



FUSION BONDED EPOXY

PROTECTIVE COATING



PEKA
CHEMIE
INDUSTRIAL COMPANY



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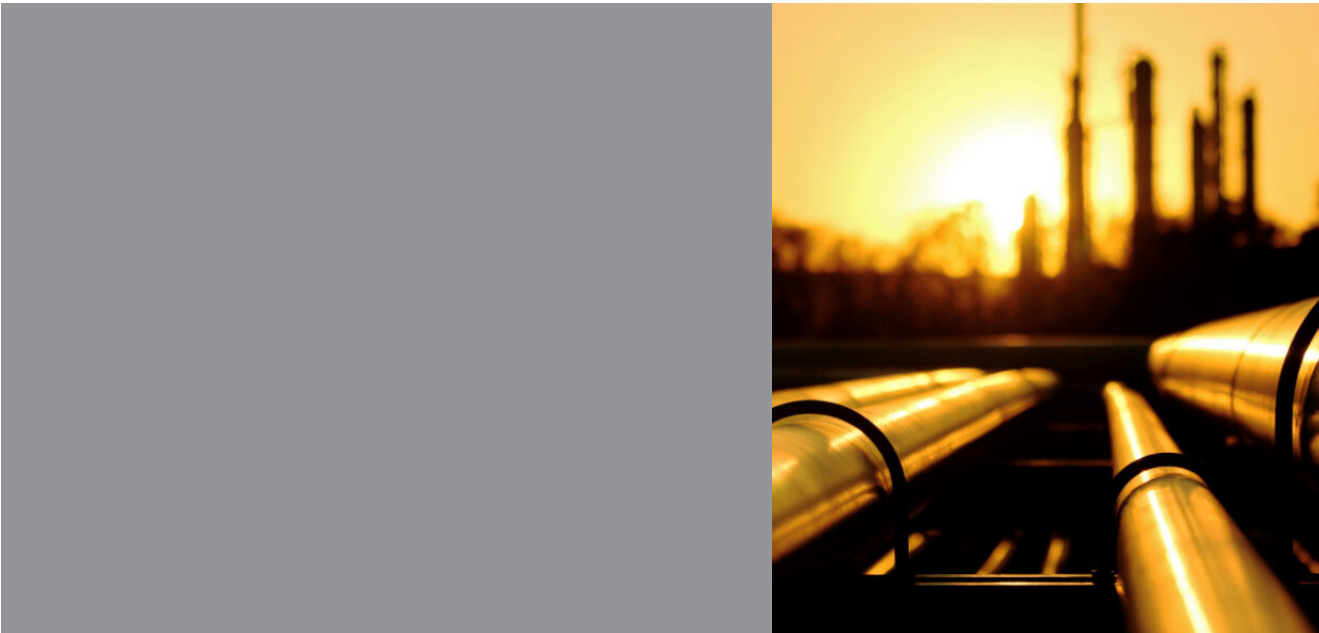


About us

PEKA CHEMIE Company was founded in March 1995 with the aim of producing different kinds of powder coatings.

As the biggest producer of powder coatings based in Iran, PEKA CHEMIE has been supplying the highest quality of powder coatings, including decorative, industrial and fusion bonded epoxy.

PEKA CHEMIE, owing to its highly developed technology and technical experts in the field, is the stand-alone producer of fusion-bonded epoxy in Iran.



Introduction

Peka Chemie Co.

Corrosion and degradation of the water, oil and gas transportation steel pipelines are among the serious problems in various industries. Repairing or replacing destroyed pipes is very costly. One of the most effective methods for corrosion protection of the pipelines is the application of pipe coatings for the cathodic protection process. Steel pipelines covered with protective coats must be mechanically resistant during transportation, working operations and resistant to the destructive effects of the soil. Also, when cathodic protection is carried out on a coated pipeline, the coating can be delaminated from the surface through destructive conditions and cathodic reactions. In this case, the cathodic disbonding extends radially from the defects in the coating.

Therefore, studies on the production of powder coatings with a significant resistance to corrosion and cathodic disbondment have always been considered by researchers and experts working in PEKA CHEMIE industrial company. FBE is a group of epoxy powder coatings that is used as a protective coating for steel pipelines, reinforcing steel bars due to their anti-corrosion and barrier properties.



Peka-Pro Products

PEKA CHEMIE Co.



Peka-Pro

Peka-Pro is a series of fusion bonded epoxy products from PEKA CHEMIE that have excellent corrosion and cathodic disbondment resistance along with outstanding mechanical performance on steel pipelines and reinforced steel bars, even in severe operating conditions.

The portfolio of Peka-Pro products includes:

- Peka-Pro SL (single layer FBE)
- Peka-Pro DL (Dual Layer FBE)
- Peka-Pro Pr (Primer for three-layer and dual-layer systems)
- Peka-Pro Re (Rebar Coating)
- Peka-Pro IPC (Internal Pipe Coating for Potable Water)
- Peka-Pro IPC II (Internal Pipe for wastewater and non-potable Water)

Substrate condition:

For applying Peka-Pro products, steel pipelines should be blasted at Sa2 ½ degree defined by ISO11124-3, and the average profile thickness should be 50 to 100 microns.



