# FHYC
## Education Seminar

# A Discussion about Marine Varnish

John Myer, 12 March 2021

# Boat Varnish

In the days when boats were made of wood the varnish choices for a boat owner were simple. You got a natural bristle brush, a can of turpentine or mineral spirits and a quart of Tung Oil or Linseed Oil based Spar Varnish (what ever brand your local Marine or paint store carried) and applied four to ten coats sanding between each coat. The resulting finish was amber colored, smooth, glossy and flexible to handle expansion and contraction of wood from temperature and humidity, but was susceptible to abrasion damage.

# Traditional Spar Varnish

Early Spar Varnishes only contained a few main ingredients – a resin, oil dryers and a solvent. As the name implies Marine Spar Varnish was developed to protect the mast and spars on wooden sailing vessels from moisture. They needed to be waterproof but flexible to accommodate the bending of masts and spars without cracking. Early Spar Varnishes did not provide any UV protection. The single technology, that most improved the long-term durability of marine varnish, was the inclusion of UV protective additives specifically designed to combat the harmful effects of sunlight.

# Modern Varnishes

These original spar varnishes have largely been replaced today by varnishes containing a blend of resins including synthetic resins, like alkyd, urethane, polyurethane, acrylic, phenolic, vinyl, and epoxy resins. Unlike natural resins, synthetic resins can be manufactured in large quantities and can be chemically tailored with great precision for particular characteristics. The type of resin or combination generally affects the hardness and durability of the varnish. The type or combination of oils in the varnish generally affects the drying time and coatings flexibility, while the solvent affects application flow, leveling and tack time. Manufacturers are able to modify and tailor the ingredients to change these characteristics and create varnishes that have specific advantages and in some cases disadvantages in the use, application, finish, maintenance and longevity of the varnish.

# Varnish Selection

- Today the choices in marine varnishes are wide and the characteristics of the resulting coating can vary greatly.
- Varnish Resin Base (Blend of resins, Alkyd, Phenolic, Polyurethane, acrylic)
- Solvent Base (Oil, Water, oil modified)
- Film finish (Glossy, Satin, Matte, Rubbed, Hard, Soft, Flexible),
- Color (clear, Amber, Brown)
- Application (High Build, sand between coats, no-sand, brush, wipe, spray, roll & tip)
- Use (interior, exterior, high UV protection, no UV Protection)
- Type (One Part, Two Part, Catalyzed)

# Marine Store Varnish Selections

## West Marine Catalog Varnish Listings Page 1


INTERLUX
Perfection Plus Varnish Kit, Quart
(3)
**$119.99**


INTERLUX
Schooner Gold Varnish, Quart
(14)
**$69.99**


INTERLUX
Compass Clear Varnish, Quart
(6)
**$49.99**


AWLGRIP
Awlspar Classic Spar Varnish, Quart
(2)
**$57.99**


PETTIT PAINT
SeaGold Marine Wood Treatment, Quart
(9)
**$49.99**


INTERLUX
Goldspar Satin Varnish, Quart
(0)
**$49.99**


EPIFANES
Clear High-Gloss Varnish
(85)
**$41.99 – $59.99**


PETTIT PAINT
Z SPAR 1015 Captain's Varnish
(63)
**$29.99 – $119.99**


EPIFANES
Gloss and Matte Wood Finishes
(8)
**$69.99 – $74.99**

## West Marine Catalog Varnish Listing Page 2


INTERLUX
Schooner Varnish, Quart
(7)
**$49.99**


PETTIT PAINT
Flagship Varnish 2015
(19)
**$54.99 – $159.99**


PETTIT PAINT
SeaGold Marine Wood Treatment, Gloss, Quart
(2)
**$49.99**


Z-SPAR
V-975 Captain's Satin Sheen Polyurethane Varnish, Quart
(0)
**$37.99**


EPIFANES
Rubbed Effect Interior Varnish, Quart
(0)
**$74.99**


EPIFANES
Epifanes Rapid Coat, 1 1/2 Pints
(0)
**$47.99**


EPIFANES
PP Varnish Extra, 2 Liter Kit
(0)
**$249.99**


BRISTOL
Bristol Amber Urethane Finish
(18)
**$24.99**


Z-SPAR
Flagship Varnish 2015, Warm Amber, Pint
(0)
**$29.99**

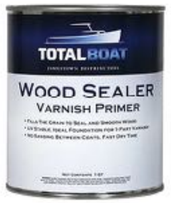
- West Marine lists 20 different varnishes
- Defender Marine lists 26 different varnishes
- Hamilton Marine lists 25 different varnishes
- Jamestown Distributors lists 27 different varnishes

