

What is PF CP 203 (Hp 2061.6)

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Hard paper laminate (phenolic resin/paper) to DIN 7735 / EN 60893 – hot-punching grade with particularly low water absorption

PF CP 203 (Hp 2061.6) is a phenolic-resin-bonded hard paper laminate to DIN 7735 / EN 60893 from the PF-CP series. It is specifically designed for hot punching (NEMA XXP) and has by far the lowest water absorption within the family – ideal for insulation parts that need to be punched reliably while remaining particularly moisture resistant.

Classification and Basic Character

Hard paper laminate (also known as Hp or by the trade name Pertinax) is a thermoset laminate: cellulose paper webs are impregnated with phenol-formaldehyde resin, layered and pressed under heat and pressure into sheets – a brown, mechanically stable, electrically insulating semi-finished product to DIN 7735 / EN 60893. PF CP 203 (Hp 2061.6) belongs to the PF-CP series (PF CP 201–206), whose grades differ in punchability, electrical characteristics and flame behavior, but are all built on the same base of paper carrier and phenolic resin.

PF CP 203 Compared to the Other PF-CP Grades

Each grade in the series covers its own requirement profile:

- PF CP 201 (Hp 2061) – economical standard grade for general insulation applications
- PF CP 202 (Hp 2061.5) – electrically improved grade, highest test voltage in the series (40 kV)
- PF CP 203 (Hp 2061.6) – hot-punching grade (NEMA XXP), by far the lowest water absorption (60 mg vs. 120–300 mg)
- PF CP 204 (Hp 2063) – flame-retardant grade (UL 94 V-0), known internationally as "FR-2", base material for flame-retardant PCBs
- PF CP 205 / 206 (Hp 2062.9 / 2062.8) – economical punching grades without high mechanical requirements

Manufacturing, Processing and Properties

For the hot-punching grade, paper webs are impregnated with a specially tuned resin system and pressed so that the material can be punched crack-free and dimensionally accurate at slightly elevated temperature, without fraying – an advantage over cold-punching grades for complex contours and high punching speeds. Mechanically, PF CP 203 (Hp 2061.6) achieves a flexural strength of around 130 MPa and a tensile strength of about 70 MPa at a density of 1.4 g/cm³; notched impact strength (Charpy) is 2.5 kJ/m². Electrically, the grade insulates with test voltages of 25 kV parallel and 30 kV perpendicular to the lamination at a limiting temperature of 120 °C (thermal class E). Notable is the water absorption of only 60 mg at 4 mm thickness – the lowest value in the entire series.

When PF CP 203 (Hp 2061.6) Is the Right Choice

Especially suitable for hot-punched, moisture-resistant insulation parts – for example:

- Hot-punched electrical insulation parts with tight tolerances and clean edges
- Insulation parts in moisture-sensitive applications requiring stable electrical values
- Switchgear manufacturing with high demands on the dimensional accuracy of punched parts
- Components with complex contours not cleanly producible by cold punching

When PF CP 203 (Hp 2061.6) Is NOT the Right Choice

Equally important are the limits of the material:

- Direct food contact – PF CP 203 (Hp 2061.6) is not declared for this
- Flame retardance to UL 94 V-0 – PF CP 204 (Hp 2063) is the correct grade here
- Highest electrical test voltages – PF CP 202 (Hp 2061.5) offers more margin at 40 kV
- Purely cost-driven punching applications without moisture requirements – PF CP 205/206 are sufficient here

Cost and Machining at Liedtke

As a specialized hot-punching grade, PF CP 203 (Hp 2061.6) sits somewhat above the economical standard grades in the PF-CP series' price structure; the part price is determined mainly by sheet thickness, material utilization, punching effort and batch size – we are happy to provide binding prices based on your drawing. At Liedtke the material can be both hot-punched and machined with sharp, carbide-tipped tools by sawing, milling and drilling; its low moisture absorption contributes to high dimensional accuracy of the finished parts.

Advantages and Disadvantages at a Glance

Advantages

- Optimized for hot punching (NEMA XXP) – clean edges, high dimensional accuracy
- By far the lowest water absorption in the PF-CP series
- Good electrical insulation properties
- Good machinability

Disadvantages

- Not declared for direct food contact
- Not flame-retardant (no UL 94 V-0 – choose PF CP 204/Hp 2063 for that)
- Lower test voltage than PF CP 202 (Hp 2061.5)
- Limiting temperature capped at 120 °C

Practical tip: Where insulation parts are hot-punched in series and moisture resistance is a priority, PF CP 203 (Hp 2061.6) is the right choice. If flame retardance to UL 94 V-0 is also required, we switch to PF CP 204 (Hp 2063).

Typical Properties

- Hot-punching grade (NEMA XXP)
- By far the lowest water absorption in the PF-CP series
- Good electrical insulation properties
- High mechanical strength
- Good machinability

Product Examples

- Hot-punched electrical insulation parts
- Carrier plates and insulation pieces in switchgear manufacturing
- Spacer and insulation washers
- Punched parts for the electrical industry
- Insulation parts in moisture-sensitive assemblies

Typical Industries

- Electrical and electronics industry
- Switchgear manufacturing
- Mechanical engineering
- Punched-parts manufacturing
- Power engineering

	Test Method	Unit	Value
Mechanical Properties			
Flexural strength (23 °C)	DIN 53452	MPa	130
Tensile strength	DIN 53455	MPa	70
Impact strength	DIN 53453	kJ/m ²	7
Notched impact strength (Charpy)	DIN 53453	kJ/m ²	2.5

	Test Method	Unit	Value
Compressive strength $\perp$ to lamination	DIN EN 60893	MPa	250
Electrical Properties			
Insulation resistance between plugs (24 h / 23 °C)	DIN 53482	Ω	5×10^7
Test voltage $\parallel$ to lamination	DIN 53481	kV	25
Test voltage $\perp$ to lamination	DIN 53481	kV	30
Dielectric dissipation factor (1 MHz, 24 h water immersion)	DIN 53483		max. 0.05
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
Resistance to glowing	DIN 53459		Level 2b
General Properties			
Density	DIN 53479	g/cm ³	1.4
Water absorption (4 mm thickness)	DIN 53495	mg	60
Color			brown

PF CP 203 (Hp 2061.6) is a hard paper laminate (phenolic resin/paper) to DIN 7735 / EN 60893. The values given are typical values, researched from common, publicly available data sheet information for this product type; they serve as an aid to material selection and do not constitute a legally binding guarantee of specific properties. Actual values may vary slightly depending on manufacturer and sheet thickness. PF CP 203 (Hp 2061.6) is not declared for direct food contact.