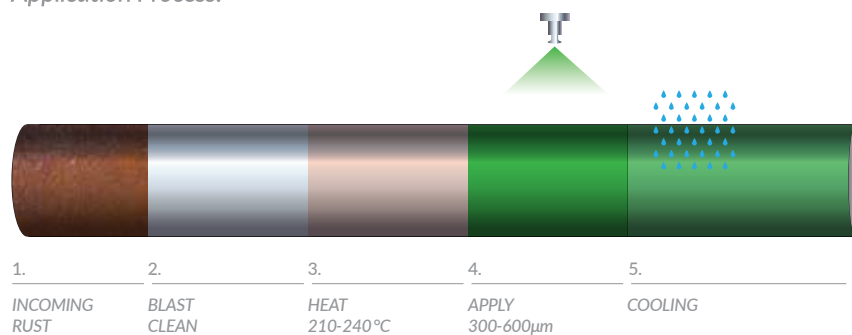
Peka-Pro SL

(Standard Single Layer FBE)

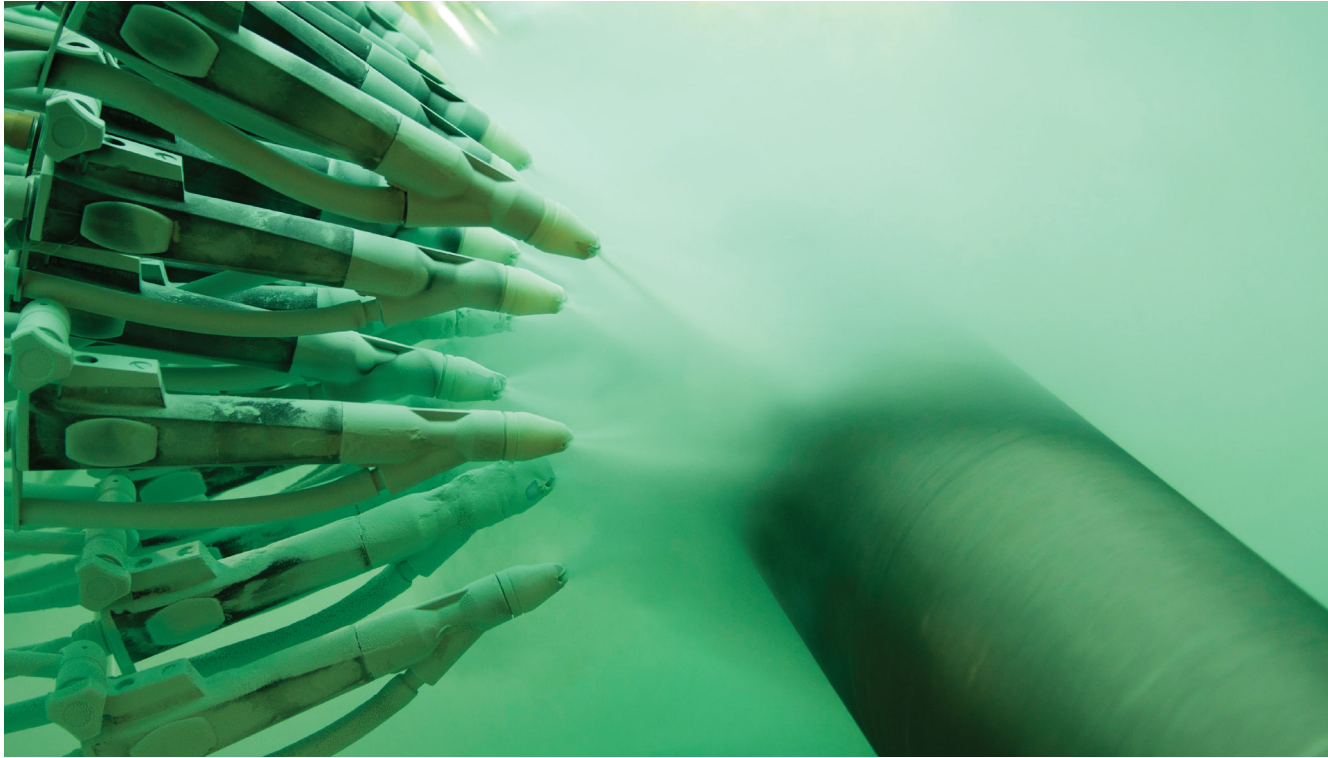
Peka-Pro SL includes a range of stand-alone fusion-bonded epoxy coatings for steel pipelines. This is a cost-effective solution for oil, gas and water pipeline transportation systems. Film property meets CSA Z245.20-22 1A and ISO21809-2 system requirements.

