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What is Hp 2061.5 (PF CP 202)

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Hp 2061.5 (PF CP 202) – phenolic paper laminate (phenolic resin, paper reinforcement) to DIN 7735 / EN 60893, electrically improved grade (NEMA XX)

Hp 2061.5 (PF CP 202) is a phenolic paper laminate based on phenolic resin and cellulose paper reinforcement to DIN 7735 / EN 60893 – the electrically improved grade of the PF CP family. With a 40 kV test voltage it is significantly higher than the other grades in the series, making it particularly suitable for more demanding electrical insulation applications.

Classification and basic character

Phenolic paper laminate is produced by impregnating cellulose paper webs with phenol-formaldehyde resin and pressing them under heat and pressure into a thermoset laminate. Hp 2061.5 (PF CP 202) is brown, has a density of around 1.4 g/cm³, and belongs to the group internationally known as NEMA XX electrically improved phenolic paper laminates – the classic insulating material for components with increased dielectric strength requirements.

Hp 2061.5 (PF CP 202) compared with other phenolic paper grades (PF CP 201–206)

Hp 2061.5 (PF CP 202) stands out within Liedtke's phenolic paper series for its electrical performance:

- PF CP 201 (Hp 2061) – economical standard grade for general insulation applications
- PF CP 202 (Hp 2061.5) – electrically improved grade, 40 kV test voltage vs. 15–25 kV for the other grades
- PF CP 203 (Hp 2061.6) – hot-punchable grade with the lowest water absorption in the series
- PF CP 204 (Hp 2063) – flame-retardant grade (UL 94 V-0), known worldwide as "FR-2", the base material for flame-retardant printed circuit boards
- PF CP 205/206 (Hp 2062.9/2062.8) – economical punching grades without high mechanical requirements

Production, processing and key properties

To produce Hp 2061.5 (PF CP 202), several layers of cellulose paper are impregnated with phenol-formaldehyde resin, stacked and pressed into sheets under heat and high pressure. The resulting material machines very well – sawing, milling, drilling and punching are all straightforward with standard carbide-tipped tools.

Hp 2061.5 (PF CP 202) achieves 130 MPa flexural strength, 100 MPa tensile strength and 15 kJ/m² impact strength at a modulus of elasticity of 7000 MPa; delamination strength is 2000 N. Electrically it is characterised by a 40 kV test voltage (∥ and ⊥ to the laminations), a dielectric dissipation factor of 0.08 and CTI 100. Thermally it is rated thermal class E up to a limiting temperature of 120 °C.

When Hp 2061.5 (PF CP 202) is the right choice

Hp 2061.5 (PF CP 202) is particularly suitable for electrical insulation parts with increased dielectric strength requirements:

- Insulation parts in switchgear and electrical equipment subject to high voltage stress
- Transformer and coil formers, and insulating supports with increased electrical requirements
- Components requiring significantly higher test voltage (40 kV) than the standard grade PF CP 201
- Punched or machined insulation parts for mechanical and plant engineering
- Applications requiring a good combination of mechanical strength and electrical insulating capability

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When Hp 2061.5 (PF CP 202) is NOT the right choice

The limits of the material are equally important:

- Direct food contact – Hp 2061.5 (PF CP 202) is not declared for this purpose
- Flame retardancy to UL 94 V-0 – PF CP 204 (Hp 2063) is the suitable grade here
- Very low water absorption or hot-punchability as the main criterion – PF CP 203 (Hp 2061.6) is better suited
- Continuous use beyond the 120 °C limiting temperature
- Purely cost-driven stamped parts with no electrical requirement – PF CP 201, 205 or 206 is usually sufficient

Cost and machining at Liedtke

As the electrically improved grade, Hp 2061.5 (PF CP 202) sits above the standard grade PF CP 201 in price; component price is determined mainly by sheet thickness, material utilisation, machining effort and batch size. We quote binding prices on request based on your drawing. During machining we ensure adequate dust extraction and use sharp, carbide-tipped tools for clean cut edges and holes – from single parts to series production.

Advantages and disadvantages at a glance

An honest assessment of Hp 2061.5 (PF CP 202)'s properties:

Advantages

- Highest test voltage (40 kV) within the PF CP phenolic paper series
- Good mechanical strength (flexural strength, tensile strength, delamination strength)
- Good machinability with standard tools
- Proven, standardised material to DIN 7735 / EN 60893

Disadvantages

- Not declared for direct food contact
- Not flame-retardant (choose PF CP 204/Hp 2063 for UL 94 V-0)
- Limited to a 120 °C limiting temperature (thermal class E)
- Higher price than the pure punching grades (PF CP 205/206) for simple parts with no electrical requirement

Practical tip: Where significantly higher dielectric strength is required, Hp 2061.5 (PF CP 202) is the right grade. Where flame retardancy is required, we recommend PF CP 204 (Hp 2063); for purely stamped parts with no electrical requirement, PF CP 201, 205 or 206 are often the more economical choice.

Typical Properties

- Electrically improved grade (NEMA XX) with 40 kV test voltage
- Good mechanical strength and delamination resistance
- Good machinability
- Thermal class E (120 °C limiting temperature)
- Standardised to DIN 7735 / EN 60893
- Brown colour

Product Examples

- Insulation parts for switchgear
- Transformer and coil formers
- Insulating supports and strips
- Punched insulation profile parts
- Components for electrical equipment

Typical Industries

- Electrical and electronics industry
- Switchgear manufacturing
- Mechanical and plant engineering
- Transformer manufacturing
- Power engineering

	Test Method	Unit	Value
Mechanical Properties			
Flexural strength (23 °C)	DIN 53452	MPa	130
Impact strength	DIN 53453	kJ/m²	15

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	Test Method	Unit	Value
Notched impact strength (Charpy)	DIN 53453	kJ/m²	4
Tensile strength	DIN 53455	MPa	100
Compressive strength ∥ to laminations	DIN 53454	MPa	100
Compressive strength ⊥ to laminations	DIN 53454	MPa	250
Delamination strength	DIN 53463	N	2000
Modulus of elasticity	DIN 53457	MPa	7000
Electrical Properties			
Test voltage ∥ to laminations	DIN 53481	kV	40
Test voltage ⊥ to laminations	DIN 53481	kV	40
Dielectric dissipation factor (50 Hz)	DIN 53483		0.08
Permittivity	DIN 53483		5
Comparative tracking index (CTI)	IEC 112		100
Thermal Properties			
Thermal conductivity	DIN 52612	W/(m·K)	0.2
Coefficient of linear expansion	VDE 0304/2	10^{-6}/K	20–40
Limiting temperature	VDE 0304/2	°C	120
Thermal class	IEC 85		E
Glow-wire / ember resistance	DIN 53459		Level 2a
General Properties			
Density	DIN 53479	g/cm³	1.4
Water absorption (4 mm thickness)	DIN 53495	mg	210
Colour			brown

Hp 2061.5 (PF CP 202) is a phenolic paper laminate (phenolic resin/paper) to DIN 7735 / EN 60893. The values stated are typical properties, researched from common, publicly available data sheet information for this product type; they serve as an aid to material selection and are not a legally binding warranty of specific properties. Actual values may vary slightly depending on the manufacturer and sheet thickness. Hp 2061.5 (PF CP 202) is not declared for direct food contact.

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