COMPATIBILITY OF ACCOYA WITH IRONMONGERY

Meeting with VHS (corrosion workgroup), 20 April 2021

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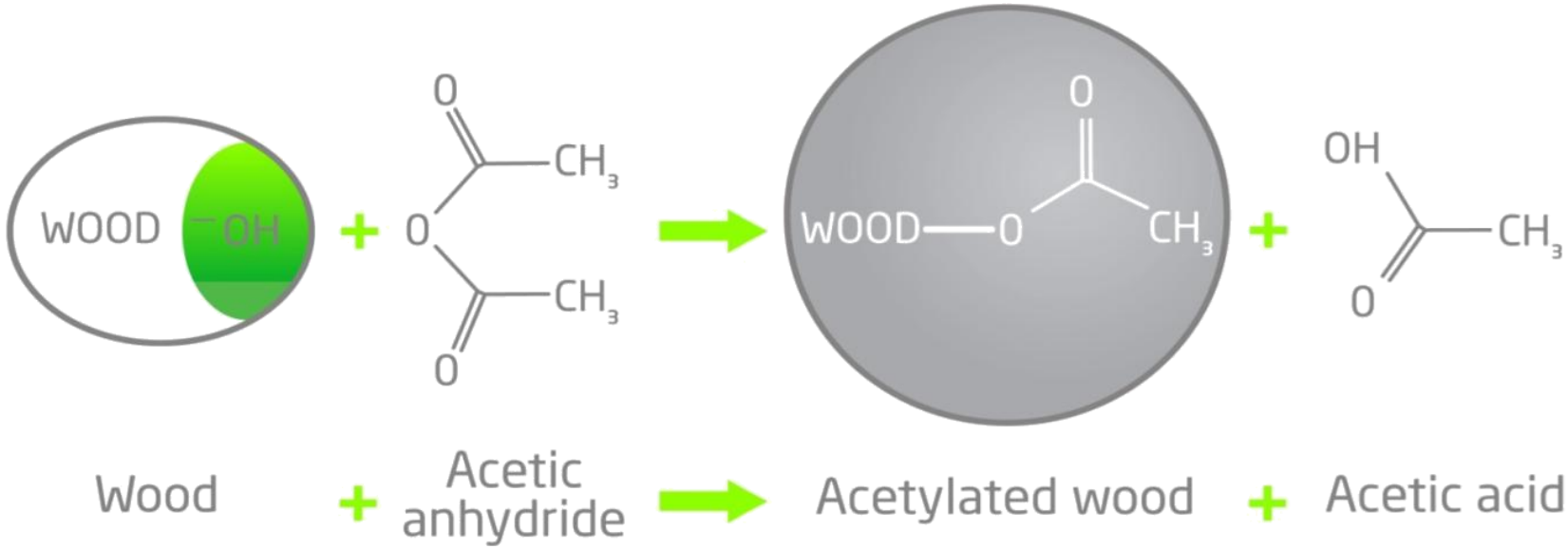
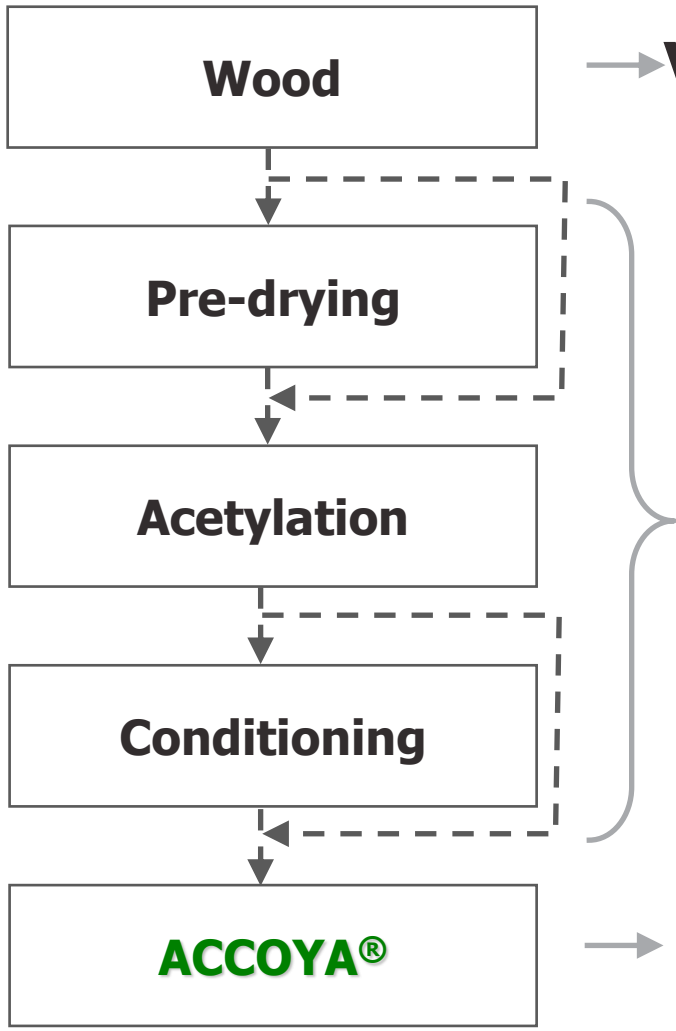
CONFIDENTIALLY AND PRIVILEGED - VHS working group on Corrosion