Advantages:

- Excellent corrosion resistance
- High Cathodic disbondment resistance
- Excellent adhesion to metal substrates
- Outstanding mechanical performance, even with high film thickness
- Cost-effective solution for customers
- Available in 4 types of Gel time:
 1. Short: 10±20% (s)
 2. Medium: 25±20% (s)
 3. Long: 35±20% (s)
 4. Extra Long: 60±20% (s)

Application Process:**Technical features of Peka-Pro SL(standard SL FBE):**

PROPERTY	TEST METHOD	ACCEPTANCE CRITERIA	RESULTS
Color	----	----	Green & Gray
Gel time at 205°C	ISO 21809-02 (Clause A.3)	----	Available in 4 types
Impact Resistance	ISO 21809-02 (Clause A.14)	≥2 J	Pass
Cathodic Disbondment	ISO 21809-02 (Clause A.9)	24 hours, -3.5V, 65°C±3°C ≤ 5 mm 28 days, -1.5V, 20°C±3°C ≤ 8 mm 28 days, -1.5V, 65°C±3°C ≤ 18 mm	1- 4 mm 1-3 mm 6-9 mm
Flexibility @ -30°C	ISO 21809-02 (Clause A.13)	No cracking @ 2° ppd	Pass
28 d hot-water adhesion 75°C ± 3°C	ISO 21809-02 (Clause A.16)	Rating of 1 to 3	Rating 1
Taber Abrasion Resistance	ISO 21809-02 ASTM D4060	100 mg	35 mg



Peka-Pro LAT

(Low Application Temperature)

Peka-Pro LAT is specially formulated for low-temperature applications, typically used in pipeline coatings and other corrosion-resistant systems where the substrate cannot withstand standard FBE application temperatures (180–250°C) or where reduced energy consumption is desired. Low temperature FBE powders are formulated to cure effectively at lower substrate temperatures often around 150–180°C or even lower in some advanced systems.

Despite its reduced curing temperature, Peka-Pro LAT maintains strong adhesion to steel substrates and offers chemical and abrasion resistance comparable to conventional fusion-bonded epoxy (FBE) coatings. This makes it an ideal solution for field joints, small diameter pipes, insulated pipelines, and other applications where high-temperature curing is not feasible. With its advanced formulation and reliable protective properties, Peka-Pro LAT provides a high-performance, energy-efficient alternative for modern pipeline coating projects.

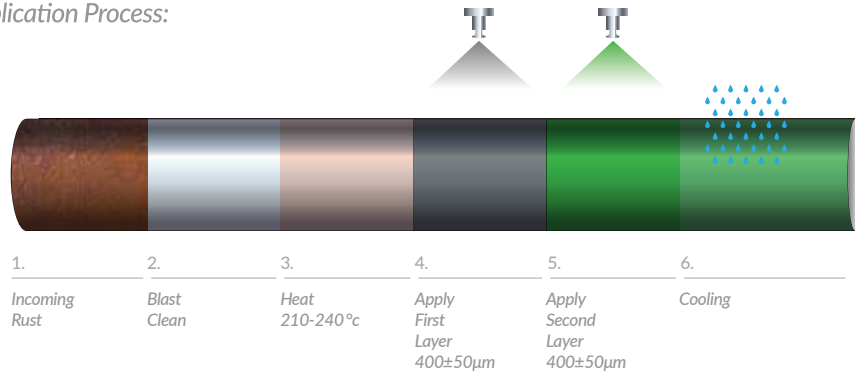
Peka-Pro HT (single layer FBE for high Temperature service)

Peka Chemie has introduced a new Fusion Bonded Epoxy (FBE) technology Peka-Pro HT120, Peka-Pro HT140 and Peka-Pro HT160. Peka-Pro HT protects oil and gas pipelines against corrosion while they operate at high temperatures.

Peka-Pro HT products are a one-part, heat-curable thermosetting epoxy powder designed as a stand-alone or as the corrosion coating for a dual-layer FBE and multilayer polyolefin system for the corrosion protection of pipe. These new FBE coatings have excellent thermal properties that protect natural gas and crude oil pipes against corrosion.

Peka-Pro HT120, Peka-Pro HT140 and Peka-Pro HT160 can operate up to 110°C, 130°C and 150°C respectively as stand-alone coatings. For mechanical protection of this series of products, a second mechanical layer with high service temperature (Peka-Pro DL-AR-HT) can be applied.

Application Process:



Film Results*

PROPERTY	TEST DESCRIPTION	PEKA PRO-HT120	PEKA PRO-HT140	PEKA PRO-HT160
Cathodic Disbondment	CSA-Z245.20- 12.8	Disbondment Radius (mm)	Disbondment Radius (mm)	Disbondment Radius (mm)
	28d, 95°C, -1.5 V	3	7	8
	28d, 65°C, -1.5 V	2.5	5	7
Adhesion	CSA-Z245.20- 12.14	Rating	Rating	Rating
	28d, 75°C	1	1	1
	28d, 95°C	1	1	1
Flexibility	CSA-Z245.20- 12.11			
	2°ppd	No Cracking	No Cracking	No Cracking
Impact	CSA-Z245.20- 12.12			
	-30°C	≥ 5 j	≥ 3 j	≥ 3 j
Strained Coating Cathodic Disbondment	CSA-Z245.20- 12.13			
	1.5°ppd 28d, 20°C, -1.5 V	No Cracking	No Cracking	No Cracking

*Performance will be influenced by quality of surface preparation, film formation and curing conditions. The above test results are typical for 250-500 µm Peka-Pro HT120, Peka Pro-HT140 and Peka-Pro HT160 applied on steel panels cleaned to Near-White Blast SA2.5 (without acid wash or any pre-treatment)

