FROSIO PRE-EXAMINATION TEST

DUTIES OF AN INSPECTOR

1. As an inspector, you may need to understand:
   a) When should a paint inspector stop the ongoing work?
   b) Please define the difference between QA and QC.
   c) How the role of the paint inspector is normally regulated?

Answer:

a) An inspector should not stop the ongoing work except he/she gets a written authority.

b) QA is quality assurance and QC is quality control. QC is a part of QA.

c) The role of an inspector can be regulated by contract, specification and other legal document.

CONSTRUCTION MATERIAL AND DESIGN

2. What is the difference between brass and bronze is composition? Where do we normally use copper and its alloys?

Answer:

The difference is coming from the alloyed metal. Brass is an alloy by copper and zinc but bronze by copper and Tin. Copper and copper alloys are often used as electric cable, heating exchanger, pump, propeller, condensers, etc.

3. Give some advantages by use of square and bulb profiles in relation to H-beam and L-beam profiles.

Answer:

- *Square and bulb profiles can avoid deposits accumulating or water trapped.*
- *Square and bulb profiles are normally rolled with round edge (free from sharp edges).*

4. Different steel:

   a) What is the difference between stainless steel and mild steel?
   b) What kinds of corrosion prone to happen if a sea water tank is made by half stainless steel and half mild steel?
   c) Will you recommend painting mild steel or stainless steel, or other way to prevent corrosion and please explain why?

Answer:

a) The composition difference. Stainless steel composite chromium and other elements than iron and carbon is mild steel.

b) Galvanic corrosion, pitting corrosion.

c) No. I will recommend painting both mild steel and stainless steel with assisting by sacrificial anodes.
Individually apply paints to mild steel or stainless steel is risk to get galvanic corrosion if any damage occurs to coatings. The galvanic corrosion will be serious if coatings are on mild steel but general corrosion would happen if it is not painted. Painting both materials could prevent general corrosion and sacrificial anode would prevent galvanic corrosion.

CORROSION GENERAL

5. Gutter pipes made of aluminum are draining water from a copper covered roof. Severe corrosion is observed in places where there is metallic connection between the metals.
   a) What type of corrosion has caused this?
   b) Which of the two metals corrodes?

To solve the corrosion problem the two metals are insulated from each other. After some more years large holes is observed on the aluminum gutter pipes.

   c) How can you explain this phenomenon?

d) Please list other three materials that could be used in the gutter pipes to avoid the problems.

Answer:

a) Galvanic corrosion

b) Aluminum

c) It is possible the copper dust or particle occurring during exposure and flush onto gutter pipe. The dust and/or settle to the surface of aluminum forming as cathode. It is minor area comparing with aluminum pipe surface. That means the galvanic cell include a small cathode but big anode. The corrosion on anode (aluminum) would be very slow. That's why the large hole presented after some more years.

d) Copper, stainless steel. PVC

6. Which three factors are essential for general corrosion to take place?

Answer:

Temperature, humidity, contamination (pollution)

7. Some metals are more prone to attacks from stress corrosion than others.
   a) Name two metals which are particularly prone to stress corrosion.
   b) Name three factors which influence the formation of stress corrosion.

Answer:

a) Stainless steel, aluminum or brass

b) Stress, material, temperature, corrosive environment.

8. Give the characteristics of pitting corrosion and crevice corrosion

Answer:

Pitting corrosion: localized attack on material to form deterioration through depth of a metal.

Crevice corrosion: deterioration of metal on where a crevice exists.

9. Degraphitation is a special form of bimetallic corrosion and either iron or the steel is consumed through dissolution. Which of the two substances will go to dissolution?

Answer:

Iron will go to dissolution.

10. The galvanic series valid for sea water has been discussed.
    a) What do we mean by the term "galvanic series"?
    b) How can we utilize the galvanic series in anti-corrosion work?

Answer:

a) The galvanic series is a rank of potential difference of material in an electrolyte. And it can determine the nobility of metals and semi-metals.

b) We can check sequence of material by potential difference in galvanic series to fin which one is noble and which is not if dissimilar metals are electrically connected. By that, we can find which one is serious to corrosion.

