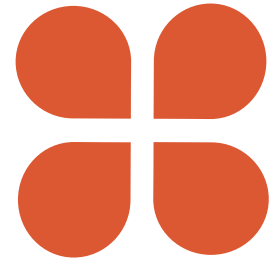


Cherish well



National Heritage Board in January 2016

Pine tar: Preparation, differences in quality and properties

This guidance sheet describes various raw materials and production methods for tar, how these affect tjärkvaliteten and properties of various tar products have. Advice Sheet caters primarily to administrators of cultural and historical buildings.

Tar has today almost been a forgotten subject. Swedish commercial in Sweden imported. Production of artisanal scale is sometimes done on homesteads and in association context, often for their own use, but sometimes also for sale. There is currently no standardized way to describe and classify tar. There exist a number of Swedish standards of coal tar for coating, but the corresponding lack of pine tar. In trade and in the product data sheets can be called tar wide variety of different brands and vendors, and these terms are not always linked to raw material quality, the production behavior and content. An overall assessment of the tar is important to unite the right quality to the right purpose. There are often not enough to just read and understand the product data sheet or a list of contents. In this Nurturing well-leaf emphasizes raw and framställningssättets importance for tjärkvaliteten. In Foster well-blade *Pine tar: Assessment of quality*



UV light and heat, especially when exposure to moisture, making the raw wood is broken down faster on the sunny side than the shadow side. Photo: Fabian Mebus / raw.

described how to assess the characteristics of tar.

Tar prevent degradation of wood

Weathered untreated wood on facades and roofs are broken down by individual and combined factors such as UV radiation, heat, water and mechanical be affected. The subject lignin in wood degraded by UV radiation, which manifests itself as a discoloration which is first yellowish, then merges into graying and solutsatta sides continue to brown and then released in a very dark discoloration. Bright sunlight in combination

nation with moisture influence also breaks down the cellulose in wood. This impact is particularly visible in the Nordic countries, where the sun's angle in the fall and spring means greater direktbestrålning where reflections from the snow amplifies this effect. The surface layer of untreated surfaces can be broken down by about 5-12 millimeters per century. Heat radiation causes shrinkage cracks. Moreover, if the wood has a high moisture content, tensions may arise which enhances the effects of

so-called dry cracking. Facades and roofs to the south breaks

Content and characteristics affecting tar characteristics as wood preservatives

Pine / fir: Rich in resins, terpenes and fats. This includes Töre, tar wood, tjärstubb and katad fur.

Fir: Lower levels resins, terpenes and fats.

Leaf: Contains starch instead of resins and terpenes. Lövvedstjära should be completely avoided for coating.

therefore down faster than the north. In particular, this is done on the wood surface has dark color, because the heat when absorbed to a greater extent. The solar heat can also drive out the natural resins to the surface of the resinous timber, where they oxidize to a yellow powder. Cracks and cavities where drying is complicated to collect water and create conditions for rotting. Pine tar prevents cracks and degradation by light / UV and prevents leaching of the resins. It is this and tar ability to reject water that gives it its protective properties. Selection of trätjärekvalitet is closely linked to the purpose - it comes to finding the right quality to the given application and the surrounding environment.

Raw material importance to the quality of the tar

Resin acids and terpenes are part of coniferous tree's natural defenses against insects and fungi. The quantity of resin acids and terpenes in raw material affect trätjärens properties as wood preservatives. Wood pitch of the highest quality mainly contains resin acids and naturally occurring turpentine. Resin-rich pine from tjärstubbbar, different heartwood or deliberately damaged stem wood (called katad fur) is the best raw material for tar for coating.

Tjärframställning with the direct method (see below) requires the highest quality raw materials, while the front position with the indirect method enables the extraction of raw materials of different and inferior qualities. Commodity class to the meaning will therefore be greater at the assessment of ugnsprömda tars (prepared with the indirect method - see below).

Framställningssättets importance

Pine tar produced by dry distillation of wood, which means heating under oxygen poor environments. This can be by direct (autothermal) or indirectly (allothermic) method. Direct method means that the heat source is the same wood that is distilled into tar. The indirect method means that the heat source is outside the enclosed tjärråvaran.