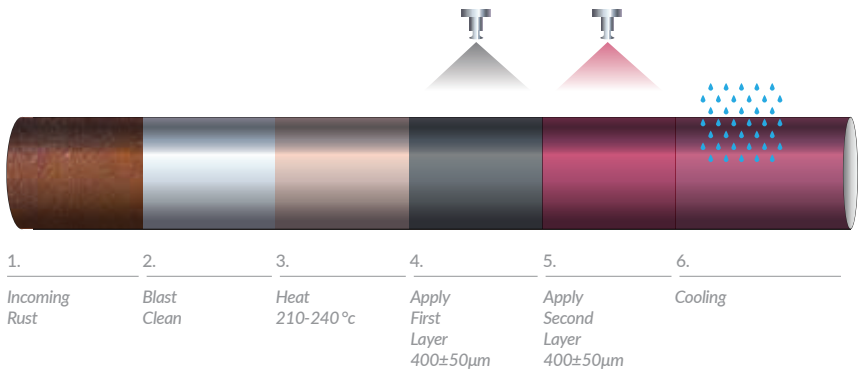


Peka-Pro DL (Dual Layer FBE)

Dual layer FBE was introduced to the market in 1999 as an alternative to multi-layer system for directional drilling applications. In the dual layer FBE system two stand-alone FBE are applied one after the other on steel pipelines to protect steel pipelines from corrosion, cathodic disbondment and mechanical damage arising from laying, handling, backfilling and horizontal drilling. Dual Layer FBE is much more effective than Single Layer FBE.

Peka-Pro DL as a top coat and Peka-Pro Pr as a primer together show outstanding cathodic disbondment resistance and mechanical performance in severe operating conditions.

Application Process:

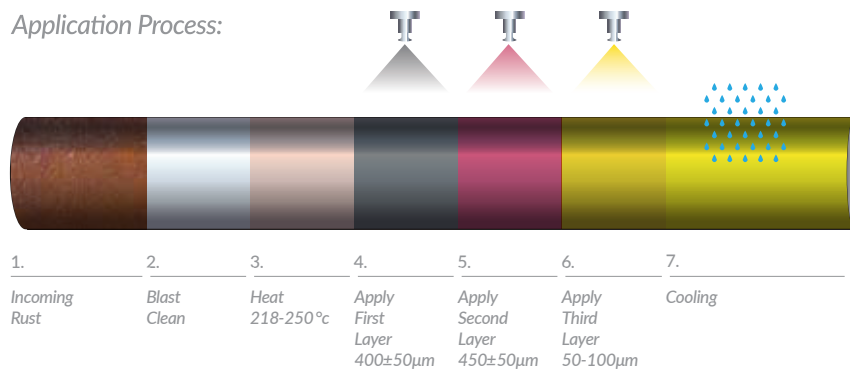


Peka-Pro DL from PEKA CHEMIE includes 5 systems according to required application:

Peka-Pro DL-AR (Dual Layer Abrasion Resistance System)

Pipes are exposed to mechanical stress during handling and transportation. Peka-Pro DL-AR ensures optimum protection during laying, handling, backfilling and horizontal drilling. Because of its special formulation, Peka-Pro DL-AR enjoys excellent abrasion and gouge resistance to pipelines. Peka-Pro DL-AR meets IGS-M-TP-026 and CSA Z245.20-22 system 2B requirements.

Application Process:



Peka-Pro DL-AR-HT (Dual Layer Abrasion Resistance with High Temperature Resistance System)

In transportation pipelines where operational temperatures exceed 90°C, the use of a high-temperature-resistant coating is essential to ensure long-term integrity and performance. This type of coating must maintain its mechanical strength, abrasion resistance, and adhesion properties under continuous exposure to elevated service temperatures, typically up to 130°C.

Such coatings are applied as a topcoat system over primary corrosion protection layers (like "Peka-Pro HT120, Peka Pro-HT140 and Peka-Pro HT160") and are specifically engineered to withstand thermal stress without compromising protective functionality. These advanced formulations are widely known as "Peka-Pro DL-AR-HT" in multi-layer pipeline coating systems.

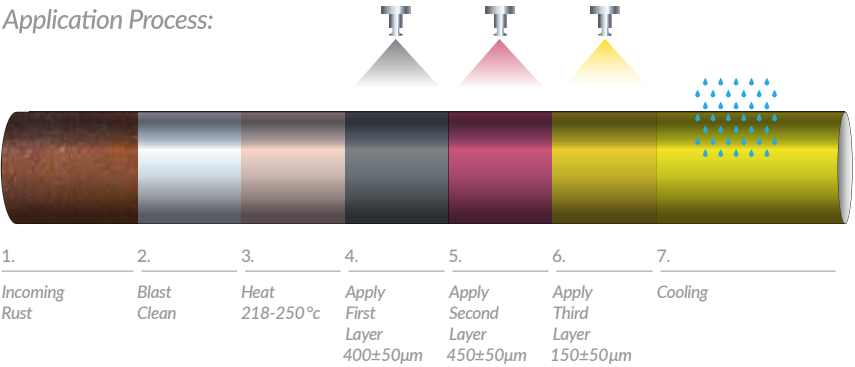
Peka-Pro DL-AS (Dual Layer Anti-Slip System)

In some projects concrete weight coatings are applied on coated pipes. To prevent slipping, an anti-slip coating as a second layer is applied to pipes. It improves the bond strength between pipe and concrete weight coating by increasing friction.