11. Galvanic/bimetallic corrosion takes place in the presence of an electrolyte.
    a) What is an electrolyte?
    b) Why will anodes not work unless an electrolyte is presents?
    c) Which is the better electrolyte-fresh water or sea water- and why is this?

Answer:

a) Electrolyte is an electrically conductive liquid, e.g. seawater.

b) Lack of electrolyte will not transform ions so that the current can't form. Result of that is electron where the anode sacrifice can't provide to cathode. That's why the anode not works unless an electrolyte is present.

c) Sea water is a better electrolyte because there are more ions which can transfer current than is fresh water.

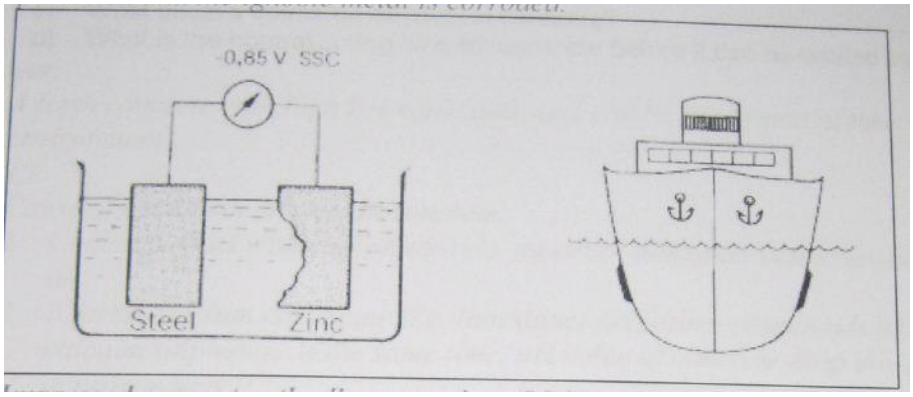
CATHODIC PROTECTION

12. Cathodic protection of the underwater hull on ship can be carried out in two ways.
    a) Please describe the two ways in which this can be done and make sketches to explain.
    b) Would you use magnesium anodes for the underwater protection of ships' hulls? Please justify you answer.

Answer:

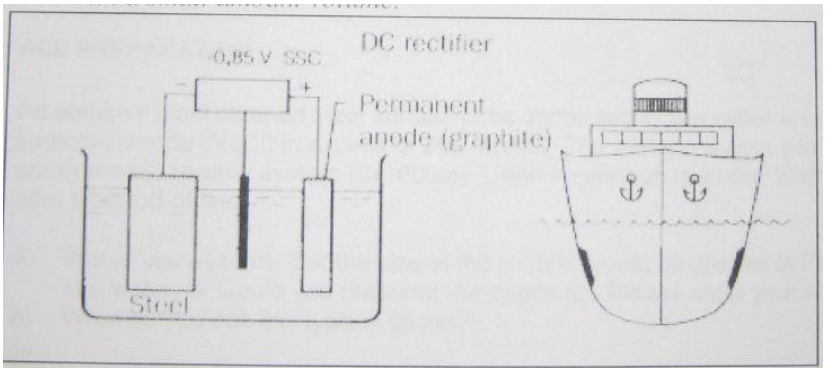
a) Sacrificial anode:

An ignoble metal is metallic connected with a noble metal in electrolyte. The ignoble metal will provide electron to noble metal. The noble metal is thus protected and the ignoble metal is corroded.



Impressed current cathodic protection (ICCP):

A noble metal or material (permanent anode) is used to protect and ignoble metal (cathode). An external power resource is used to change potential between these two metals once corrosion happened on cathode. Cathode is charged and the noble metal is converted as anode. The permanent anode is normal with good corrosion resistance so that it could last for very long time even with a small amount volume.



b) No, magnesium reacts with very high rate in water. At same time, it can create hydrogen gas to form blisters in film.

