LIGNOFOL, 1956 (in englischer Sprache)

LIGNOFOL

„LIGNOFOL" (Registered Trademark)

LIGNOFOL is beech plywood impregnated with resin according to the German Standard Specifications (DIN 4076 I B 2). The specification values for such materials are laid down in DIN 7707. The LIGNOFOL values exceed those specified in most cases. LIGNOFOL is manufactured at high temperatures under a wide range of compression.

The veneers are laid in three different ways, i. e. with grains in one direction, grains crossing at right angles, or at angles from 15° to 45°. Resin content and degree of compression govern the mechanical strength as well as resistance to the action of water and weather conditions. LIGNOFOL is superior to normal wood in these respects.

Mechanical and Engineering Properties

The following properties should be noted when comparing LIGNOFOL with other materials:

- Increased hardness
- Corrosion resistance
- Splinter-proof and smooth surface
- Increased bending strength
- High resistance to weathering agents (especially LIGNOFOL B with TROLONIT cover)
- High resistance to water action (especially the types with increased resin content)
- Low thermal conductivity
- Low noise level (in the case of gear wheels)
- Resistance to termite attack without the need for insecticides (especially the types with increased resin content)
- Low specific weight

Please refer to the table at the end of this booklet for the property values of various LIGNOFOL types.

LIGNOFOL is manufactured in three classes: A, B and C

Class A The grains of all the veneers usually run in the same direction, but for reasons of manufacture some veneers might be arranged with the grains running at right angles. Class A includes four different types called L, O, R and W which differ in the thickness of the veneers, the kind of resin used and the specific weights. Those types have high mechanical strength in one direction.

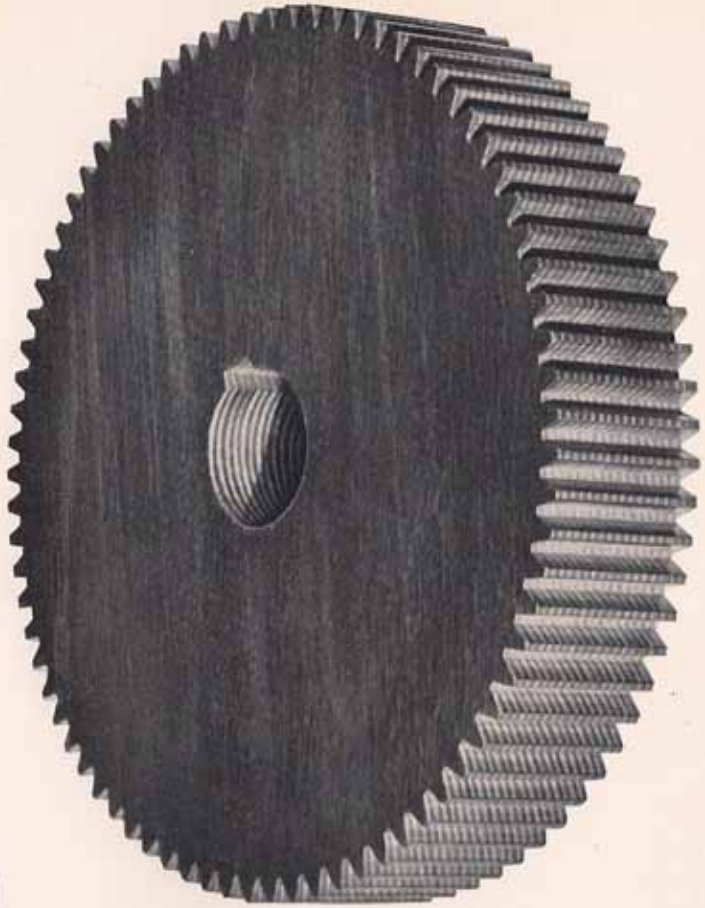
LIGNOFOL L is composed of thick veneers. Specific weight is approx. 1.4 kg/dm³
LIGNOFOL O is composed of thick veneers. Specific weight is approx. 1.1 kg/dm³
LIGNOFOL R is composed of thin veneers. Specific weight is approx. 1.4 kg/dm³
LIGNOFOL W is composed of thin veneers. Specific weight is approx. 1.4 kg/dm³
Increased resin content and therefore resistance to oil and water action.