Peka-Pro DL-AS as the external anti-slip coating along with Peka-Pro Pr as a primer ensure excellent cathodic disbondment resistance and anti-slip properties.

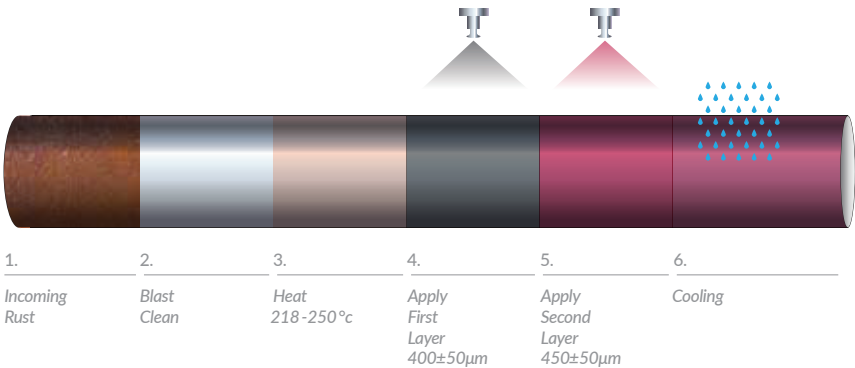
The Peka-Pro DL-AS system meets CSA Z245.20-22 system 2C requirement.

Application Process:



Peka-Pro DL-UF (Dual Layer Ultra-Flexible System)

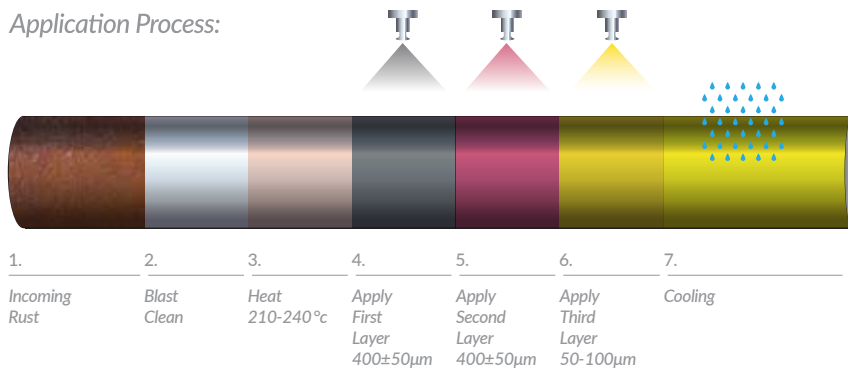
During pipe laying some pipes should bend more than usual. Peka-Pro DL-UF as a second layer on Peka-Pro Pr certifies excellent flexibility even in high film thickness. Peka-Pro DL-UF provides flexibility (defined in CSA Z245.20-22 system 2A) beyond expectation.



Peka-Pro DL-UV (Dual Layer UV Resistance System)

In some conditions pipes are not buried and are exposed to sunlight. Since Epoxy coatings will chalk fairly quickly when exposed directly to sunlight, the upper layer of pipe coating must resist UV degradation. Peka-Pro DL-UV is applied as a third layer on dual layer system to prevent UV degradation of dual layer system under sunlight exposure. Peka-Pro DL-UV is a UV resistant polyester.

Application Process:



Together, this dual-layer system offers reliable protection for pipelines exposed to both high temperatures and continuous UV radiation, making it ideal for industrial, petrochemical, and onshore infrastructure projects.

Technical features of Peka-Pro DL-AR and Peka-Pro DL-UF

PROPERTY	SPECIFICATION	ACCEPTANCE CRITERIA	RESULTS FOR PEKA-PRO DL-AR	RESULTS FOR PEKA-PRO DL-UF
Color	----	----	Green	Red
Gel time at 205°C	IGS-M-TP-026	----	Available in 4 types	Available in 4 types
Impact Resistance	IGS-M-TP-026	≥3.6 J	Pass	Pass
Cathodic Disbondment	IGS-M-TP-026	48 hours, -3.5V, 80°C±3°C ≤ 5 mm 28 days, -1.5V, 20°C±3°C ≤ 5 mm 28 days, -1.5V, 80°C±3°C ≤ 10 mm	1 - 4 mm 1 - 3 mm 5 - 7 mm	1 - 4 mm 1 - 3 mm 5 - 7 mm
Flexibility @ - 30°C	IGS-M-TP-026	No cracking @ 2° ppd	No cracking @ 3° ppd	No cracking @ 3.6° ppd
28 d hot-water adhesion 80°C ± 3°C	IGS-M-TP-026	< 10% of the test area blistering or disbonding no failure of adhesion pull off min 7 N/mm2 (> 50% surface area cohesive)	No Delamination	No Delamination
Gouge Resistance	IGS-M-TP-026	Maximum 25% total coating thickness	Pass	< 50% total coating thickness

Note: all tests performed on Dual layer system (Peka-Pro Pr (450±50µm) + Peka-Pro DL-AR or Peka-Pro DL-UF (450±50µm))



