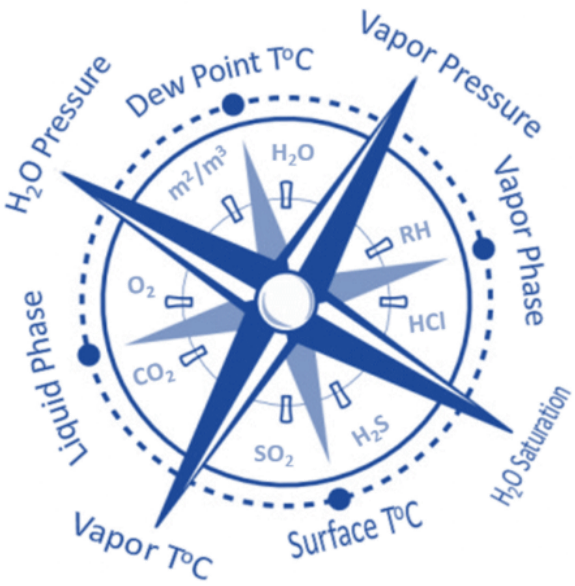

Corrosion Prediction Software and Corrosion Modeling Software

VPC-Compass®: Prediction and Modeling of Vapor Phase Corrosion in Closed Systems

A High Value Software Solution to Costly Corrosion

Version 9.20

☆ **Performance** ☆ **Functionality** ☆ **Usability**

Anytime	Anywhere	Any Device	Any OS
No USB dongles	No installation	No Browser Plug-ins	

Overview and Application Examples of VPC-Compass

VPC-Compass is the only device and OS independent software tool on the market for the prediction and modeling of vapor phase corrosion in closed systems such as storage tanks, pipelines, process vessels, and other industrial facilities. Designers, OEM engineers, consultants, operation personnel, maintenance and inspection engineers can quickly determine the corrosion rate of steel and the risk rankings of internal corrosion in the vapor phase of a closed system, anytime, anywhere, on any device running any OS without the need to install or download anything. VPC-Compass also predicts the relative humidity in the closed system, the partial pressure of water vapor, the saturated water vapor pressure, the dew point of water vapor, the thickness of moisture film on the internal surface, the surface conductivity of the moisture film, and the maximum metal loss over the lifetime of the closed system.

Figures below show the screen shots of VPC-Compass.

VPC-Compass®: Vapor Phase Corrosion in Closed Systems - Prediction, Modeling and Assessment

System description/ID	ABC Tank at XYZ Location, ID#123456				
Internal vapor pressure	kPa	24,659.000	Predicted corrosion risk category	No corrosion risk	
Internal vapor temperature	°C	40.00	Predicted relative humidity	%	0.333
Internal metal surface temperature	°C	40.00	Partial pressure of H_2O vapor	kPa	0.0246
Internal surface area to volume ratio	m^2/m^3	10.000	Saturation pressure of H_2O vapor	kPa	7.3824
H_2O content in vapor	g/m^3	0.170	Dew point temperature of H_2O	°C	-43.55
O_2 content in vapor	g/m^3	5.000	Predicted thickness of H2O film	nm	0
CO_2 content in vapor	g/m^3	0.010	Conductivity of H_2O film	$\Omega^{-1}.cm^{-1}$	No H2O
SO_2 content in vapor	g/m^3	0.010	Maximum metal loss over lifetime	µm	0.000
H_2S content in vapor	g/m^3	0.010	Comments:		
HCl in vapor	g/m^3	0.010	Under the current condition, there is no electrolyte (liquid water) to initiate corrosion in the vapor phase.		
HF in vapor	g/m^3	0.010			
HBr in vapor	g/m^3	0.010			

Figure 1 VPC-Compass predicts the risk of internal corrosion in the vapor phase (no corrosion risk).

Under the prevailing conditions shown in Figure 1 above, there is no risk of internal corrosion in the vapor phase as there is no electrolyte (liquid water) to support the corrosion process in the vapor phase. There is no moisture film on the internal surface and the surface is non-conductive..