Class B The grains of the veneers run at right angles to each other with consequent equally high mechanical strengths in two directions.

LIGNOFOL M is composed of thick veneers. Specific weight is approx. 1.4 kg/dm³
LIGNOFOL S is composed of thin veneers. Specific weight is approx. 1.4 kg/dm³
LIGNOFOL V is composed of thin veneers. Specific weight is approx. 1.4 kg/dm³
Increased resin content and therefore high resistance to oil and water.

Class C The veneers are arranged with their grains crossing each other at angles from 15° to 45°. Thus, mechanical strength is effective in all directions within this range.

LIGNOFOL Z
(specific weight 1.4 kg/dm³) is a special grade and particularly suitable for the manufacture of silent gear wheels subjected to rough service. Other useful applications of LIGNOFOL Z are listed in a special brochure which is supplied on request.



Gear wheels made of LIGNOFOL Z

Other types of LIGNOFOL can be made in addition to the standard types listed above, to meet the specific requirements of any user by varying the kinds of wood, thickness of veneers, specific weight, etc.

Hard LIGNOFOL is generally available in sheets of 1,000 x 1,000 mm and 1,400 x 1,000 mm. Other sizes are manufactured upon request with corresponding price increase. The thickness of the sheets varies between 10 to 100 mm. Thicknesses of 6 mm and 8 mm are made upon request, provided that at least six sheets of any particular thickness are ordered. Glued blocks are available up to 180 mm thickness.

Thickness tolerances are:

± 10 % up to 30 mm nominal thickness
± 5 % from 30 mm to 60 mm nominal thickness
± 3 % from 60 mm to 100 mm nominal thickness

Specific weights:

1.35 to 1.40 kg/dm³ for all types, except Type 0. Sheets with specific weights between 1.1 kg/dm³ and 1.4 kg/dm³ are manufactured upon request.

Light-weight LIGNOFOL sheets with specific weights between 0.7 kg/dm³ and 1 kg/dm³ are made by reducing the degree of compression. These sheets are preferably used for the manufacture of boats. Water tightness being of primary importance in this case, light-weight LIGNOFOL sheets are widely used in this industry. The manufacture of containers is another field of application. Light-weight LIGNOFOL is supplied in sizes 2,000 x 1,000 mm and 1,400 x 1,000 mm. The thicknesses range from 4 to 16 mm. Both surfaces are coated with resin, but uncoated sheets are equally also available for subsequent varnish treatment.