Peka-Pro Pr

(Dual Layer Abrasion Resistance with High Temperature Resistance System)

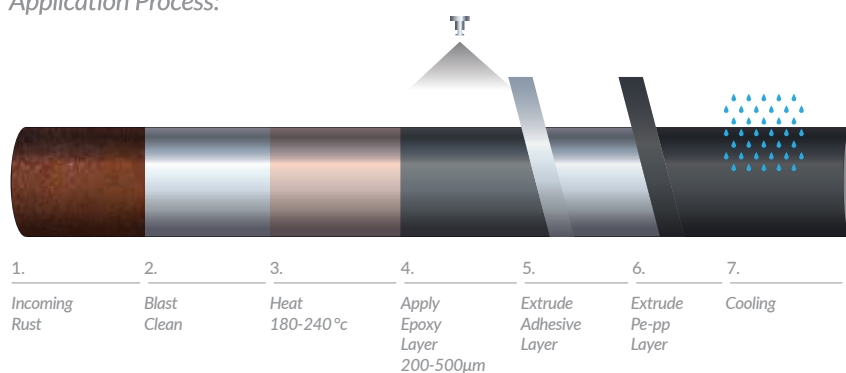
Triple-layered polyolefin system is the most famous protective coating for oil, gas and water pipelines all over the world.

The steps to apply include:

- 1) The surface pretreatment of the steel pipeline with shot blast operation
- 2) Application of Peka-Pro Pr on steel surface as a primer
- 3) Application of the copolymer adhesive layer
- 4) Application of polyethylene top layer in strip form with the extruder

This system has excellent cathodic disbondment resistance, high resistance to chemical attack and outstanding mechanical performance. Peka-Pro Pr has wide application range and is also used as a primer for dual layer system. Peka-Pro Pr meets IGS-C-TP-010 and CSA Z245.21 and Aramco 09-SAMSS-089 standards.

Application Process:



Technical features of Peka-Shield Pr as primer for three layers system:

PROPERTY	SPECIFICATION	ACCEPTANCE CRITERIA	RESULTS
Color	----	----	Grey
Gel time at 205°C	IGS - C - TP - 010	----	Available in 4 types
Cathodic Disbondment	IGS - C - TP - 010	28 days, -1.5V, 65°C±3°C ≤ 15 mm	5-9 mm
Flexibility @ -30	IGS - C - TP - 010	No cracking @ 3° ppd	Pass
28 d hot-water adhesion 75 °C ± 3 °C	IGS - C - TP - 010	Rating of 1 to 2	No Delamination



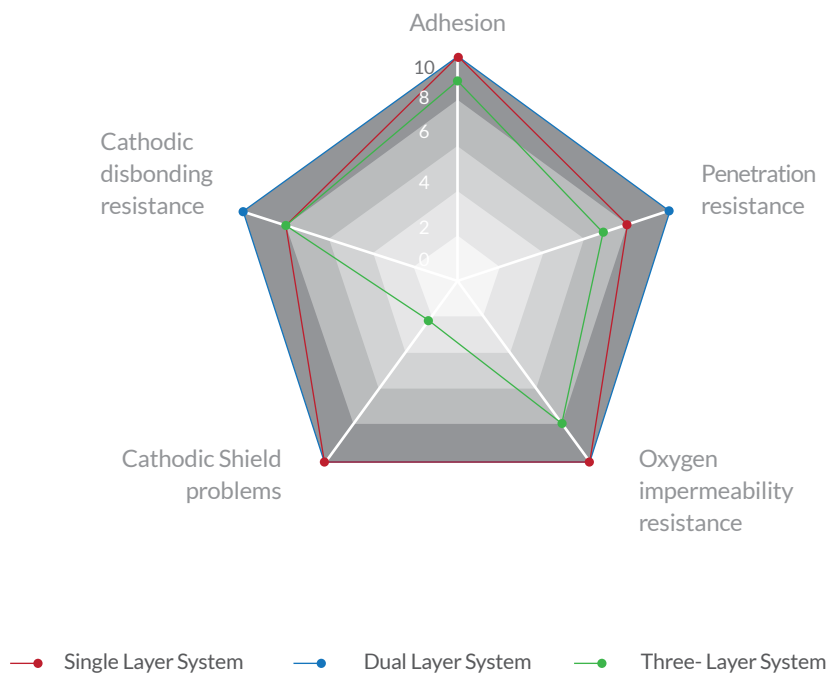
*Properties of Different
FBE System at a Glance*

10= Excellent 1= Very Poor

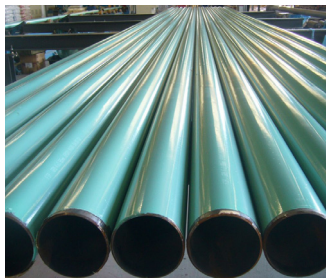
Customers choose the suitable FBE system according to their need.
The graph below compares the efficiency of FBE systems.