## TotalBoat Finishes from Jamestown Distributors


Halcyon Water-Based Marine Varnish
$17.99 – $119.99


Gleam 2.0 Marine Spar Varnish
$20.99 – $97.99


Lust Rapid Recoat Marine Spar Varnish
$24.99 – $104.99




Wood Sealer Varnish Primer
$24.99


Marine Wood Finish
$32.99 – $56.99

# Types of Varnish

## “Traditional” Oil Based Resin Spar Varnish

Many of the Marine Spar Varnishes on the market today are in this category. Developed to mimic the natural resin Spar varnishes of the past, they are a combination of alkyd and phenolic resins with Tung or linseed oil dryers and mineral spirits or naphtha solvents. They have a thick amber colored consistency to allow quick build up of film thickness, but can be thinned for penetration coats and better brushing flow and leveling. They provide a high gloss flexible film when applied in multiple coats. The cured coating is softer and less abrasion resistant than other varnishes. UV protection varies among brands and individual varnishes with some offering extra UV protection additives. Each coat needs to cure completely before sanding and applying succeeding coats. Tack time is generally hours and full cure time is 12 to 24 hours. Time and labor requirements for application are high.

Examples: TotalBoat Gleam, Epifanes High Gloss, Epifanes Extra UV Filter, Old Masters Spar, Circa 1850, Interlux Original, Interlux Schooner, Pettit Flagship 2015, Pettit Captains 1015,

# Polyurethane Spar Varnish

Polyurethane spar varnish is composed of a one part polyurethane (liquid plastic) or a blend with other resins. Compared to Traditional Oil Based varnishes, polyurethane varnish forms a harder, abrasion-resistant and more waterproof film. Different finishes are available including matte, satin and gloss. Polyurethane varnish cures faster allowing a much faster and higher “build up" of film thickness. Thick polyurethane films may de-laminate if subjected to heat or shock, fracturing the film and leaving white patches. This tendency increases with long exposure to sunlight or when it is applied over soft woods like pine. This is due in part to polyurethane's lesser penetration into the wood. Various priming techniques are employed to overcome this problem, including the use of certain oil varnish primers, clear penetrating epoxy sealer, or "oil-modified" polyurethane varnishes. Polyurethane may be applied over a clear epoxy resin sealer coat that has fully cured for 2 to 3 days. UV-absorbers are added to polyurethane varnishes to prevent UV damage but can be decreasingly effective over years of sun exposure. The coating should be completely cured before recoating. Polyurethane varnishes can also be water based. The advantage of water-based polyurethane is that it provides a crystal clear finish and has less application oder. On the other hand, oil-based polyurethane varnishes tend to lasts longer, and typically have a yellow/amber color that many prefer over clear. A new breed of hybrid varnishes have been developed that allow multiple recoating in one day without sanding between coats, this allows faster buildup of coating thickness and reduces time and labor.


Examples: TotalBoat Halcyon, TotalBoat Lust, Varathane Ultimate Spar, Interlux Goldspar, Interlux Compass Clear, Pettit Captains 2067 Ultra Clear & V-975 Satin, Epifanes Rapidclear

# Modern UV High Performance Marine Varnishes

Some High performance varnishes contain a blend of premium quality UV absorbers and Hindered Amine Light Stabilizers (HALS), as well as UV protectors, to extend the lifespan of the varnish coating beyond that of conventional products. In addition some varnishes include surface stabilizers and antioxidants to keeping the varnish from fading or becoming cloudy.

