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Guide to Coating Systems

ISO 12944

Protecting your assets worldwide





ISO 12944-1 to 8

ISO 12944 Paints and Varnishes – Corrosion protection of steel structures by protective paint systems (parts 1-8), 2017, 2018

The ISO 12944 standard is intended to assist engineers and corrosion experts in adopting best practice in corrosion protection of structural steel at new construction.

ISO 12944 is progressively superseding regional standards to become a truly global benchmark in corrosion control.

Selecting specifications that comply with ISO 12944 provides clients with :

- Confidence that the corrosion protection specified will be fit for purpose.
- An objective approach to coating selection.
- A meaningful coating design life.
- A simplified matrix of coating systems to select from.
- A universally accepted standard.

ISO 12944-9

ISO 12944 Paints and Varnishes - Corrosion protection of steel structures by protective paint systems. Protective paint systems and laboratory performance test methods for offshore and related structures (part 9) 2018

Offshore and related structures require specific attention in order to be able to withstand the severe corrosion stresses to which they are exposed during their service life and to minimise the risk along with the relevant laboratory performance tests to assess their likely durability.

ISO 12944 part 9 places emphasis on high-durability paint systems, with the aim of minimizing maintenance and hence reducing safety considerations and environmental impact.

This document specifies the performance requirements for protective paint systems for offshore and related structures i.e. those exposed to the marine environment atmosphere, as well as those immersed in sea or brackish water. Such structures are exposed to environment category CX (offshore) and immersion category Im4.

The coating systems presented in this guide have been laboratory tested and conform to ISO 12944, Corrosive Categories C2 low to C5 very high and CX extreme.

To select a compliant system follow steps 1 and 2 below.

1. Consult the table below to select the most appropriate classification for your project.

Corrosivity Categories	Corrosivity Categories & Risk	Exterior (Typical Environments)	Interior (Typical Environments)
C1	Very low	-	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels
C2	Low	Atmospheres with low level of pollution, mostly rural areas	Unheated buildings where condensation can occur, e.g. depots, sports halls
C3	Medium	Urban and industrial atmospheres, moderate sulphur dioxide pollution. Coastal areas with low salinity	Production rooms with high humidity and some air pollution e.g. food-processing plants, breweries, dairies
C4	High	Industrial areas and coastal areas with moderate salinity	Chemical plants, swimming pools, coastal ship and boatyards
C5	Very high	Industrial areas with high humidity and aggressive atmosphere and coastal areas with high salinity	Buildings or areas with almost permanent condensation and with high pollution
CX	Extreme	Offshore areas with high salinity and industrial areas with extreme humidity and aggressive atmosphere and sub-tropical and tropical atmospheres	Industrial areas with extreme humidity and aggressive atmosphere

2. Choose the durability of the coating system below. ISO 12944 [parts 1 to 8] considers four time spans to categorize durability and part 9 considers high durability. The higher the durability, the longer the time to first major maintenance. Note the durability range is not a “guarantee time”.

Low durability : up to 7 years

Medium durability : 7 years to 15 years

High durability : 15 years to 25 years

Very high durability : more than 25 years

C2

Paint systems for low-alloy carbon steel for corrosivity category C2

Surface preparation: Sa 2½ (ISO 8501-1)

System No.	Priming Coat(s)				Subsequent Coat(s)	Paint System		Expected Durability**				Kansai's Recommended Systems			
	Binder*	Type of Primer*	No. of Coats	NDFT* (µm)		Binder*	No. of Coats	NDFT* (µm)	LOW	MED	HIGH	VERY HIGH	Generic Name	Coating System	NDFT (µm)*
A	AK	Misc.	1	70	AK	2	100					Alkyd Primer	RUSGON PRIMER	70	2
								Alkyd Paint	RUSGON TOPCOAT	30					
B	EP	Misc.	1	70	EP,PUR	2	120					Epoxy Primer	EPOTECT HB	70	2
								Polyurethane	RETANTECT 6000(M)	50					

* [Abbreviation] AK: Alkyd / EP: Epoxy / ESI: Ethyl Silicate / PUR: Polyurethane / Zn(R): Zinc Rich Primer
Misc: Primers with miscellaneous types of anticorrosive pigments / NDFT: Nominal Dry Film Thickness

** Expected durability is indicated in ISO 12944-1 which is a technical consideration/planning parameter that can help the owner set up a maintenance programme

C3

Paint systems for low-alloy carbon steel for corrosivity category C3

Surface preparation: Sa 2½ (ISO 8501-1)