Properties of Different FBE System at a Glance

10= Excellent 1= Very Poor



Single Layer System



Dual Layer System



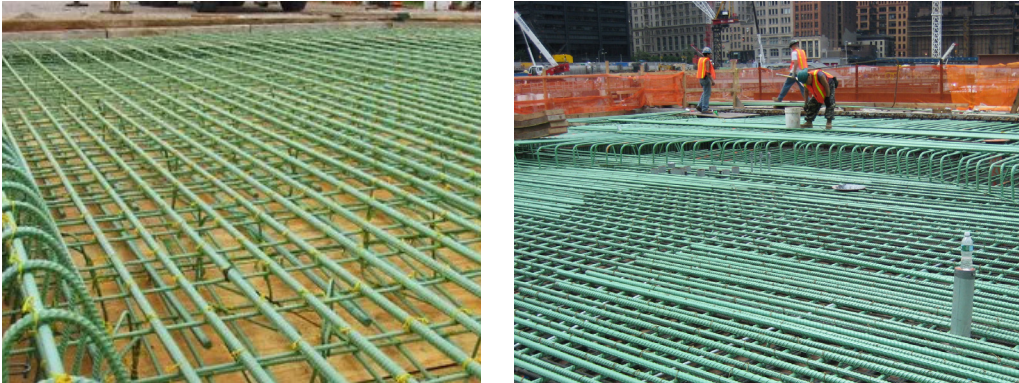
Three - Layer System

Peka-Pro Re

(Rebar Coating)

Steel rebar in concrete structures is usually protected by a passive film formed due to the alkaline environment of fresh concrete. However, this protective film can be degraded by the ingress of chloride or carbonation of the concrete cover layer. Once damaged, corrosion initiates in the presence of oxygen and moisture.





The volume of the corroded parts is usually two to six times greater than the volume of the original steel it consumes, resulting in tensile stress in the surrounding concrete. When the stress exceeds the tensile strength limit of concrete, cracking/spalling occurs in the concrete. Meanwhile, corrosion reduces the steel-concrete bond strength and the cross-sectional area of steel rebar. Therefore, steel corrosion is one of the main causes of premature deterioration in concrete structures.

Many techniques have been developed to protect steel rebar from corrosion in concrete structures, such as the addition of corrosion inhibitors or high-performance admixtures, use of protective coatings or corrosion resistant bars. Among these methods, the use of protective coatings is one of the most efficient methods because it can establish a physical and chemical barrier between the steel rebar and the corrosive environment.

Fusion-Bonded Epoxy (FBE) coating was identified as an effective method of corrosion protection in the early 1970s when, in North America in the late 1960s, premature deterioration of highway bridge decks was discovered as a result of corrosion of the reinforced steel.

Peka-Pro Re has been used along with other systems or on its own to protect rebar, dowel bar/dowel bar baskets, welded wire fabric/wire mesh, mechanical splicing, and spirals.

Peka-Pro Re is formulated to help provide superior flexibility for shop or field fabrication that exceeds current AASHTO and ASTM bend requirements. Peka-Pro Re is resistant to corrosive agents such as de-icing salts, airborne salt spray, seawater, harsh chemicals, acid rain, and carbonation, contaminated aggregate and concrete additives.

Peka-Pro Re meets ASTM A 775 / A 775M Standard.

Peka-Pro IPC

(Internal Pipe Coating for Potable Water)

Peka-Pro IPC has been used for potable water pipelines. For any pipeline internal lining application, the coating must withstand the constant flow of liquid or solid particles. This pure epoxy coating was designed for corrosion protection of water transporting pipelines. Peka-Pro IPC also meets the requirements of AWWA standard C213, and BS 6920 listed under WRAS (Cold & Hot water use up to 85 °C).



Peka-Pro IPC II

(Internal Pipe Coating for Wastewater (non-Potable Water))

Peka-Pro IPC II is a high-performance fusion-bonded epoxy (FBE) powder coating specifically developed for the internal lining of pipelines used in the transportation of non-potable water. Designed to endure the continuous flow of liquids containing suspended solids, this durable coating provides long-term protection against corrosion, erosion, and chemical degradation. The smooth, seamless surface of Peka-Pro IPC II minimizes friction loss, improves hydraulic efficiency, and prevents the buildup of sediments and microbial growth. This makes it an ideal solution for industrial water systems, cooling water lines, fire protection piping, and reclaimed water networks. Peka-Pro IPC II meets key international standards, including AWWA C213, ISO 2178, ISO 2409, and ASTM D4537, ensuring reliable performance under challenging operational conditions.

Peka-Pro FE

Flow Efficiency Fusion Bonded Epoxy

Peka-Pro FE is a series of fusion bonded epoxy of PEKA CHEMIE that is formulated specially for pipelines internal coatings which carry Non-corrosive gas (sweet gas). Peka-Pro FE has been designed as a reliable solution to improve gas transmission efficiency, reduce transportation costs. When applied to the internal surface of steel pipes, Peka-Pro FE reduces the surface roughness (Rz) from 30-50 microns to even below 1 micron. A smoother surface (Rz) will increase flow capacity whilst reducing transportation costs. Peka-Pro FE meets requirements of API RP 5L2 and ISO 15741.