13. ICCP need to be generated in a certain condition. Please list some situation which ICCP system doesn't work.

Answer:

- *ICCP system is broken.*
- *The potential is not great enough.*
- *ICCP system is serving in fresh water.*
- *The permanent anode is covered by accident.*
-

14. Please answer below questions:
    a) Why does steel not corrode in concrete?
    b) What is the approximate pH for new concrete?
    c) What causes corrosion on steel in concrete?
    d) What is the normal curing time for concrete before it can be coated by paint?

Answer:

a) A fresh concrete with high PH value and steel can be passivated in the environment.

b) 13

c) Cause of corrosion on steel in concrete.

1). Concrete react with carbon dioxide, moisture and other acidic gases in the air.

2). It forms calcium carbonate (i.e. limestone) and other compounds (such as calcium sulphate). At the same time, PH value of concrete drop down to approximately 9.

3). Once carbonation develops down to the reinforcement steel, the steel is no longer protected by high PH environment. Rust occurs.

The expansion force of rust spalls the concrete and steel rebar expose in environment. The corrosion will be accelerated.

d) 4 weeks. (28 days).

SURFACE PREPARATION

15. An abrasive blast cleaned steel surface to be immersed in sea water is contaminated with sodium chloride (NaCl) in excess of 200 mg/m^2. The surface is over coated with an epoxy mastic coating system (3x100um). Upon immersion in water, blistering will start after a period time.
    a) Would you assume that the size of the blisters would be greater in fresh water than in sea water, or would you presume the opposite? Please state you reasons.
    b) What do you call this type of blister?

Answer:

a) The size of blisters will be greater in fresh water than in seawater. The reason is bigger concentration difference between surface and fresh water than in sea water.

b) Osmotic blister.

16. A long blasting hose to be used for a pot storing in door over night. It carries to outdoor at the early morning for a job. Do you expect any problem happen during blasting and why?

Answer:

The surface may get re-rusting because the cold air in early morning would cooling down the hose but the air inside hose is warm as in door temperature. The surface of inside hose will get condensation. The moisture will be sprayed on steel during blasting cause re-rust.

17. Please explain what difference would present on steel surface by using various surface preparation methods.

Answer:

Abrasive blasting: create roughness but couldn't remove contamination.

Hand and power tooling: may polish surface or give excessive roughness, it also couldn't remove contamination.

Water-jetting: expose the initial roughness but couldn't create, it can remove contamination at same time.

18. What should the pre-treatment before abrasive blast cleaning be?

Answer:

- *Treat steel imperfection, such as: lamination, roll-over, welding spatter.*
- *Remove surface contamination, such as: oil/grease, water soluble salt, dirt.*

19. Your company, which has many years of experience in the field of blast cleaning and painting, has been chosen for blast cleaning of different construction in Mok-po, South Korea. The job will involve blast cleaning of the following materials:
    A) Steel
    B) Aluminum
    C) Stainless steel.

Your client has little knowledge concerning blast-cleaning. His question is very simple: can you use the same abrasive for all materials? State your reasons.

Answer:

Yes, non-metallic abrasive can treat steel, aluminum and stainless steel without resk of galvanic corrosion.

20. How could a blasting pot adjust mixing ratio between grit and compressed air to be used and where could you handle it?

Answer:

By a metering valve, it is normally under blasting pot.

21. How do we determine if a blasted steel surface achieving the required metal cleanliness or not?

Answer:

By visual assessment according to ISO 8501

22. Why is a surface profile important to adhesion of a coating system?

Answer:

The surface profile can increase contact area between coating system and surface. Therefore, the dispersion force between paint and substrate is increased in a unit area.

AMBIENT CONDITION

23. What is the definition of the term "relative humidity", and what can we use to determine the relative humidity?

Answer:

The amount of water absorbed in the air as a percentage of the maximum amount the air can absorb at a given temperature. We can use sling psychrometer to determine the relative humidity.

24. How often should the relative humidity, steel temperature, dew point be determined?

Answer:

At the shift starting, mid of a shift and at the end of a shift.

25. You have some knowledge concerning temperature and relative humidity:
    The air in a hall has a temperature of +7^{o}C and a relative humidity of 85%. The doors are closed and the hall is heated to +18^{o}C (no ventilation is used).
    a) To what RH does the air increase or decrease after the temperature is raised to +18^{o}C?
    b) Determine the dew point.