ACETYLATION OF WOOD

- Large improvement of resistance against fungal decay
- Large improvement of dimensional stability
- Main markets: cladding, decking, joinery



ACETYLATION PROCESS



Verification purchase
moisture content, quality

Process control
temperature, time, pressure

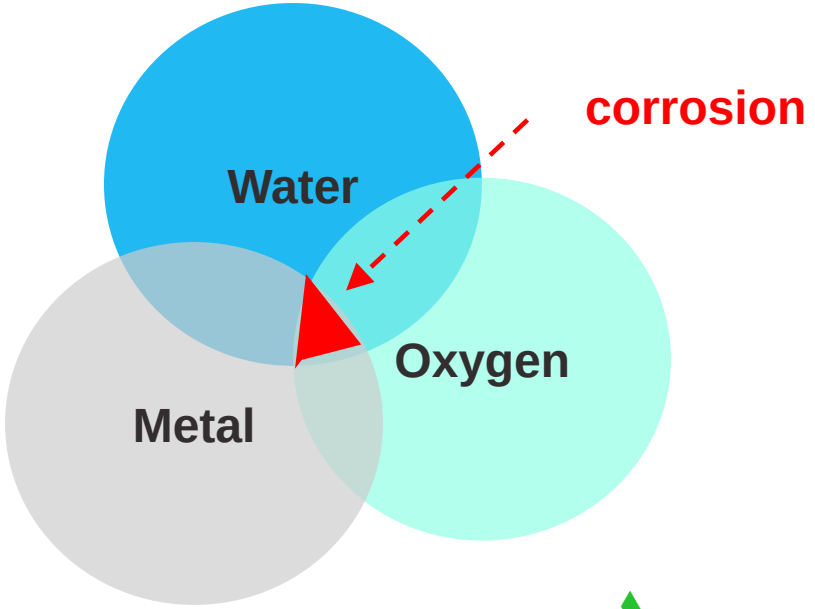
Quality assurance

- ✓ *acetyl content (min)*
- ✓ ***acetic acid content (max)***
- ✓ *wood moisture content*
- ✓ *wood quality*