Film* Results

PROPERTY	Test Method	Acceptance Criterion	Results
Color	----	----	Light grey
Salt Spray 500 hrs	ASTM B117	API RP 5L2 (Appendix #2)	No blistering and delamination
Water Immersion	Saturated CaCO ₃ solution in distilled water- 100% immersion, room temperature, 21 days.	API RP 5L2 No blistering over 0.25 in. (6.3 mm) from Edges	Pass
Stripping	API RP 5L2 (Appendix #3)	API RP 5L2 (Appendix #3)	Pass
Bending	ASTM D 522	API RP 5L2	Pass
Adhesion	API RP 5L2 (Appendix #4)	API RP 5L2 (Appendix #4)	Pass
Hardness	DIN 53 153	API RP 5L2 Minimum 94 Buchholz at 77 ± 2°F	Pass
Gas Blistering	API RP 5L2 (Appendix #5)	No blistering	Pass
Abrasion	ASTM D 968, Method A	API RP 5L2 Minimum 23 Coef. Of Abrasion	Pass
Hydraulic Blistering	API RP 5L2 (Appendix #6)	API RP 5L2 Minimum 23 Coef. Of Abrasion	Pass
Surface Roughness (Rz)	-----	-----	≤ 3 µm

all film properties obtained on shot blasted steel Sa 2.5 (ISO 8501-1) with surface profile 35-50 µm with film thickness 150µm.



Peka-Pro SGS

(Sour Gas Service)

Peka-Pro SGS is a specialized fusion-bonded epoxy (FBE) coating developed by PEKA CHEMIE for the internal protection of pipelines carrying sour gas. Formulated to perform in aggressive environments containing hydrogen sulfide (H_2S) and carbon dioxide (CO_2), Peka-Pro SGS offers long-term corrosion resistance while maintaining excellent structural integrity.

To ensure optimal performance under such harsh conditions, Peka-Pro SGS incorporates a specially engineered Liquid Phenolic Primer, which promotes strong adhesion and enhances durability against chemical attack and coating disbondment.

Its smooth, inert surface minimizes the accumulation of corrosive deposits and inhibits microbial growth, contributing to extended pipeline service life.

The product has been tested and certified by internationally recognized laboratories, confirming its compliance with key industry standards, including Saudi Aramco's 09-SAMSS-091, and its reliability for sour gas service applications.

Test	Required Value		Standard / Clause
Visual Assessment	In original state	Smooth, uniform, defect-free surface	09-SAMSS-091, Sec. 9.9
	After environmental tests	No cracks, blisters, discoloration; gloss loss allowed	Sec. 10.11
Dry Film Thickness (DFT)	375–625 μm (APCS-102A/B), 500–750 μm (APCS-102C)		09-SAMSS-091 Sec. 9.5
Dielectric Continuity (Holiday Test)	No voltage breakdown Max 10 holidays (>24"), Max 3 holidays ($\leq 20"$)		NACE SP0188 / Sec. 11.6
Abrasion Resistance	Weight loss < 100 mg (CS-17 wheel, 1kg load, 1000 cycles)		ASTM D4060 / Appx A-3.6
Adhesion	In original state	No adhesive failure (knife test)	ASTM D6677 / Sec. 11.5
	After service simulation	Max 30% reduction from initial adhesion	09-SAMSS-091 Sec. 11.5.1.4
Cure Test (DSC)	$\Delta T_g (Tg4 - Tg3) = \pm 3^\circ\text{C}$		CSA Z245 Clause 12.7 / Sec. 11.8
Flexibility (Bend Test)	No cracks or delamination, 5.5°/PD @ 25°C		NACE SP0394 / Sec. 11.7
Surface Cleanliness	Sa 3 (white metal finish)		ISO 8501-1 / Sec. 8.3
Chloride Contamination	$\leq 20 \text{ mg/m}^2$		ISO 8502-6 / Sec. 8.8
Dust Level	Class ≤ 2		ISO 8502-3 / Sec. 8.5
Anchor Profile	50–100 μm		Sec. 8.4
Coating Resistance to Environments	3% CO ₂ + 3% H ₂ S, 95°C, 3000 psi	Adhesion reduction $\leq 30\%$, no blisters/cracks	NACE TM0185 / Appx A-3.8
	Treated seawater, 90°C, 3000 psi	Same as above	Appx A-3.8
	10% HCl, 70°C, 1 month	Same as above	Appx A-3.8
Porosity (Cross-section & Interface)	Rating 1–3		CSA Z245 Clause 12.10 / Appx A-3.7
EIS (Electrochemical Impedance)	$\geq 1 \times 10^8 \text{ ohm}\cdot\text{cm}^2 @ 0.01 \text{ Hz}$		Appx A-3.5
Density of Powder	As per manufacturer's specification		CSA Z245 / Appx A-3.9
Moisture Content of Powder	$\leq 0.5\%$ (from fluidized bed)		CSA Z245 Clause 12.4 / Sec. 6.1.6

HEAD OFFICE: 3RD FLOOR, NO.48, 16TH WEST ST, NORTH ALLAMEH ST,
SAADAT ABAD, TEHRAN, IRAN P.O.BOX: 19979 - 86467

FACTORY: NO.10, BOOALI SINA ST, BAHARESTAN BLVD, SHAMS ABAD
INDUSTRIAL COMPLEX, TEHRAN, IRAN P.O.BOX: 18341 - 79433
TEL: +98 21 - 83824 FAX: +98 21 - 22362072 www.pekachemie.com



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