Examples: Pettit Flagship 2015, Pettit Captains 2067 Ultra-Clear

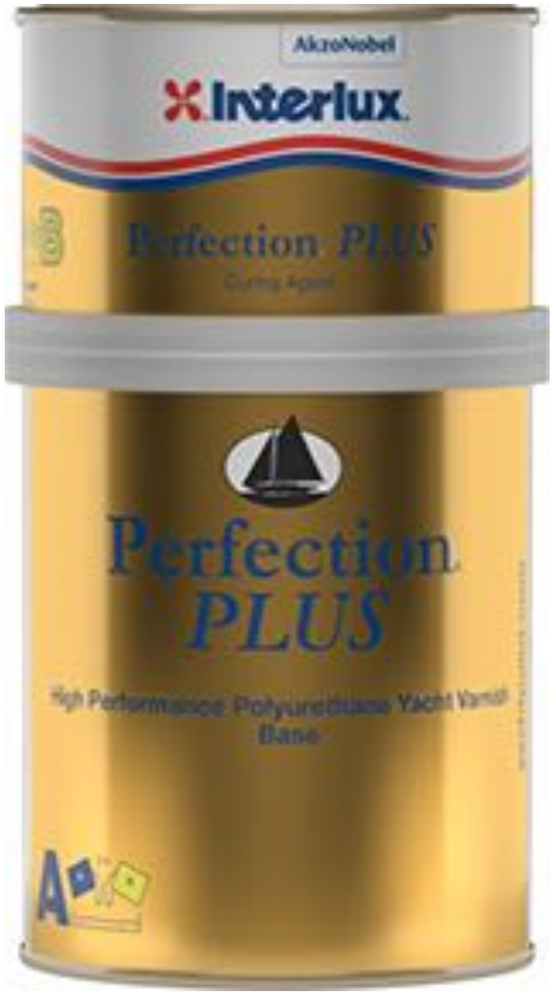
## Acrylic Based Spar Varnish

Acrylic resin varnishes are typically water-borne varnishes with high clear transparency,  that resists yellowing. Acrylics have the advantage of water clean-up and lack of solvent fumes, but typically do not penetrate into wood as well as oils. They sometimes lack the brush-ability and self-leveling qualities of solvent-based varnishes. Generally they have excellent UV-resistance. The film is quite flexible and It can also be used on other kinds of surfaces aside from wood. These fast drying varnishes can make it difficult to maintain a wet edge and apply an even coating. Most of the Acrylic Marine Varnishes are only available for commercial use.

# Two-Part Varnishes

Various True Polyurethanes have been formulated as two part varnishes. Often, the two parts are of equal volume and are referred to as "part A" and "part B".  All two-part varnishes have a "pot-life" or "working time" during which it can be applied. Usually the pot-life is a matter of a few hours but is also highly temperature dependent. Two-part varnish cures/hardens quickly through a chemical reaction. The coating becomes very hard, but may crack from impact if applied over a soft wood.

Examples: Epifanes PP, Interlux Perfection Plus



# Marine Wood Finishes

Synthetic wood coatings that typically contain colored pigments that provide varying degrees of a translucent film, that is hard and abrasion resistant. Color can vary from semi opaque red/brown to nearly transparent amber.  The pigment in these finishes provides UV protection but can partially hide the natural wood grain. They have quick recoat times and can be recoated without sanding between coats.

Examples: Sikkens Cetol, Pettit SeaGold and TotalBoat Marine Wood Finish

# How Long does Marine Spar Varnish Last ?

The lifespan of marine spar varnish coatings will greatly depend on the environment. Exposure to direct sunlight can reduce its longevity. Wear spots from abrasion and hard service require regular recoating. A good six to eight coats would will generally last 4 to 8 years before needing stripping and replacement if maintained annually. Maintenance has a big part of prolonging the life of spar varnish. Keep coatings clean, repair damage and sand and recoat with one or two coats on a regular basis.

# Checking Varnish Compatibility

If you’re applying a new varnish over an existing finish, ensure that the surface is sound, if not the coating should be stripped down to bare wood.  If changing varnish type you should test for compatibility by taping a cloth soaked in the new varnishes solvent over the existing coating for 24 hours. If the coating becomes soft, it is probably not compatible. In this instance, you should completely strip off the old coating or change to a different varnish for recoating. Two part varnishes can not be applied over One Part Varnish coatings, strip to bare wood and apply an epoxy or sealer coating before applying the Two Part Varnish.

# Surface Prep for Varnishing

## Cleaning & Inspection

Wash and rinse varnished surfaces frequently. Inspect for damage and repair any abrasions, blemishes, dings and nicks. Strip delaminated, peeling and discolored areas to bare wood before applying a new coat of varnish. Bare Teak must be cleaned, sanded smooth, and wiped clean to remove oils before applying varnish to ensure the best bond, finish and longevity. Take the extra time to prepare the surface properly and you'll spend less time on maintenance and more time admiring your varnished wood.

# Stripping Off Old Coating

Varnish that’s old, dull, flaking, or blistering needs to be removed completely before new coats are applied. If you use a chemical varnish remover, position polyethylene sheeting so it covers adjacent areas that the varnish remover will damage. Use a quick-release masking tape to hold the cover in place. Also, follow the label directions carefully because some strippers are more toxic than others and require you to apply an acid neutralizer after you remove the chemical stripper.