Under the prevailing operating condition in Figure 2, VPC-Compass predicts that there is a medium risk of internal corrosion in the vapor phase as there exists sufficient electrolyte (liquid water) to sustain a moderate corrosion rate in the vapor phase. The predicted moisture film thickness is 11 nm and the surface conductivity is 5.924×10^{-9} $\Omega^{-1}.cm^{-1}$. The maximum metal loss over the lifetime of the closed system is 0.223 µm. The expected corrosion rate of steel is about 0.1 mm/y.

VPC-Compass®: Vapor Phase Corrosion in Closed Systems - Prediction, Modeling and Assessment

System description/ID	ABC Tank at XYZ Location, ID#123456				
Internal vapor pressure	kPa	24,659.000	Predicted corrosion risk category	Medium corrosion risk	
Internal vapor temperature	°C	25.00	Predicted relative humidity	%	73.891
Internal metal surface temperature	°C	25.00	Partial pressure of H_2O vapor	kPa	2.3413
Internal surface area to volume ratio	m^2/m^3	10.000	Saturation pressure of H_2O vapor	kPa	3.1685
H_2O content in vapor	g/m^3	17.000	Dew point temperature of H_2O	°C	17.35
O_2 content in vapor	g/m^3	5.000	Predicted thickness of H2O film	nm	11
CO_2 content in vapor	g/m^3	0.010	Conductivity of H_2O film	$\Omega^{-1}.cm^{-1}$	5.924e-9
SO_2 content in vapor	g/m^3	0.010	Maximum metal loss over lifetime	µm	0.223
H_2S content in vapor	g/m^3	0.010	Comments:		
HCl in vapor	g/m^3	0.010	Under the current condition, there exists sufficient electrolyte to sustain moderate corrosion rate in the vapor phase. Expected corrosion rate of steel is about 0.10 mm/y.		
HF in vapor	g/m^3	0.010			
HBr in vapor	g/m^3	0.010			

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Figure 2 VPC-Compass predicts the risk of internal corrosion in the vapor phase (medium corrosion risk).

Under the prevailing operating condition shown in Figure 3, there is a very high risk of internal corrosion in the vapor phase.

VPC-Compass®: Vapor Phase Corrosion in Closed Systems - Prediction, Modeling and Assessment

System description/ID	ABC Tank at XYZ Location, ID#123456				
Internal vapor pressure	kPa	24,659.000	Predicted corrosion risk category	Very high corrosion risk	
Internal vapor temperature	°C	25.00	Predicted relative humidity	%	100.000
Internal metal surface temperature	°C	25.00	Partial pressure of H_2O vapor	kPa	6.8860
Internal surface area to volume ratio	m^2/m^3	10.000	Saturation pressure of H_2O vapor	kPa	3.1685
H_2O content in vapor	g/m^3	50.000	Dew point temperature of H_2O	°C	36.60
O_2 content in vapor	g/m^3	5.000	Maximum thickness of H2O film	nm	3,751
CO_2 content in vapor	g/m^3	10.000	Conductivity of H_2O film	$\Omega^{-1}.cm^{-1}$	> 4.0E-8
SO_2 content in vapor	g/m^3	10.000	Maximum metal loss over lifetime	µm	1.022
H_2S content in vapor	g/m^3	10.000	Comments:		
HCl in vapor	g/m^3	10.000	Under the current condition, there exists very strong electrolyte to sustain very high corrosion rate in the vapor phase. Expected corrosion rate of steel is about 0.75 mm/y.		
HF in vapor	g/m^3	10.000			
HBr in vapor	g/m^3	10.000			

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Figure 3 VPC-Compass predicts the risk of internal corrosion in the vapor phase (very high corrosion risk).

The powerful applications of VPC-Compass are truly unlimited in engineering design, internal corrosion prediction and risk assessment, materials selection, trouble-shooting process-related issues and failure analysis of components and systems. A special edition of VPC-Compass for the microelectronics and semiconductor industry is also available.

Click here to contact us for licensing details and experience the power of VPC-Compass.