Answer:

a) The RH will decrease after temperature is raised.

b) Dew point is 4.5 Celsius.

PAINTS AND COATINGS

26. There is three different ways paint can protect a metal from corroding, please state the different ways. Give an example of paint within each group.

Answer:

1) Barrier effect: it forms a layer on top of metal to prevent moisture. Oxygen contacting to surface.
   Example: epoxy paint.

2) Inhibitive effect: substance in paint (normally pigment) will form a passivation layer on top of metal when it reacts with moisture. This passivation layer can provide protection function.
   Example: zinc-phosphate epoxy.

3) *Cathodic effect: positive pigment (commonly zinc) in paint can sacrifice itself to protect the noble base metal. Example: zinc ethyl silicate.*

27. Please name three functions that pigment may have in paint formulation.

Answer:

1) *Improve corrosion resistance*
2) *Cosmetic*
3) *Improve mechanical strength*

28. What is a water borne coating?

Answer:

Coatings use water as solvent.

29. Epoxy paints are two components, list three types of curing agents.

Answer:

1) *Amine and amine adduct*
2) *Polyamide*
3) *isocyanate*

30. Epoxy, polyurethane and vinyl paint coatings sometimes have tar added to their formulations.
    a) Please list some of the advantages and disadvantages of adding tar to the formulation of this paint?
    b) Please name two of the most common areas of use for such tar-containing paint coatings.
    c) What is likely to happen if coal tar epoxy paint on the floating roof of a storage tank is over-coated with white epoxy paint?

Answer:

a) *Advantage:*
   -increase water resistance.
   -improve wetting property.
   -Increase flexibility.
   -lower coat.
   Disadvantage:
   -dark color.
   -deduce dry heat resistance.
   -bleeding.
   -carcinogenic.
b) *Void space, underwater hull, water ballast tank, immersed pipeline*
c) *Bleeding, the white epoxy paint will change color by tar.*

31. As stated, paint coatings have different mechanisms of drying/curing
    a) Please explain how the drying/curing mechanisms of alkyd paint work.
    b) Please name two the generic types of paint which need to absorb moisture from the surrounding air as part of their curing process.

Answer:

a) *Solvent evaporated and oxygen into film to react with alkyd.*
b) *Zinc ethyl silicate, moisture curing polyurethane.*

32. You company has applied 1 coat of chlorinated rubber on previously painted steel as listed below:

Primer:	2-3 coats of unknown paint	150um
Top coat:	1 coat of chlorinated rubber	75um

Immediately after application of the chlorinated rubber, the paint “lifts”

What kind of drying/curing mechanism does this indicate for the unknown paint?

Answer:

Physically drying paint

33. An aluminum yacht has been given 3 coats of cuprous oxide containing antifouling directly to the underwater hull. After short time problems arise.
    a) Please shortly identify possible problems.
    b) What could have been done to avoid the problems?

Answer:

a) Galvanic corrosion occurred and aluminum was corroded.

b) Use copper free antifouling.

34. How long can the different AF be allowed to dry before launching a ship?

Answer:

- *Conventional AF: 6-8 hours*
- *Long life AF: no limit*
- *Self-polishing AF: some of them are less than 3 month*

35. Prefabrication primer:
    a) In what DFT should they be applied?
    b) How is the DFT determined during production?
    c) List the health hazard in its described primer.

Answer:

a) Iron oxide: 15-20um
Zinc: 10-15um

b) Shop primer should apply onto a polished steel sample panel as normal and use magnetic induction DFT gauge to get reading from this sample panel.

c) Zinc dust and fumes: zinc fever, chills, coughing, irritation
Dust of iron oxide: siderosis

36. Please explain the terms below:
    a) Pot life
    b) Volume solids
    c) Thinner

Answer:

a) Pot life: the effective period for application after two components paint is mixed in a given temperature.

b) Volume solids: the volume of solids part present in paint, express by percentage.

c) Thinner: thinner is a blend of solvents and be function during paint application to adjust viscosity of paint.