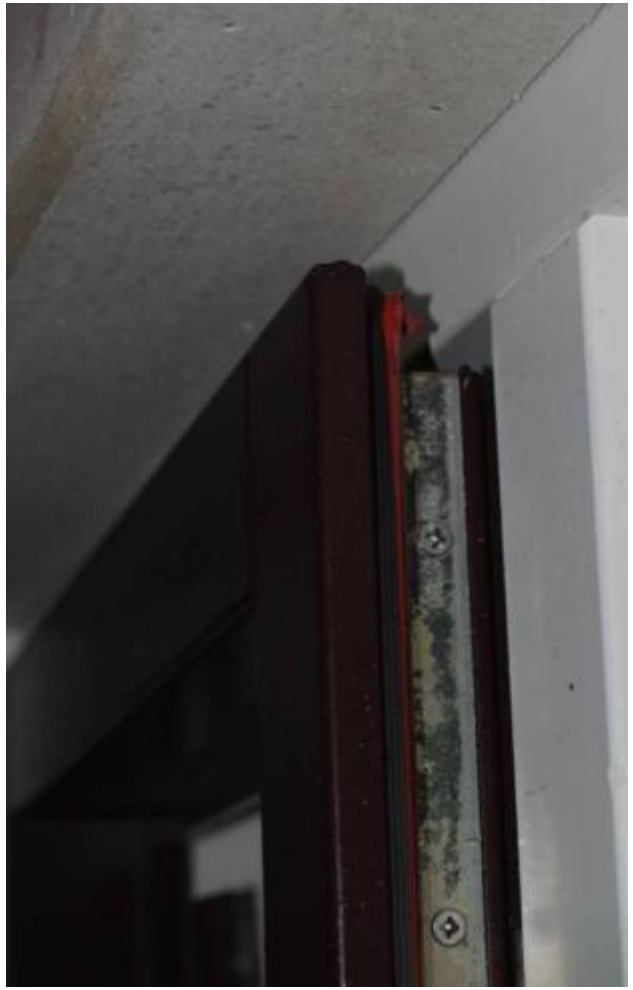
COMPATABILITY IRONMONGERY

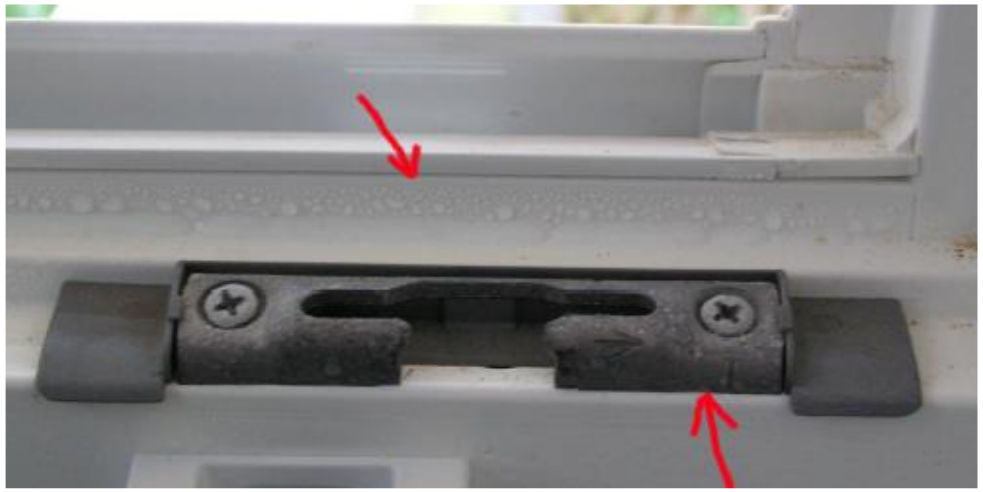
- Accoya has a small percentage of acetic acid that have influence on metal corrosion.
- Most modified wood species have increased acidity.
- Several (natural) wood species (WRC, Oak, Sapupira) are also known to be corrosive to metals

- Rate of corrosion depending on:
  - Type of metal
  - Condition (RH, Temperature, ventilation)
  - Direct contact versus VOC's