Direct / autothermal method - dalbränd tar

At dalbränning the process occurs over time and lower temperature because the oxygen supply in a simple way (with the covering peat). It therefore becomes difficult to achieve the same low oxygen content as possible at ugnsprömda. The low temperature means that the percentage resin acids which have not been converted to other less desirable hydrocarbons (eg phenols) by overheating, is larger in comparison wise subsets early. In comparison with ugnsprömda processes (see below), which have been rapidly and under high heat, the phenolic content of whole firing at lower dalbränning.

Indirect / allo-term approach - ugnsprömd tar

At ugnsprömda it is easier to control the heat and oxygen supply. Therefore, one can in less time getting more tar out of a burning and use a raw material with lower resin content than the direct approach. Retortugnsbränning is an industrial method to more precisely control the process. High temperatures in fast processes resin acids hydrocarbon chains are broken down quickly, allowing the tar produced in this way has lower concentration desired resin acids and low or no turpentine content. With ugnsprömd tar referred to today as a rule by manufacture retortugnstjära. The traditional private distillation of small quantities of tjärgryta is also a form of kiln firing.

Fractions (aliquots)

In all tar condensed fractions gradually as the process progresses. The temperature rises clean throughout the burn, which affects the quality of the various fractions. The highest quality obtained from the first fraction, the front set at lower temperature, and the lowest kvalite-

TEN obtained from the last and hot part of the process. How fast firing takes place affects how much of the tar belonging to the early fractions with high quality. A rapid rise in temperature means that most of the tar has similar characteristics to the later fractions and a slow rise in temperature gives greater proportion of high-quality tar. Fractionation determination is usually meaningless in terms of industrial origin retorttjära, because the different

fractions usually are mixed to a single production product in this type of process. The hotter the process at ugnbränning also means that a relatively large proportion of the recovered tar belongs to later fractions. By controlling the processing temperature in combination with the selection of high quality raw materials and fraktionsut-proceeds, it is possible to manufacture ugnbränd tar with a similar quality as the dalbrända.

Preparation of tar - method, raw material, fractions and field

Method	Raw material / commodity class	Fraction Sorting / quality	Uses / coating applications
Direct (autothermal) method: dalbränd tar. Example: tjärgrav, tar. The heat source is the raw material consumed during process.	Resin-rich softwood high quality, which thus high resin (from kärnfur or katad stem wood), designations tar wood / tjärstubbbar, katad stemwood and Tore. NOTE! stem wood should be katad to counts as high quality.	Fintjära, primate tar (primary). The first tar coming, light in color. Expensive fraction. The highest concentration of resin acids.	All locations, sun exposed areas. Good film forming properties. Provides a stronger surface. Underlines that last treatment.
		Ordinary Tar (secondary). The largest recovered amount at the firing. Darker than fintjäran. Slightly lower concentration of resin acids.	Mainly roof, but other surfaces. Good penetration in wood. Unscrupulous surfaces.
		Heavy Tar (tertiary). Dark, containing impurities. Low concentration of resin acids.	Decking, bridges etc.
		Pitch. The very last fraction, rough texture. *)	
Indirect (allothermic) method: ugnbränd tar Example: tjärugn, tjärgryta, retortugn. External heat source.	Both the core and stem wood (sapwood) can used and wood from wood with less tar content: softwood, and mixtures hardwood. commodity Class are of significance only for ugnbränd tar, while dalbränd tar will automatically have high class commodity.	A tar **), any tar known as ugnbränd and which can be used coating applications. The raw material for firing determines the quality.	As a rule a mixture of various fractions. Equivalent uses and properties of ordinary tar about fur quality (Tore tar) is a raw material. Inferior raw material of pine corresponds coarse tar. Tar hardwood and blandved should not be used coating applications.
		B-tar **) low quality.	Fuel only.

*) Pitch may also denote a by simmering further refined tar e.g. used to boat care.

**) Note that A- and B-tar stands for primary and secondary tar in Norway.

The different quality of the properties

and uses

Various grades may have different uses also for the preservation of wood (see Table). Fintjärä low- give as a film (coating) on the surface while ordinär- tar have higher penetration. All tar settles, however, that a movie when the ground is saturated with tar.

This is an indication that further underscore not required.