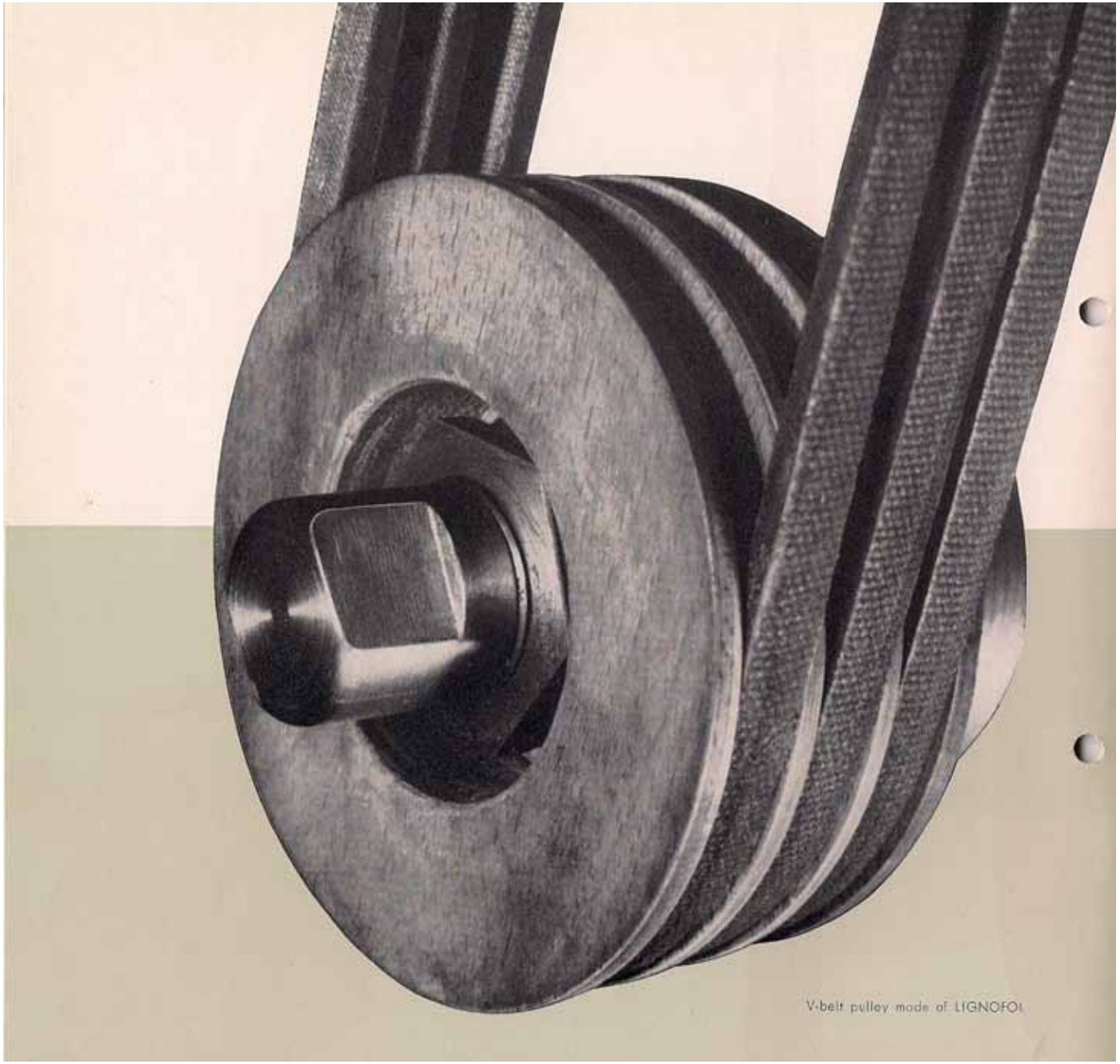
Used hard LIGNOFOL

When properly used according to its characteristics, hard LIGNOFOL can, in many cases, replace iron, steel or other metals in general machine construction, textile machinery, tools, waggons, car bodies and electrical equipment. Some of the large number of applications are listed below. New ones are found all the time and experimental use is recommended. Our Engineering Dept. will be glad to help solve any of your LIGNOFOL problems.

LIGNOFOL L, O and R (grains running in one direction) are used for beaters, shuttles, bobbins, drawing rollers, etc. of textile machines. Notable properties are smooth surface, corrosion resistance, freedom from splintering, low weight, increased hardness and durability. Bearing bushes and running surfaces in general machinery construction and brake linings and brake blocks are another field of application of LIGNOFOL L, O and R. The material resists wear better than metal where moderate-speed shafts are concerned, as the rubbed-off particles have no corroding effect but are pressed back into the surface. The bearings are highly insusceptible to dust (use in cement works and mines) and have good running characteristics even if lubrication is unsatisfactory for any reason. LIGNOFOL never attacks the shaft surface and does not widen by wear as, for instance, white metal. It is therefore the right material for rough service. LIGNOFOL with graphite addition improves the running characteristics of bearings and is available upon request. Brake linings of LIGNOFOL incorporate many advantageous features and reduce the high rate of replacement necessary with other lining materials.