System No.	Priming Coat(s)				Subsequent Coat(s)	Paint System		Expected Durability**				Kansai's Recommended Systems			
	Binder*	Type of Primer*	No. of Coats	NDFT* (µm)		Binder*	No. of Coats	NDFT* (µm)	LOW	MED	HIGH	VERY HIGH	Generic Name	Coating System	NDFT (µm)*
A	AK	Misc.	1	80	AK	3	160					Alkyd Primer	RUSGON PRIMER	80	3
								Alkyd Paint	RUSGON TOPCOAT	40					
								Alkyd Paint	RUSGON TOPCOAT	40					
B	EP	Misc.	1	120	EP,PUR	2	180					Epoxy Primer	EPOTECT HB	120	2
								Polyurethane	RETANTECT 6000(M)	60					
C	EP	Zn(R)	1	60	EP,PUR	3	200					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	80					
								Polyurethane	RETANTECT 6000(M)	60					

* [Abbreviation] AK: Alkyd / EP: Epoxy / ESI: Ethyl Silicate / PUR: Polyurethane / Zn(R): Zinc Rich Primer
Misc: Primers with miscellaneous types of anticorrosive pigments / NDFT: Nominal Dry Film Thickness

** Expected durability is indicated in ISO 12944-1 which is a technical consideration/planning parameter that can help the owner set up a maintenance programme

C4

Paint systems for low-alloy carbon steel for corrosivity category C4

Surface preparation: Sa 2½ (ISO 8501-1)

System No.	Priming Coat(s)				Subsequent Coat(s)	Paint System		Expected Durability**				Kansai's Recommended Systems			
	Binder*	Type of Primer*	No. of Coats	NDFT* (µm)		Binder*	No. of Coats	NDFT* (µm)	LOW	MED	HIGH	VERY HIGH	Generic Name	Coating System	NDFT (µm)*
A	EP	Misc.	1	80	EP, PUR	2	120					Epoxy Primer	EPOTECT HB	70	2
								Polyurethane	RETANTECT 6000(M)	50					
B	EP	Zn(R)	1	60	EP, PUR	2	160					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	50					
								Polyurethane	RETANTECT 6000(M)	50					
C	EP	Zn(R)	1	60	EP, PUR	3	200					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	80					
								Polyurethane	RETANTECT 6000(M)	60					
D	ESI	Zn(R)	1	75	EP, PUR	3	200					Silicate Primer	ZINCTECT 1500	60	3
								Epoxy	EPOTECT HB(M)	80					
								Polyurethane	RETANTECT 6000(M)	60					
E	EP	Zn(R)	1	60	EP, PUR	3	260					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	140					
								Polyurethane	RETANTECT 6000(M)	60					
F	ESI	Zn(R)	1	75	EP, PUR	3	260					Silicate Primer	ZINCTECT 1500	75	3
								Epoxy	EPOTECT HB(M)	125					
								Polyurethane	RETANTECT 6000(M)	60					

* [Abbreviation] AK: Alkyd / EP: Epoxy / ESI: Ethyl Silicate / PUR: Polyurethane / Zn(R): Zinc Rich Primer
Misc: Primers with miscellaneous types of anticorrosive pigments / NDFT: Nominal Dry Film Thickness

** Expected durability is indicated in ISO 12944-1 which is a technical consideration/planning parameter that can help the owner set up a maintenance programme

C5

Paint systems for low-alloy carbon steel for corrosivity category C5

Surface preparation: Sa 2½ (ISO 8501-1)