37. In a coating system the various coats (layers) have differing functions.
    a) Please list at least three functions which a finish coat may have to fulfill.
    b) Please list at least three functions which a primer coat may have to fulfill.

Answer:

a) Finish coat:
    1) Appearance
    2) Weather resistance
    3) Gloss and color retention
    4) Self cleaning

5) *Chemical resistance*

b) *Primer*

1) *Adhere onto substrate*
2) *Corrosion resistance*
3) *Bond to subsequent coat*

38. The viscosity of the paint can be adjusted through addition of thinner to the paint. There is, however, another method for adjusting the viscosity.
    a) Please describe this method.
    b) Which of the two methods is the preferred one if the needed change of viscosity is great?

Answer:

a) Heating the paint.

b) Adding thinner.

PAINT APPLICATION

39. What problems with the paint film can be expected when you hold the spray gun 80cm away from the work piece?

Answer:

- *Dry spray over spray*
- *Pinholes*
- *Rough surface*
- *Uneven film*

40. In application of paint coatings the term “wet film thickness” (WFT) is used.
    a) What factors influence the WFT which need to be applied on order to achieve the specified dry film thickness (DFT)? Please list at least three.
    In specification DFT is rarely defined and can be interpreted as “minimum DFT” or “average DFT” (also designated as “nominal DFT”)
    b) If nothing is defined in the specification what should be the DFT aimed at during application? Why?

Answer:

a) – paint methods

- Nozzle size
- The pressure of the paint
- The operator skill
- The gun moving speed during paint
- The pass times.

b) 80/20 rules. The paint film DFT must be control a range. If the DFT too low cannot efficient protect the steel, if too high some paint defects maybe occur. E.g. cracking, sagging, solvent entrapped, pinhole, etc.

41. Ambient conditions may preclude the application of paint coatings.

a) What should be the minimum difference between the steel temperature measured and the dew point?

b) How can wind influence on the application of paint coatings? Please list three.

Answer:

a) The steel temperature should be at least 3^oC degree above than dew point.

b) –high wind will affect safety of applicator during application.
-higher wind will produce greater dry spray and increase consumption of paint.
-high wind may create skin drying of a film and it will risk getting checking, wrinkle, solvent entrapment, etc.

42. Describe the working principle of an airless pump and name the main components in the pump. Please make a sketch

for statement.

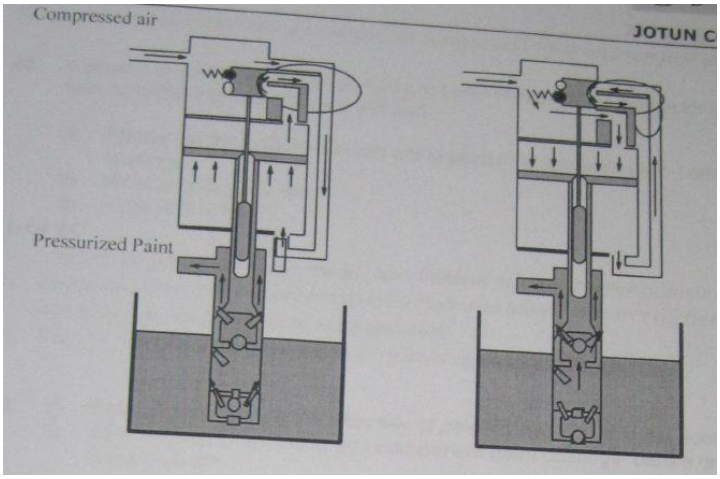
Answer:

Main components:

- *Air motor*
- *Air piston*
- *Paint chamber*
- *paint piston*

Working principle:

- *Compressed air pull the air piston up as well as the paint piston is dragged up.*
- *At the same time, the upper ball valve is closed so that the upper paint chamber is airtight.*
- *The paint piston pressurizes paint is upper chamber to hose.*
- *The lower ball valve is open to allow paint into lower paint chamber.*
- *Once the air piston move to a certain location, the moving block turn the air direction to push the air piston down.*
- *Paint piston is running down and upper ball valve is open to allow the paint into upper paint chamber.*
- *At the same time, the lower ball valve is closed and the paint chamber is airtight.*
- *The paint in chamber can be pressurized to hose by paint piston moving.*



43. How is the paint atomized in the airless spray gun?

Answer:

Highly pressurized liquid (such as paint) goes through a narrow orifice (nozzle tip) to open air. It can form a situation as explosion. Therefore, the paint is broken to large amount of fine mist, which is atomization of paint by airless spray.