Ordinary tar has better penetration and can thus act as a "oiling" while primary tar form a stronger coating. Grovtjärar used only on hard surfaces, such as bridges.

Asphalting aims to protect degradation of wood. The protection itself is dependent on, among other tar characteristics, the type of wood and is coated on wood consists of sapwood or heartwood, and the coating is carried out. Resinous wood requires fewer strokes than kådfattigt. At

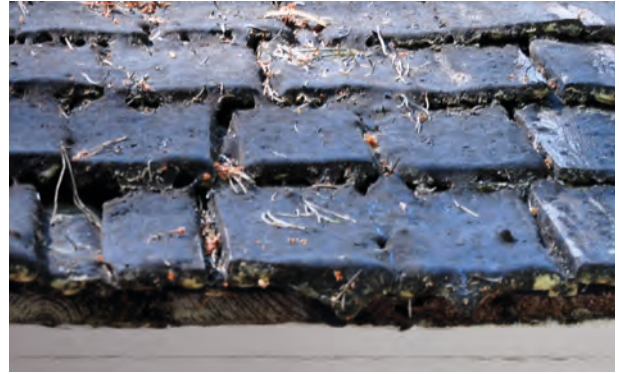
impregnating deletions integrate the natural resin in the wood tar with equality of the solution equal. The tar is thus a strengthening of the wood already existing systems of water icing. When saturation occurs filming. Tar can be ironed generously with film-forming performance without saturating the wood needs to be reached. The tar is then more on the surface. In both cases, the surface becomes smooth and the time to dull matt. Wood impregnated with tar, but that is not saturated or not fitted with a generously applied finishes, has instead left the wood's own grain. Pigmentation give similar properties of preventive protection against damage related to UV radiation, heat and moisture, such as strong film formation capacity in the tar in the surface layer.



Church door on Vänge church in Gotland (right) are crossed with primary tar. Gateway to the left from the church Mjölby Östergötland is probably underlined by senfraktionstjärä, ugnstjärä or pigmented tar. The karakteristiska remains of previously saturated layer appears as unevenness in the surface layer of the right port. Photo: Helen Simonsson / raw.



The surface on the church door to dalhem church on Gotland has exposed wooden structure. It has been impregnated with tar without being saturated. Photo: Helen Simonsson / raw.



Top: Chip Coverage on forest canopy at Skogskyrkogården in Stockholm exhibits a film formation suggesting deletion to saturation or alternatively a thick topcoat on an unsaturated substrate. Photo: Helen Simonsson / raw.

The varnish-like surface that gives a resin-rich tar acts as a barrier layer that prevents moisture to penetrate and rosin acids in the wood to be heated out. The surface should be sufficient film-forming to keep the ground dry enough to keep formbestän- resistance and prevent the resins in the ground to leach out the sunshine. At the same time, the surface should not be so tight, in relation to a perhaps still absorbent substrates, possibly penetrating moisture can not be aired out. Turpentine provides better penetration and occurs naturally in primary tar. Turpentine, as well as moderate preheating the tar, enabling many brush strokes. The fast drying time, high proportion

Bottom: Weathered panel on Vestveiløftet at Skansen in Stockholm. The wood's natural resin has been heated up by the sun as a yellow precipitate upon the twigs. Photo: Helen Simonsson / raw.

unconverted resin acids and turpentine helps dalbränd of the tar fraction of early, enabling more deletions in the same season to a saturation of the wood and a film forming the surface layer of appropriate overall thickness. Current recommendation in Sweden is to emphasize during the summer months, when warm, sunny weather and on dry surfaces. Where greater emphasis is placed on continuous film formation and surface layer thickness, rather than the saturation of the wood, sometimes recommended smoothing up in spring and autumn, ie during cooler weather. There will turpentine is added as a diluent to improve the consistency and penetration. A disadvantage of turpentine is supplied to dilution also means that the resin acid concentration decreases at coating. Therefore, many people choose instead to heat the tar to 50-60 degrees Celsius in order to make it more thin.

Generally speaking dalbränd tar guarantee raw material quality and comparatively high concentration of resin acids, regardless of faction. Fraction Classification defines the quality further. Ugnbränd / retortbränd Tore tar highest quality of ugnstjärorna.

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This sheet is part of a series of advice on the care and management of cultural heritage.



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