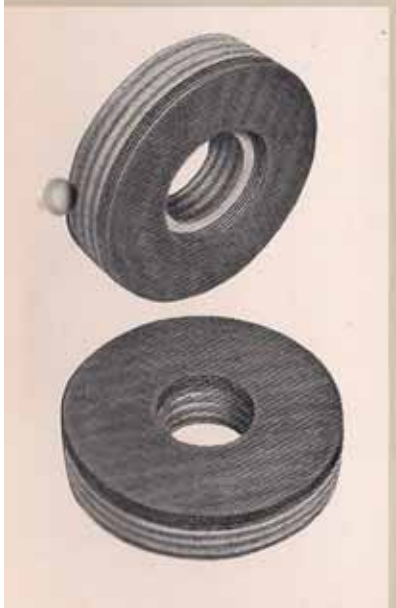
Flattening hammers, mallets and hammer handles are preferably made of LIGNOFOL. Advantages are a high degree of hardness and low wear and tear.

Beaters and shuttle

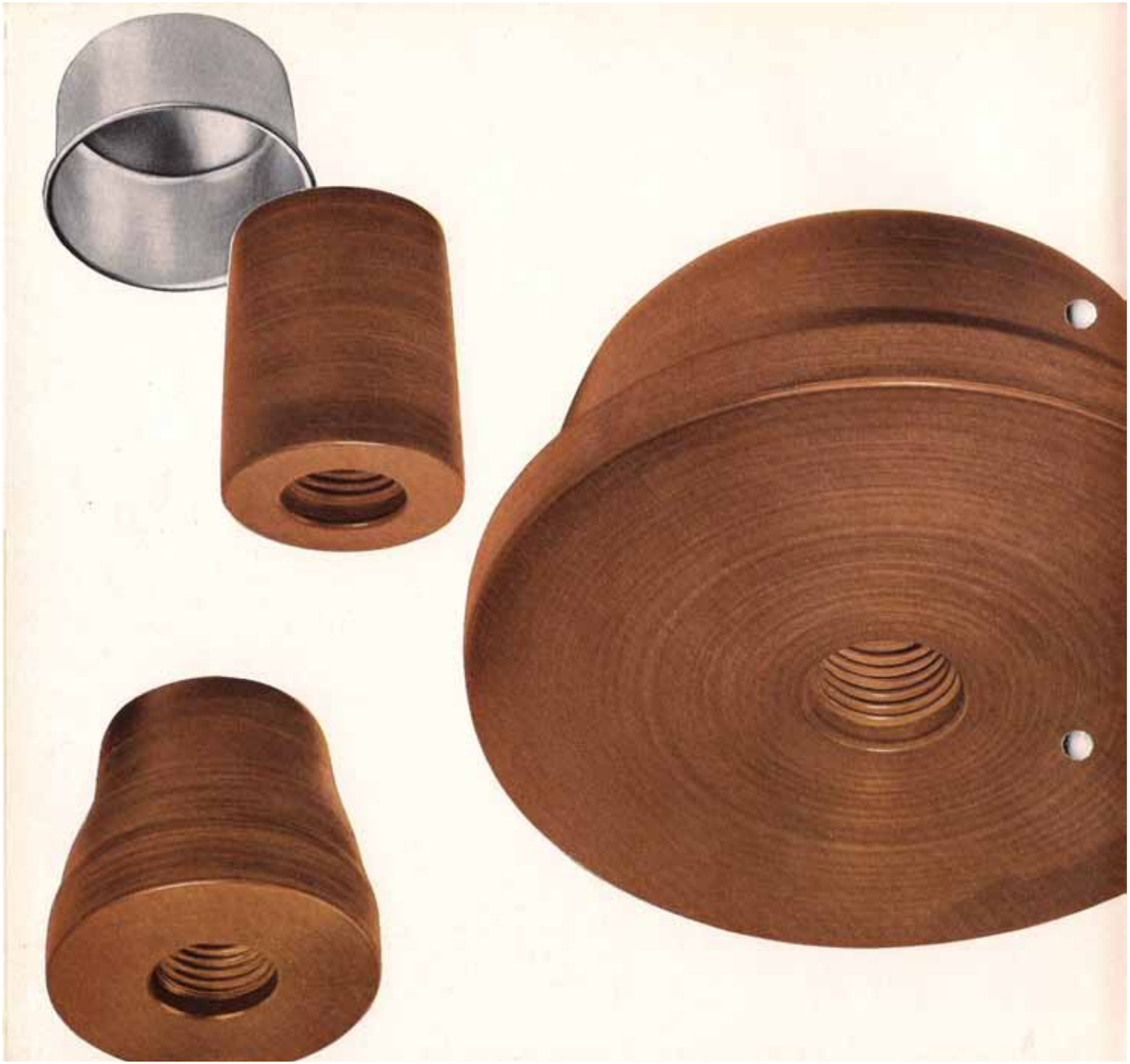


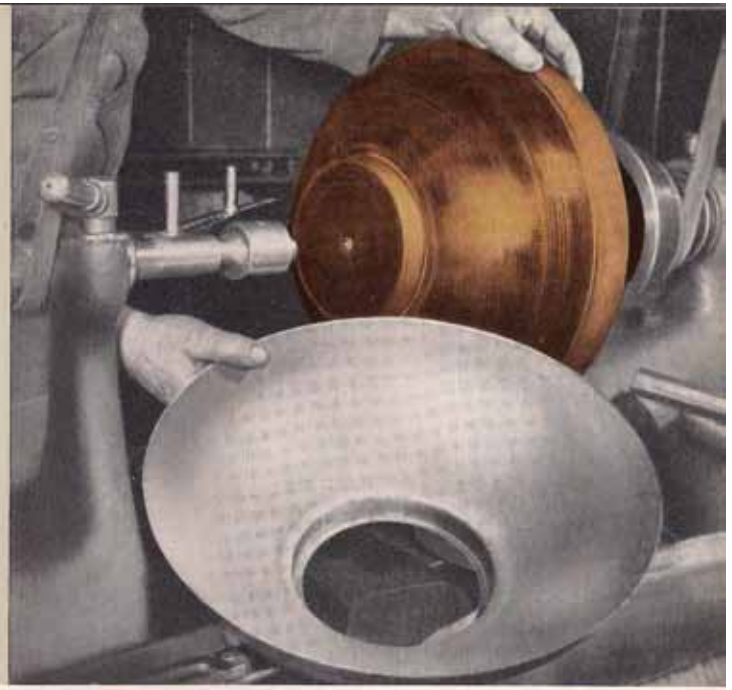
V-belt pulley made of LIGNOFOL

LIGNOFOL M and S (grains of the veneers running at right angles to each other) are used for press tools, tools for shaping plastics, as for instance TROVIDUR, ASTRALON, PLEXIGLASS, etc., tools and constructional parts of various designs, templates for the construction of jigs and fixtures, aircraft engineering, V-belt and other pulleys, self inducting coils, foundry patterns, replacing aluminium and other metal parts in model-workshops, base-plates for machinery installations, replacing welded or cast machine parts and holding devices, protecting walls of machinery installations, guards on wood-working machinery, worktable tops and workbench tops, discs for bobbins of all sizes, weaving loom pallets, high-frequency induction machinery when use of metal is prohibited, running surfaces of feeders and discharge units, holders for grinding of light-metal shapes, templates for moulding machines in the furniture industry etc., rollers for conveyors, supporting blocks for transport containers, limit stops and entering wedges in rolling mills, bearing cages in sheet rolling mills, and mill grinding bushes and other technical bushes. Advantages include lower initial costs as compared with metal, saving in weight, easier working with reduced consumption of time, resistance to corrosion and splintering, high degree of hardness with increased life and better service, smooth surfaces obtained by grinding and polishing, designs with better moments of inertia due to the lower specific weight, high resistance to buckling and bulging, high rate of absorption of vibrations and lower thermal conductivity as compared with metals, which is often sought for a variety of reasons.