For a chemical-free alternative, a heat gun is very effective at stripping old varnish, especially on irregular or curved areas. Take care not to expose fiberglass to the excessive heat generated by the heat gun. For the best result, it’s important to keep the varnish bubbling up consistently by holding the gun at the same distance from the surface while scraping. Manual hand scraping with a sharp scraper can also remove old varnish.

# Stripping Varnish with a Heat Gun
# Tips from a Shipwright

Stripping and sanding varnish with a heat gun to prep for new coats
https://www.youtube.com/watch?v=Enk4OS_8tI0

# Sanding & Cleaning

Bare Teak and other woods must be clean and oil free before wood finish is applied. Sand surface, in direction of grain, smooth using appropriate abrasive grit sequence required, lower grit papers for rough surfaces to higher grit papers as surface becomes smoother. For existing quality varnish surfaces sand with higher grit papers or scuff with 3M abrasive pad to eliminate any sheen on surface. Vacuum, solvent wipe and tack cloth wipe surface before applying new varnish coat.

Power Sanding equipment and materials

Shaped foam block for sanding contours

Hand sanding narrow surfaces and hard to reach areas

# Scraping Heavy Varnish coating to Flatten surface
# Tips from a Shipwright

How to best prep and varnish your boat - Part 1 (Tips from a Shipwright)
https://www.youtube.com/watch?v=AxLTI8Dl8Kk&t=2s

Using Utility knife blade to scrape varnish runs and flatten film surface for recoating

# Masking

Use appropriate masking materials such as polyethylene sheeting and masking tape to protect any surface that abuts the surface to be varnished. This includes hardware (think oarlocks and cleats) which is sometimes not practical to remove. There are various types of masking tape for different purposes. Some flex better for use on curves; others can stay on the surface longer and remove cleanly without leaving residue. After choosing the right tape, take your time to place it carefully without wrinkles or gaps.

# Wiping

The final step before applying the varnish is to ensure the surface is dry and completely free of any residual dust or contaminants, such as oil from fingerprints, dirt, or grease. Dampen a clean lint-free rag or cheesecloth with mineral spirits or denatured alcohol, wipe the surface, and let the solvent flash (dry). Wipe with a Tack Cloth just prior to applying varnish.

# Conditions for Varnishing

Ideally, start varnishing on a dry, clear day, in the morning after dew has dried. Stay out of the wind and direct sunlight, which can raise dust and cause wrinkling and uneven drying. Better yet, apply varnish indoors, with adequate ventilation. Pay special attention to the varnish manufacturer’s recommendations for temperature and humidity. In hot weather consider adding thinner or brushing reducer to help maintain wet edge.

**Note**: If applying varnish in hot weather, it's more difficult to maintain a workable (wet) edge. Air temperature and humidity are important factors, but you must also consider the temperature of the wood surface. Dark wood surfaces in sunlight can exceed maximum recommended temperature for application.

# Varnishing a Teak Table

Tutorial - How to varnish teak on a sailing vessel (Liberty International Sailing Club)
https://www.youtube.com/watch?v=K4W2KFGMx-E

# Thinning Varnish

Varnish can be thinned by adding an amount of solvent to the varnish to reduce its viscosity and improve the brushing ability and flow quality. Be sure to use the solvent specified by the manufacturer. Certain solvents will be better for warm or colder conditions; others are used specifically for brushing or spray applications.

The first coat of varnish is typically a “sealer” coat, which is varnish that has been thinned substantially, so it sinks into the wood grain. Straight varnish is too thick to do that effectively. The amount of thinner recommended for the sealer coat depends on the varnish, so read manufacturers directions carefully.

The sealer coat is followed by a succession of “build” coats, before the final coats are applied. The build coats are thinned as needed to make the varnish lie down easily and level out smoothly. More thinning may be necessary in warmer, more humid conditions. Take care not to add too much thinner, as this will affect cure times and gloss levels. The final coats of varnish are usually applied at full strength, with no thinner added.

