g/cm ³	± 1.08 g/cm ³
	Mixture A + B	± 1.36 g/cm ³	± 1.13 g/cm ³	± 1.13 g/cm ³
Solid content		100 %	100 %	100 %
Viscosity of the mixture @ 23 °C and CSS 750 Pa		25 ± 1 Pa·s	8.8 ± 1 Pa·s	4.0 ± 1 Pa·s
Flash point mixture A + B		> 100 °C	> 100 °C	> 100 °C
Hardness		Shore D > 74	Shore D > 74	Shore D > 74
Colour (gloss) (For colour stability (only aesthetic), apply Humidur TC on top of Humidur FP)		Any RAL colour 25 colours immediately deliverable	Any RAL colour 25 colours immediately deliverable	Any RAL colour 25 colours immediately deliverable

Compatibility with Cathodic Protection Systems (ISO 20340)		Yes	Yes	Yes	
Practical thickness in one layer	Brush	Stripe coat	400 µm	200 µm	200 µm
		Thick layer	400 µm – 500 µm	400 µm	400 µm
	Spray	One layer	400 µm – 800 µm	/	/
Minimum total layer thickness		400 µm	400 µm	400 µm	
Covering capacity (WFT = DFT)	Theoretical @ 200 µm		/	0.23 kg/m ²	0.23 kg/m ²
	Theoretical @ 400 µm		0.54 kg/m ²	0.45 kg/m ²	0.45 kg/m ²
	Theoretical @ 600 µm		0.81 kg/m ²	/	/
Mixing ratio A : B	By weight		5 : 1	3.7 : 1	3.7 : 1
	By volume		3.8 : 1	3.475 : 1	3.475 : 1
Overcoating time		Unlimited	Unlimited	Unlimited	
Standard packaging / set		18 kg or 264 kg	1 kg or 5 kg	1 kg or 5 kg	
Pot life @ 23 °C		25 minutes	25 minutes	25 minutes	
Shelf life max. 25 °C dry		24 months	24 months	24 months	

6. Curing Time

Humidur coatings have the ability to cure under water. The curing of Humidur is a chemical reaction and is water repellent. The curing times depend on air circulation, temperature and the film thickness. Humidur is able to cure at sub-zero temperatures.

	-5 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C
Touch-dry	24 hours	7 hours	5 hours	4 hours	3 hours	2.5 hours	2 hours
Full cure	6 days	5 days	3 days	48 hours	24 hours	12 hours	8 hours



7. Surface Preparation

All surfaces shall be free of oil, grease, dust or any other contamination prior to coating.

SURFACE PREPARATION	CLEANLI-NESS	METHODS	ROUGHNESS	EXPECTED LIFE TIME	WARRANTY
Minimum	St 2 – 3	Hand tool Power tool (wire brush, needle gun, bristle blaster, grinding disc)	Original profile	15 years	On request
Optimal	Sa 2 ½ Iso 8501	Grit blasting	60 ± 10 µm 2/3 reference ISO 8503	> 30 years	On request

8. Application

APPLICATION PARAMETERS	HUMIDUR FP SINGLE	HUMIDUR FP BRUSH	HUMIDUR FP BRUSH LT
Temperature before mixing*	35 °C – 40 °C	20 °C – 25 °C	5 °C – 15 °C
Application temperature of mixture*	35 °C ± 5 °C	25 °C ± 5 °C	5 °C – 15 °C
Surface temperature** min.	Dew point + 3 °C	Dew point + 3 °C	Dew point + 3 °C
Ideal surface temperature**	0 °C – 50 °C	15 °C – 50 °C	0 °C – 15 °C
Surface temperature** max.	50 °C	50 °C	50 °C
Relative Humidity**	< 95 %	< 95 %	< 95 %
Humidity** Surface	No condensation	No condensation	No condensation
Spray nozzle opening	0.015" – 0.025"	/	/
Spray nozzle angle	30° - 60°	/	/

* If the product is at a higher temperature, the thickness per layer will be lower.

** These criteria are valid to achieve the most durable protection. If a reduced coating lifetime is desired, application can continue outside this window. The existing warranties do not apply in these conditions. Please contact Acotec NV directly for more information on the expected lifetime in these conditions.

Humidur FP is almost always applied in a single coat. If several coats are requested, different Humidur layers can be applied wet-on-wet depending the maximum layer thickness or on top of fully cured layers after removing possible surface contamination/pollution. The overcoating interval is unlimited over time.



9. Environment

Humidur FP has been designed to fully respect the environment.

The product contains:

- No VOC (0 %) (100 % solids)
- No solvents or diluents (WFT = DFT)
- No coal tar
- No isocyanates
- No heavy metals

Humidur FP is capable of curing under water without leaching taking place and has no detrimental effect on the sediment, fauna and flora in and out of the water. When using Humidur FP on static marine structures, the biofilm can form itself on top of the Humidur coating without affecting the substrate and without any loss of the anti-corrosion properties.

As Humidur is a one-layer system, it reduces the amount of waste and minimizes loss spray.

All technical reports are available upon request.

10. Insurance

After application, an adhesion test is performed (according to ISO 4624) for which we commit ourselves to achieve a minimum criterion of 8 MPa.

A corporate warranty can be given under certain conditions. More information upon request.

An insurance policy of 10 years, given by HDI Gerling, is available on all Humidur coatings in case of optimal surface preparation. For the terms and conditions on this warranty, please contact Acotec NV directly.

11. Humidur FP Approval / Certificates

Approved in petrochemical industry and offshore oil and gas market by: Shell, Statoil, ConocoPhillips, Talisman Energy, Maersk Offshore, Transocean Drilling, Fairfield Energy

- University Ghent: Approval for resistance against Microbially Induced Corrosion (MIC)
- TÜV Rheinland: Approval for combination with cathodic protection systems
- SGS: Resistance to liquids of Humidur FP (EI 1541 + ISO 2812-1)
- Force Technology: Fuel and water resistance testing of Humidur FP (MIL-PRF 4456F)
- Norsok M-501: Rev. 6 June 2013, section N° 7, by SGS
- NDT inspections allowed (tested on Talisman Energy assets)
- Royal Haskoning: Most cost-effective anti-corrosion solution (Life Cycle Cost Analysis)
- Approved by CCS for above and below ship's waterline and the inside of tanks
- The use of Humidur FP in combination with the Humidur Non-Skid Aggregate is approved according to the Friction Test Standard Requirements as per UK CAA CAP 437 (Standards for offshore helicopter landing areas).
- Approved in accordance with IMO PSPC-WBT-MS-C.215(82) (Water ballast tank) and IMO PSPC-COT-MS-C.288(87) (crude oil tank)
- Humidur FP is approved by Saudi Aramco under 09-SAMSS-070, more specifically APCS-19C.



12. Important Note

The English version of the Technical Data Sheet takes precedence over other languages. The latest version of the Technical Data Sheet can be found on our website www.humidur.com.

Should there be any discrepancies between this document and the document online, the online document takes precedence.