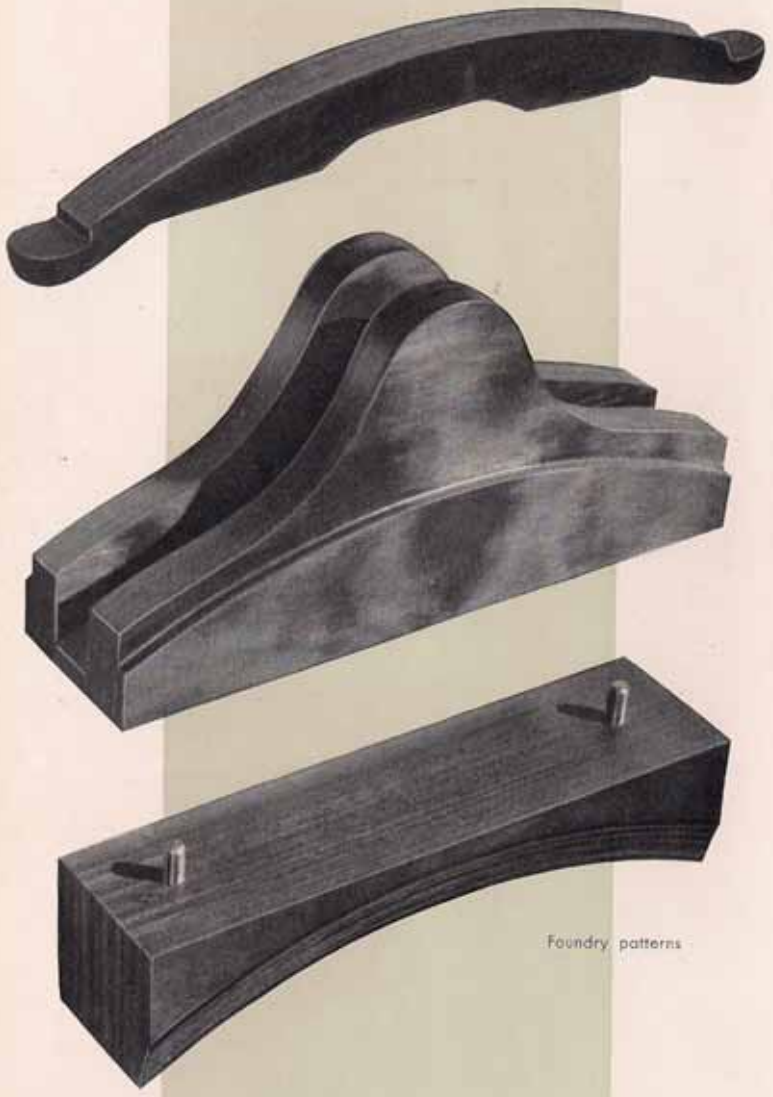


Bobbin discs





LIGNOFOL formers



Foundry patterns

LIGNOFOL V and W resist water and oil. In LIGNOFOL V the grains of the veneers run at right angles to each other and in LIGNOFOL W usually in one direction. These types have a high resin content and are especially suitable for machinery parts. LIGNOFOL V is used where resistance to water and oil is of primary importance as, for instance, for cable duct coverings, supporting blocks of containers and high-frequency induction equipment. LIGNOFOL W is used where high mechanical strength is required in one direction, in addition to resistance to oil and water as, for instance, for supporting and suspension springs of shaker conveyors, trough conveyors, salt dryers etc., spring rods and spring boards for coke screens and push-rods screening machinery.