ISSUES MAINLY DURING BUILDING PHASE



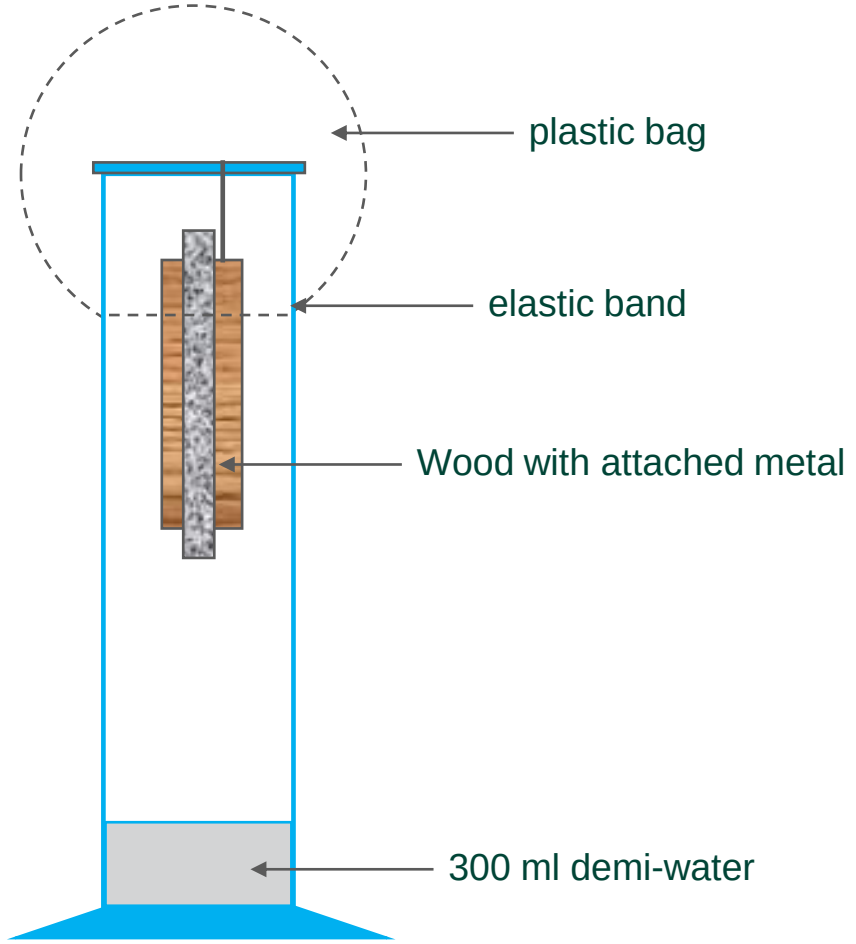


TEST METHOD

- Salt-spray test methods for metal (e.g. ISO 9227, ASTM B117, ASTM B 368, ASTM 1654). Advantage: harmonised methods. Disadvantages: salt corrosion focussed, testing only metal / no interaction with wood)
- Cyclic corrosion test in combination with UV exposure (ISO 20340)
- Cyclic corrosion test acetic acid salt fog (ASTM G85, method A2)
- AWPA E12 (disadvantage of method is that multiple wood-metal samples are exposed in one climate chamber (VOC cross contamination)

ACCSYS METHOD

- Laboratory test
- Glass container with water, and water/metal put in oven at 40°C for 21 days
- Each piece of wood/metal in seperate container (prevent VOC cross-contamination)
- Evaluation by visual method or by weighing metal coupons.
- Advantages:
  - Interaction metal and wood (direct / indirect)
  - Investigation of wood coatings, etc. possible
  - Low cost
- Disadvantages:
  - not a harmonised method (repeatability / validation method not proven).



EFFECT OF ACETIC ACID CONTENT
(RESULTS FROM ACCSYS METHOD (SLIDE #7), ENCLOSED ATMOSPHERE TESTING)

- Higher levels of acetic acid result in more severe corrosion.
- Accoya acetic acid specification is average <1% and no individual measurement >1.8%

“normal” (1%) acetic acid content Accoya

EFFECT OF WOOD MOISTURE CONTENT
(RESULTS FROM ACCSYS METHOD (SLIDE #7), ENCLOSED ATMOSPHERE TESTING)

- High wood moisture content results in more corrosion
- NOTE: when uncoated samples are tested, the wood moisture content is increased during the test.