44. When would you use a moisture/oil trap between an air compressor and the pressure pot in an air spray unit?

Answer:

It has to be always used during the application.

45. How could you prolong the pot life of paint on site?

Answer:

We can prolong the pot life of paint by put the paint in a colder environment after mixture on site.

46. A paint supplier stipulated in his instructions for use for a certain product that the unopened drums has to be turned upside down for a period of 24 hours prior to use.
    a) What can we deduct from this as concerns the specific gravity of the pigments used in the formulation of the product and also the viscosity of the paint itself?
    b) Some inorganic zinc silicate paint coatings need to be agitated during application. Why?
    c) What would the effects be on the quality of the applied paint film if this agitation is omitted?

Answer:

a) It can disperse the heavy pigment from settlement.

b) The reason is zinc pigment normally heavier than other substance in paint. Zinc will settle if we don't agitate the paint during application.

c) Zinc will not locate in film evenly. The result is paint could not be cured.

47. Why is vital to move the spray gun parallel to the substrate when applying paint by spray?

Answer:

Keep constant distance between nozzle to surface will form an even film thickness.

48. A diligent inspector will frequently carry out spot checks on the contractor when two-component paint coatings are mixed.
    a) Please list three factors which are important when mixing two-component paint coatings.
    b) What is "induction time"?
    c) What is "pot life"?

Answer:

a) Correct ratio of two components; mechanical stirrer; proper thinner ratio.

b) Induction time: the period for paint which was mixed to start reaction and pre-react in container until start painting.

c) Pot life: the period of a paint to be mixed until it couldn't be used.

49. a) How can we change the viscosity of paint? Which is the most economic way?
    b) When is thinner added to two-component paint coatings-before or after mixing of the components?

Answer:

a) We can change the viscosity of paint by adding thinner or heating paint. The most economic way is adding thinner.

b) After mixing of the components.

50. The product Jotamastic 87 (VS=82%) is applied to a structure through a 0.026 nozzle. The pump ratio is 48:1 and the air inlet pressure to the pump is 5.1 kg/cm^2.
    a) What amount of paint will come out of the nozzle pr. Minute?
    b) Please calculate the square meters covered pr. Hour if the paint is applied in a WFT of 200u.
    c) Please calculate the DFT if the paint is the paint has been thinned 10%.

Answer:

a) 3.8l/min.

b) 1:1:1000

1:?:200, therefore, 1 liter paint can cover 5 square meters.

The quantities of paint to be applied in one hour

1 hour X 60 min. X 3.8l/min=228 liters

So, the total area could be covered on one hour:

228 liters X 5Sq.m/liter=1,140Sq.m

DFT= WFT X VS/(1+Thinning ratio)=200 X 82%/(1+10%)=149um

METALLIC COATINGS

51. What degree of metal cleanliness is required for thermal spraying of a metallic coating and what should the surface profile be?

Answer:

The surface cleanliness is required to achieve Sa 3 according to ISO 850-1. The surface profile should be coarse according ISO 8503-2.

52. Hot dip galvanizing:

a) What is the most common surface preparation prior to HDG?
b) What surface preparations are recommended prior to application of paint on hot dip galvanized steel?

Answer:

a) Detergent by caustic solution, acid pickling to remove mill scale and rust.

b) Relating to the service condition difference, there are several surface preparation could be recommended.

- Degreasing plus abrading
- Degreasing plus sweeping
- washing with alkaline solution.
- weathering for 12 months more.