System No.	Priming Coat(s)				Subsequent Coat(s)	Paint System		Expected Durability**				Kansai's Recommended Systems			
	Binder*	Type of Primer*	No. of Coats	NDFT* (µm)		Binder*	No. of Coats	NDFT* (µm)	LOW	MED	HIGH	VERY HIGH	Generic Name	Coating System	NDFT (µm)*
A	EP	Zn(R)	1	60	EP, PUR	3	200					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	80					
								Polyurethane	RETANTECT 6000(M)	60					
B	EP	Zn(R)	1	60	EP, PUR	3	260					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	140					
								Polyurethane	RETANTECT 6000(M)	60					
C	ESI	Zn(R)	1	75	EP, PUR	3	260					Silicate Primer	ZINCTECT 1500	75	3
								Epoxy	EPOTECT HB(M)	125					
								Polyurethane	RETANTECT 6000(M)	60					
D	ESI	Zn(R)	1	75	EP, PUR	3	280					Silicate Primer	ZINCTECT 1500	75	3
								Epoxy	EPOTECT HB(M)	145					
								Polyurethane	RETANTECT 6000(M)	60					
E	EP	Zn(R)	1	60	EP, PUR	3	280					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	160					
								Polyurethane	RETANTECT 6000(M)	60					
F	ESI	Zn(R)	1	75	EP, PUR	3	310					Silicate Primer	ZINCTECT 1500	75	3
								Epoxy	EPOTECT HB(M)	175					
								Polyurethane	RETANTECT 6000(M)	60					
G	EP	Zn(R)	1	60	EP, PUR	3	310					Epoxy Primer	ZINCTECT 500	60	3
								Epoxy	EPOTECT HB(M)	200					
								Polyurethane	RETANTECT 6000(M)	50					
H	ESI	Zn(R)	1	75	EP, PUR	3	310					Silicate Primer	ZINCTECT 1500	75	3
								Epoxy	EPOTECT HB(M)	175					
								Fluoro Polymer	FLOTECT	60					

* [Abbreviation] AK: Alkyd / EP: Epoxy / ESI: Ethyl Silicate / PUR: Polyurethane / Zn(R): Zinc Rich Primer
Misc: Primers with miscellaneous types of anticorrosive pigments / NDFT: Nominal Dry Film Thickness

** Expected durability is indicated in ISO 12944-1 which is a technical consideration/planning parameter that can help the owner set up a maintenance programme



Paint systems for low-alloy carbon steel for atmospheric corrosivity category CX offshore and related structures

Surface preparation: Sa 2½ (ISO 8501-1)

System No.	Priming Coat(s)				Subsequent Coat(s)	Paint System		Expected Durability**				Kansai's Recommended Systems			
	Binder*	Type of Primer*	No. of Coats	NDFT* (µm)		Binder*	No. of Coats	NDFT* (µm)	LOW	MED	HIGH	VERY HIGH	Generic Name	Coating System	NDFT (µm)*
A	ESI	Zn(R)	1	75	EP, PUR	3	280					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT HB(M)	145	
												Polyurethane	RETANTECT 6000(M)	60	
B	ESI	Zn(R)	1	75	EP, PUR	3	310					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT HB(M)	175	
												Polyurethane	RETANTECT 6000(M)	60	
C	ESI	Zn(R)	1	75	EP, PUR	3	280					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT HB(M)QD	145	
												Polyurethane	RETANTECT 6000(M)	60	
D	ESI	Zn(R)	1	75	EP, PUR	3	310					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT HB(M)QD	175	
												Polyurethane	RETANTECT 6000(M)	60	
E	ESI	Zn(R)	1	75	EP, PUR	3	280					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT AL FE	145	
												Polyurethane	RETANTECT 6000(M)	60	
F	ESI	Zn(R)	1	75	EP, PUR	3	310					Silicate Primer	ZINCTECT 1500QD-85	75	3
												Epoxy	EPOTECT AL FE	175	
												Polyurethane	RETANTECT 6000(M)	60	
G***	EP	Zn(R)	1	60	EP, PUR	3	280					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT HB(M)	160	
												Polyurethane	RETANTECT 6000(M)	60	
H***	EP	Zn(R)	1	60	EP, PUR	3	310					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT HB(M)	200	
												Polyurethane	RETANTECT 6000(M)	50	
I***	EP	Zn(R)	1	60	EP, PUR	3	280					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT HB(M)QD	160	
												Polyurethane	RETANTECT 6000(M)	60	
J***	EP	Zn(R)	1	60	EP, PUR	3	310					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT HB(M)QD	200	
												Polyurethane	RETANTECT 6000(M)	50	
K***	EP	Zn(R)	1	60	EP, PUR	3	280					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT AL FE	160	
												Polyurethane	RETANTECT 6000(M)	60	
L***	EP	Zn(R)	1	60	EP, PUR	3	310					Epoxy Primer	ZINCTECT 500	60	3
												Epoxy	EPOTECT AL FE	200	
												Polyurethane	RETANTECT 6000(M)	50	

* [Abbreviation] AK: Alkyd / EP: Epoxy / ESI: Ethyl Silicate / PUR: Polyurethane / Zn(R): Zinc Rich Primer
Misc: Primers with miscellaneous types of anticorrosive pigments / NDFT: Nominal Dry Film Thickness

** Expected durability is indicated in ISO 12944-1 which is a technical consideration/planning parameter that can help the owner set up a maintenance programme

***Applicable for high impact areas in off-shore environment