"normal" Accoya moisture content (3-5%)

"high" Accoya moisture content (>20%)

EFFECT OF WOOD SPECIES
(RESULTS FROM ACCSYS METHOD (SLIDE #7), ENCLOSED ATMOSPHERE TESTING)

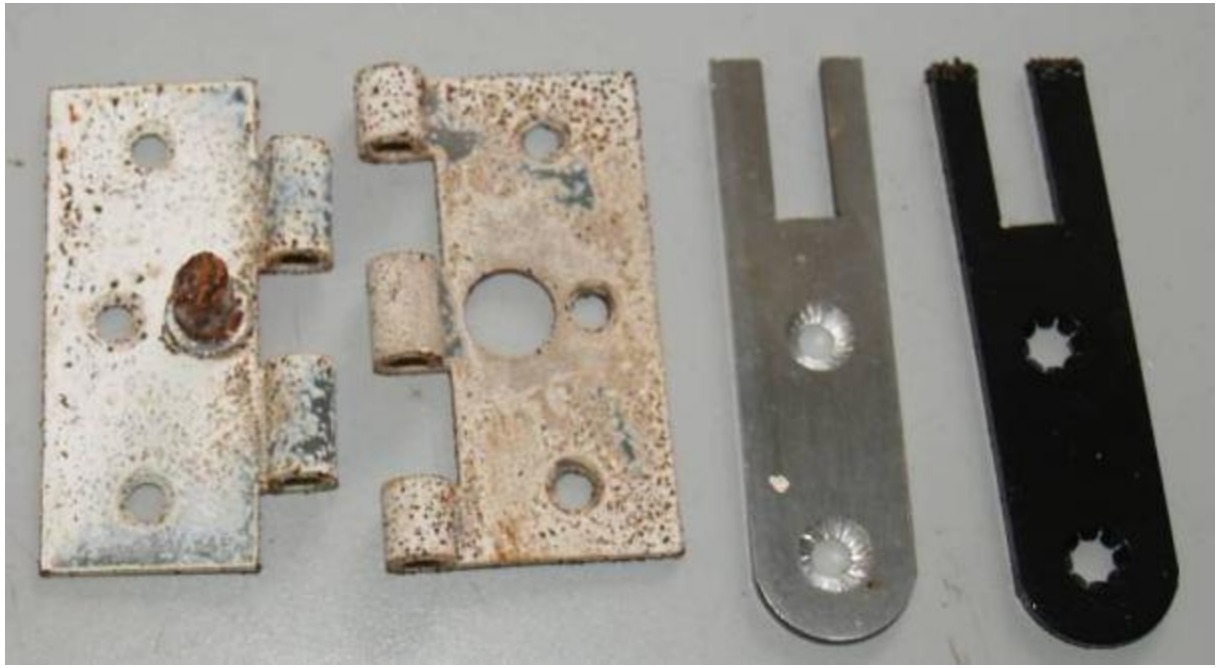
- Most natural wood species have also acids

Accoya

Meranti

CORROSION REDUCTION

- Corrosion resistance of metal
- Metal coating
- Wood coatings
- Protective sprays
- Ventilation in rebates
- Preventing direct contact