SPECIAL COATINGS

53. List three types of organic coating other than paints used for protection of steel.

Answer:

- *Fusion bonded epoxy.*
- *Rubber lining*
- *Wax*

PASSIVIE FIRE PROTECTION COATINGS

54. What are the demands for the thickness of the passive fire protection systems?
    a) Organic coatings
    b) Inorganic coatings

Answer:

a) 3-30 mm

b) 20-40 mm

55. What is the purpose of passive fire protection?

Answer:

- *To protect human lives*
- *To protect assets*

PAINT DEFECT

56. In paint terminology we see the terms “popping”, “pinholes”, “cratering”, “fish eyes”, and “blistering” used to describe paint film defects. These defects are sometimes very similar appearance. By “blistering” in this context the osmotic, cold wall and cathodic disbanding types of blistering are not included.
    a) Please explain the difference between these terms.
    b) Please explain the causes for these paint film defects.

Answer:

a) From appearance:

Popping and blistering will form bubbles. Pinhole, cratering and fisheyes are concave. Popping is often happened during application and blistering in service life. Pinhole is a tiny tunnel in film. Popping caved in and it forms cratering, normally it is closed on top. Fisheyes caused by the contamination. Paint couldn’t wet contaminated spot and form an uncoated surface.

b) Popping/ cratering: 1) porous substrate; 2) hot substrate; 3) heavy wind; 4) poor application technique.

Fisheyes: 1) oil/silicone contamination; 2) over coated with incompatible coat.

Blistering: 1) salt contamination; 2) solvent entrapped.

57. Please explain the visual appearance of “mud-cracking” and what factors influence its formation.

Answer:

Mud-cracking is deep and wide cracks in film and normally down to substrate. It often found in inorganic zinc applied with excessive dry film thickness.

HSE

58. What health hazards are related to solvents on short terms and long terms (three for each)?

Answer:

Acute effects

- *Headache*
- *Abnormal tiredness*
- *Dizziness*
- *Nausea*
- *Long term effects*

Irritability

- *Loss of memory*
- *Organ damages (kidneys, liver, CNS)*
- *Reduced reaction ability*
- *Reduced evaluation ability*

59. What do we mean with the term TLV?

Answer:

TLV: Threshold Limit Value

The concentration level of a specified substance in a working atmosphere which will not cause harm to a person when inhaling the contaminated air for more then 8 hours daily and during a whole “working life time”.

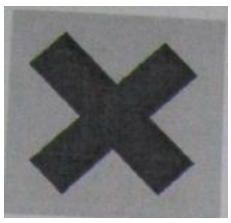
60. What is the maximum size of dust particles, which may enter your lungs if you do not use a filer mask?

Answer:

5 microns

61. Please determine what meant of below symbols:

a) Xn



b) F+



Answer:

a) Harmful

b) Extremely flammable

62. Low voltage holiday detection
    a) What is the upper DFT limit for use of a low voltage holiday detector?
    b) Why it is important that wet sponge is squeezed a bit before the coating is detected for holiday?
    c) The sensor (sponge) is touched to the ground cable – an audible signal is heard. Is this the correct procedure to check if the instrument has been grounded?

Answer:

a) 500um

b) Otherwise, water can spread everywhere and is difficult to locate where holiday is.

c) Yes.

63. a) Please describe how the ISO 8501-1 is built up.
    b) Please list the grades of preparation that is listed in this standard for steel of rust grade B.
    c) What ISO standardized method is used for detecting/measuring salt contaminants on a surface?

Answer:

a) ISO 8501-1 is built up by:
- *Four rust grades: A, B, C, D*
- *Three designations of surface preparation: Sa, St and FL.*
- *twenty eight reference photos.*
- *Appendix to show appearance difference through blasting by using different abrasives.*

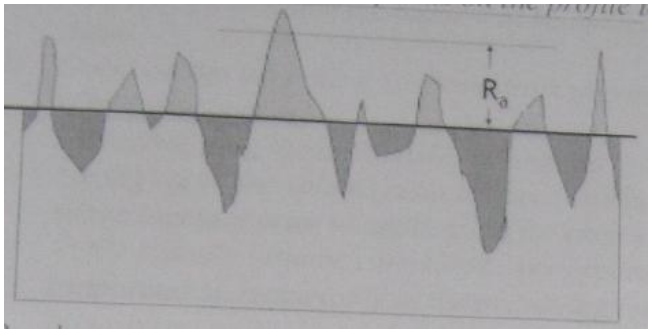
b) B Sa 2, B Sa 2 1/2, B Sa 3, B St 2, B St 3, B FL;

c) bresel method for extracting salt from surface according to ISO 8502-6 and determine all soluble salt quantity by conductivity meter according to ISO 8502-9.