LIGNOFOL Z (veneers are arranged with their grains crossing each other at angles from 15° to 45°) has excellent mechanical strength and durability and has proved its value in the manufacture of silent and vibration-dampening gear wheels. In addition it is suitable for couplings, friction discs, V-belt pulleys, guide parts and other machine parts. Please write for complete information.

Sliding conveyors of LIGNOFOL

LIGNOFOL Special Grades

knife handles, types 20/17 III (beech plywood)
LIGNOFOL V and W with graphite addition
LIGNOFOL for fish-plates
LIGNOFOL for the electrical industry, type 20/49
LIGNOFOL B with TROLONIT cover

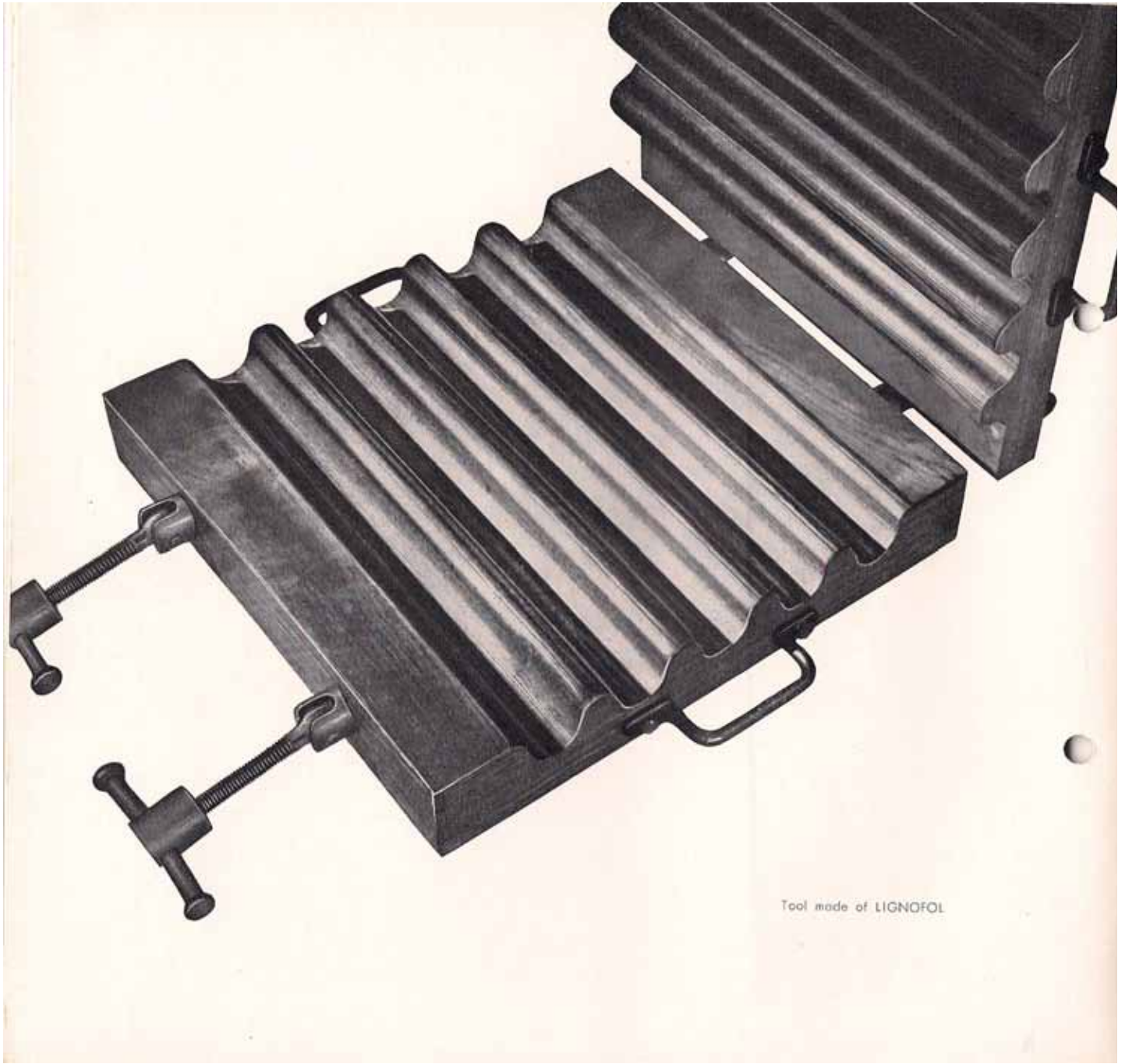
Light-weight LIGNOFOL

is a lightly compressed material of M and V quality. It is superior in strength and water resistance to normal plywood. This feature is obtained by the use of selected resins condensed under great heat. It is used in the manufacture of sporting boats and small sailing boats. The sheets (beech plywood or gabun plywood) are supplied with a resin film on both surfaces, but sheets without exterior resin films are also available for subsequent varnish treatment. The material can be bent and shaped easily after steaming. The glue selected should be waterproof as for instance Kaurit WHK or phenolic resin glue P 600 L manufactured by us. Edges should be protected with water-proof varnish in the construction of containers and material handling trucks.

LIGNOFOL property values

	PSCH KL A	PSCH KL B
Type designation according to DIN 4076		
Grade	L	M
Arrangement of grains	one direction	crossed
Colour	brown	brown
kg/dm³ Weights	1,35—1,40	1,35—1,40
kg/cm² one direction Bending strength, untreated	2600	2000
kg/cm² crossed Bending strength, untreated	3300	2000