# Bare Wood Sealing and Priming for Varnish
# Jamestown Distributors Total Boat Products

Sealing wood for varnish
https://www.youtube.com/watch?v=3cUOHea-qhk&t=101s

# Penetrating Epoxy Sealing Wood before Varnishing
# Tips from a Shipwright

How to use Penetrating Epoxy to seal and protect your wooden boat feat. (Tips from a Shipwright)
https://www.youtube.com/watch?v=F8wLbyCk7EQ

# Varnish Brushes

The best brushes for applying oil based varnish are natural bristle (Badger, Ox ear hair, white china) brushes in rectangular or oval shape, sized to match the surface to be varnished. One inch rub rails use a one inch brush, wide flat areas use a two to three inch brush. Inexpensive “Fooler” chip brushes may be used for build up coats but high quality brushes should be used for finish coats.  Chip brushes tend to shed bristles in the coating. Nylon or polyester bristle brushes may be used for water based varnishes. High-quality varnish brushes can be cleaned and reused for years, off-setting their initial high cost. After the brush is cleaned and spun dry, maintain the original shape of the bristles by storing the brush in its original package. Brushes can be wrapped in foil and stored in freezer over night between coats to eliminate cleaning after every use, but should be throughly cleaned if not reused in 48 hours.

# Roll & Tip Deck Box

TotalBoat Gleam Varnishing Tips (Tips from a Shipwright - Roll & Tip Varnish)
https://www.youtube.com/watch?v=pI7DjFy32DA

# Pro Tips for Applying Varnish

- It's important to keep as much dust as possible out of your work area while varnishing. Vacuum the work area first, then use a water-filled spray bottle to spray water on the floor or ground to keep the dust down.
- If varnishing indoors, be sure you have adequate lighting so you can see skips, or holidays. A flashlight beam aimed horizontally across the surface will make any skips stand out.
- If varnishing outdoors, avoid working in direct sunlight, or if temperatures exceed the manufacturer's maximum recommendation. Also, time it so a fresh coat has adequate time to skin over before nightfall comes, and damaging dew sets in.
- Bubbles are bad–avoid them by not stirring aggressively or shaking the can of varnish.
- Filter the varnish by pouring it through a mesh paint strainer into a separate pot or container. Do not apply the varnish directly from the can. Pour only the amount of varnish you need at the time; it's not recommended to pour extra varnish back into the can, to avoid contamination.
- If brushing, dip less than half the length of the bristles into the varnish, so you get more varnish at the tip, where it's needed.
- If brushing or rolling & tipping, apply varnish in the direction of the grain.
- Keep a wet edge to avoid brush marks by brushing from the new area into the area just varnished.
- If you're seeing bubbles in the varnished surface while brushing or rolling & tipping, make a final pass with the brush very slowly over the area, using very light pressure. This action will remove the bubbles.
- Don't apply the varnish thicker than the manufacturer recommends because it will skin over on the surface, trapping solvents underneath. The varnish will not cure properly, and can stay soft.
- Keep an eye out for drips on vertical surfaces.
- If a small bug or dust speck gets stuck in the varnish before it tacks over, diving in after it and digging it out with your fingers will only make it worse. Leave it where it lands and sand it out between coats.
- *Sanding between coats*: After a coat of varnish has dried, if the previous coat looks really good, use a Scotch-Brite pad (instead of sandpaper) to scuff the surface lightly. If the previous coat has slight imperfections, sand lightly with 220-320 grit paper to even it out and allow the next coat of varnish to achieve a sound mechanical bond with the surface. Sand only as much as you need to. Use a gentle, even motion to remove any peaks or bugs, and most importantly, to avoid sanding through the previous coat. After sanding, and before applying the next coat, wipe with a lint-free rag coated in mineral spirits to remove dust, and allow the solvent to flash.
- *Storing brushes between coats*: Wrap varnish brushes in plastic wrap and place in the freezer so you don't have to clean them as often. This solution is only good for a couple of hours or days, though, depending on the varnish.

Adding masking tape to shorten brush bristle
Length improves ability to spread thicker varnishes

Warming Varnish in warm water bath improves
Brush ability and leveling of coating

Taping off adjacent surfaces to restrict
varnish coverage makes clean up easier

Using a brush sized for the part being varnished

# Maintenance

Regular maintenance is key in keeping a varnished finish looking fresh and flawless. The major causes of damage are the sun’s ultraviolet rays, water, and abrasion.

Even the UV-blocking agents in quality varnishes will eventually break down. As UV light penetrates to the base coats they start to deteriorate, causing gloss varnish to loose its brilliant, wet look.
Eventually, the varnish separates from the wood, growing ugly delamination blisters which can only be removed by stripping the finish and starting from bare wood.
Spare yourself this aggravation with a little annual maintenance that requires scuff-sanding back the top layer of varnish, wiping the surface clean, and applying a coat or two of varnish to add depth and maintain the UV protection.
A greater potential for sun damage in certain geographic locations, such as the Caribbean, may make it necessary for this maintenance task to be done more than once a season.
A good way to tell if you need to re-coat is when the surface begins to lose its water-beading ability.
And don’t forget your interior wood. Maintaining interior varnish will not only keep it looking sharp, but will make it easier to keep clean.