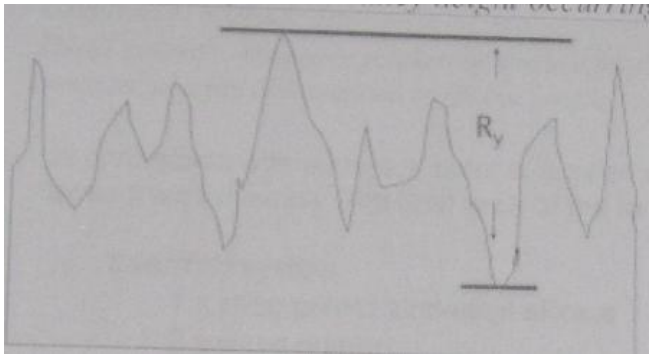
64. Please explain the terms Ra and Ry.

Answer:

Ra: the mean distance of all points on the profile to the centre line.



Ry: the maximum peak-to-valley height occurring over a sampling length.



<u>CALCULATION</u>

65. Please explain below abbreviation and term.
    a) Flash point
    b) Over coating interval
    c) Spreading rate
    d) Mixing ratio
    e) VOC
    f) Touch dry
    g) Dead volume

Answer:

a) Flash point: the lowest temperature of a liquid at which it gives off sufficient vapor to form a ignitable mixture with the air near the surface of the liquid or within the vessel used. The term characterizes the flammability of paints and solvents. It is measured under standardized conditions and determined as the temperature at which the vapor will be ignited (flash) by a spark or open flame.

b) Over coating interval: it is a term from previous coat is applied to start apply subsequent coating.

c) Spreading rate: the area could be covered by one liter paint.

d) Mixing ratio: the volume ratio between component A and component B to be mixed together prior to application for chemically curing paint.

e) VOC: volatile organic compound. Any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact.

f) Touch dry: surface dry.

g) Dead volume: dead volume is the amount of paint needed to full up the surface roughness

66. In connection with a project, paint is applied on the outside of a water tank located 200um away from the coast. The total area of the tank (outside) is 500 m^2.

- Specified system	DFT	%solids;
1X shop primer zinc-ethyl silicate	20um	60
2X alkyd primer	75um (single coat)	45
1X alkyd topcoat	75um	50
"Dead volume"	0.03 1/m^2;	
Paint loss during application	30%;	

    a) Calculate the amount of wet paint needed to the fill the "dead volume".
    b) How much do you have to order for each one when you consider a paint loss of 30% during application?
    c) What is your opinion of the paint system chosen?

Answer:

a) Dead volume:

Consumption = (area X DV X 100)/ (%VS X LF)
= (500 X 0.03 X 100)/ (60 X 0.7)
= 35.71 liters

b) Shop primer zinc-ethyl silicate:

Consumption= (area X DFT)/ (10X%VS X LF)
= (500 x 20)/ (10 x 60 x 0.7)
23.81 liters

Total: 35.71+23.81= 59.52 liters

Alkyd primer:

Consumption = (area x DFT)/ (10 x %VS x LF)
= (500 x 75)/ (10 x % VS x LF)
= 119.05 liters (single coat)

Total: 2 x 119.05 238.10 liters

Alkyd topcoat:

Consumption = (area x DFT)/ (10 x %VS x LF)

= (500 x 75)/ (10 x 50 x .07)

= 107.14 liters

c) *It is not good system which alkyd over coat onto zincs containing primer. It will form saponification and alkyd coat will peel off.*