cmkg/cm² one direction Impact strength	95	50
cmkg/cm² crossed Impact strength	75	25
cmkg/cm² one direction Notch impact strength	85	50
cmkg/cm² crossed Notch impact strength	75	25
kg/cm² one direction Tensile strength	2200—2600	1200—1500
kg/cm² crossed Tensile strength	150—170	1000—1200
kg/cm² Compression strength	1500—1700	1700—2000
kg/cm² Shear strength	280	130
kg Resistance to cleavage	300	300
kg/cm² Compressibility	30—50	30—50
kg/cm² Modulus of elasticity	250 000	170 000
kg/cm² Hardness	1500	1500
°C MARTENS deformation resistance (heat)	150	150
kcal/m h °C Thermal conductivity	0,26	0,26
1/°C Linear coefficient of expansion	10—40	10—40
Resistance to flame	1	1
Combustibility	low	low
Surface resistance, 80 % relative air humidity after 4 days	10^8	10^8
Internal resistance, 80 % relative air humidity after 4 days	10^8	10^8
kV/mm Dielectric strength	2,4	2,4
Water absorption, % in three days (with 30 x 30 x 15 mm specimen)	10	10

PSCH KL A	PSCH KL B	PSCH KL A	PSCH KL B	PSCH KL C
R one direction	S crossed	W one direction	V crossed	Z obliquely crossed 45°
brown	brown	brown	brown	brown
1,35—1,40	1,35—1,40	1,35—1,40	1,35—1,40	1,40
3300	2200	3700	2000	2200
3600	2200	3400	2000	1700
95	45	85	40	65
80	20	65	20	30
90	50	80	50	—
85	20	65	15	—
2500	1400	2500	1500	1200
200	1200	200	1500	1200
1500—1700	1500—1700	1700—2000	2000—2200	2500—2800
280	175	260	200	—
300	250	350	300	—
50—60	50—60	45—50	45—50	80—90
255000	150000	210000	150000	120000
1600	1650	1700	1700	1600
150	150	150	150	150
0,26	0,26	0,26	0,26	0,26
10—40	10—40	10—40	10—40	10—40
1	1	1	1	1
low	low	low	low	low
—	—	10^7	10^7	—
—	—	10^7	10^7	—
—	—	2,5	2,5	—
6	6	4	4	—



Tool made of LIGNOFOL

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Bearbeitet: Dr. Volker Hofmann,
Troisdorf, 13. Dezember 2012