# Checklist for Tools and Materials Needed for Varnishing

- Heat gun or chemical stripper if removing old varnish.
- Scrapers for removing old varnish. Flattened end scraper for heat and chemical stripper varnish removal, 90 degree pull scrapers for manual scraping removal of coating.
- Metal file for flattening or sharpening scraper edge.
- Random-orbit sander to expedite sanding large flat areas.
- Vacuum cleaner to help remove any sanding dust before wiping down.
- Sandpaper – From 80 to 320 grit adhesive backed for sanding blocks and size and type for any power sanders.
- Sanding blocks – Hard and soft hand sanding blocks for different surfaces. Soft foam sanding block aid in sanding curves and contours; hard sanding block is best for flat surfaces.
- Dust face mask and safety glasses.
- Masking tape – High quality that removes cleanly to protect non-varnished surfaces. For taping curved surfaces, use a flexible tape.
- Drop Cloths, Tarps or plastic sheeting to protect adjacent surfaces.
- Clean, lint-free rags and denatured alcohol for cleaning wood surfaces and removing any dirt and oils.
- Tack cloth for wiping down the wood before applying varnish.
- Paint strainers for filtering contaminants when pouring varnish from the can into your paint pot.
- Small container (paint pot) for holding varnish during application.
- Clean paint stir sticks.
- Solvent resistant gloves (nitrile, latex, rubber)
- Varnish and varnish primmer if using.
- Brushing thinner for varnish (manufacturer recommended).
- Quality paint/varnish brush (Natural bristle, badger hair or fooler chip brush). Foam brushes (throw away) is OK for sealer and build coats.
- Foam roller with tray (if applying roll & tip on flat surfaces).
- Organic vapor respirator if applying in confined space
- Mineral spirits and containers for brush cleaning

# WEB Links to Varnishing Information and YouTube Varnishing Videos

Total Boat Guide on Varnishing (Web Page with General Varnishing Information)
https://www.totalboat.com/varnishing/

Varnishing Tips & Techniques, Part 1: Sanding for Varnish (Off Center Harbour)
https://www.youtube.com/watch?v=ou4HyS68Nfk

TotalBoat Gleam Varnishing Tips (Tips from a Shipwright - Roll & Tip Varnish)
https://www.youtube.com/watch?v=pI7DjFy32DA

How to best prep and varnish your boat - Part 2 (Tips from a Shipwright)
https://www.youtube.com/watch?v=hI6dEpdo2gc&t=263s

How to best prep and varnish your boat - Part 1 (Tips from a Shipwright)
https://www.youtube.com/watch?v=AxLTI8DI8Kk&t=2s

Comparing Different Varnishes For Your Boats Brightwork (Boatworks Today)
https://www.youtube.com/watch?v=VViNE04aj3U

Varnishing (the basics) – Boat Building Sessions (New bare wood)
https://www.youtube.com/watch?v=YrHHQJafjGk

Varnish and Epoxy~ a Professional Wood Finish for Teak Part1 (Boatworks Today)
https://www.youtube.com/watch?v=IqiXZrs5hvM

Varnish and Epoxy~ a Professional Wood Finish for Teak Part2 (Boatworks Today)
https://www.youtube.com/watch?v=rNLQRRDaitE&t=292s

Stripping and sanding varnish with a heat gun to prep for new coats
https://www.youtube.com/watch?v=Enk4OS_8tI0

Top tips using Epifanes Varnish (Which varnish is best for you?)
https://www.youtube.com/watch?v=eqY1zBwNz-I

How to use Penetrating Epoxy to seal and protect your wooden boat feat. (Tips from a Shipwright)
https://www.youtube.com/watch?v=F8wLbyCk7EQ

How to prep and apply varnish on wooden boats - Part 1 of 2 (Tips from a Shipwright)
https://www.youtube.com/watch?v=5Bk7Tb0Zi48

How to best prep and varnish your boat - Part 2 (Tips from a Shipwright)
https://www.youtube.com/watch?v=hI6dEpdo2gc

Varnish Alternatives For A Quick Weekend Finish! (Wood Finishes) (Boatworks Today)
https://www.youtube.com/watch?v=tjmUot23hLs

Tutorial - How to varnish teak on a sailing vessel (Liberty International Sailing Club)
https://www.youtube.com/watch?v=K4W2KFGMx-E