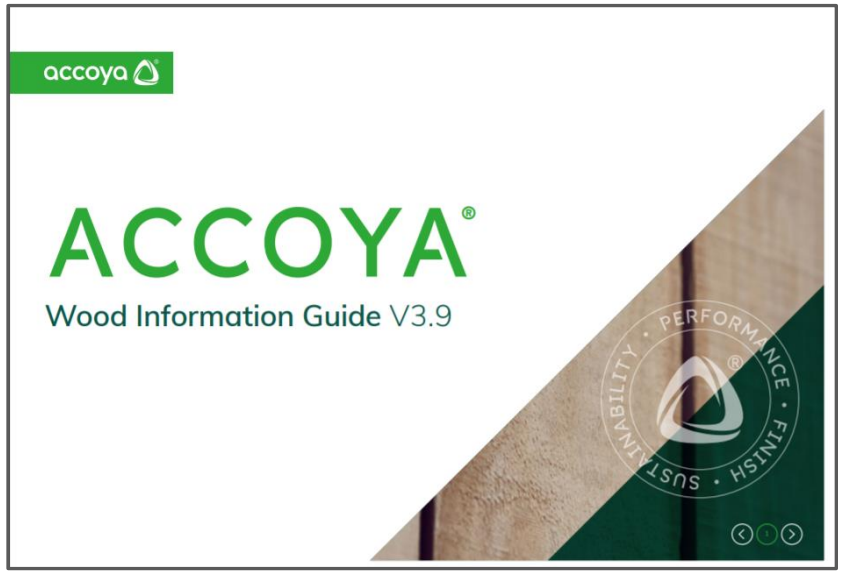
Galvanised stainless coated

EXPERIENCE

- Crucial is the buiding phase; condition of storage of joinery on the building location (risk on moisture / condensation), is there sufficient ventilation when the joinery has installed.
- When the building is used (and most moisture is removed), limited additional corrosion on ironmongery is observed
- Location (coast, inland, etc.) and use of the joinery influences corrosion of ironmongery
- Several chemicals do have impact on corrosion.
- The “Accsys” laboratory method simulates very severe conditions (these conditions can occur during the building phase, but best would be to prevent the conditions corrosion can occur).
- For less severe conditions another test method to be developed?

RECOMMENDATIONS

- Detailed information available in Accoya Wood Information Guide



sealing of hinge rebates

Incorrect storage on building site

CONTENTS

7 CONTACT WITH OTHER MATERIALS

METALS

All wood contains organic acids, although the quantity varies by species. In moist conditions, these organic acids contribute to the corrosion of metal fasteners used in wood. Accoya wood has comparable acid levels to many other durable species such as oak and western red cedar. In wet circumstances, the Accoya wood will have a pH in the range of 4 - 5.5. For a list of system suppliers in your region, please visit the More about Accoya / System Suppliers section of our website **www.accoya.com**

Tests have shown that base metals and galvanized metals that are in direct or indirect contact with wood containing acids will corrode in damp climatic conditions. It is therefore strongly recommended that high quality stainless steel, corrosion resistant aluminium or naval brass products be used in areas exposed to moisture or condensation. When stainless steel, corrosion resistant aluminium or naval brass is not available it is important to take precautions using lesser grade metals. The metal and/or the Accoya wood should be coated or otherwise separated to avoid direct contact between the wood and these metals. Similar good practices that are commonly used in the industry for reference species such as oak and western red cedar should be adopted.

Indirect contact issues can occur in non-ventilated high humidity areas with a high risk of condensation (for example lock rebates, swimming pool enclosures, bathrooms). High quality hardware and/or corrosion avoiding techniques described further on in this section should be considered for these areas. As with any installation, pit or galvanic corrosion must also be avoided by using fasteners that are compatible with the metals used in hinges, locks and other hardware.

Please consult your fixings supplier to avoid any issues.

ACCSYS

GENERAL DISCUSSION

PROPOSED RECOMMENDATIONS

Considerations - What is needed

When there is no appropriate standard, we have to design one

- Harmonised Testing – supporting warranty position
- Concept III – Performance by Design
- Essential Hardware Guide – setting expetations – Best Practice
- Supporting information available in Accoya Wood Information Guide

TEST METHOD AND REQUIREMENTS

- Does one test method fit all?
  - The different building concepts do have different moisture conditions that effect corrosion
  - Different circumstances: direct contact of metal and wood, non-ventilated rebates
  - Different geographic locations (near the coast, inlands)
- One set of minimum requirement or “grades”?
- Develop a method for different conditions?
  - Enclosed situations (e.g. lock rebates) and
  - ventilated situations (e.g. door handles)