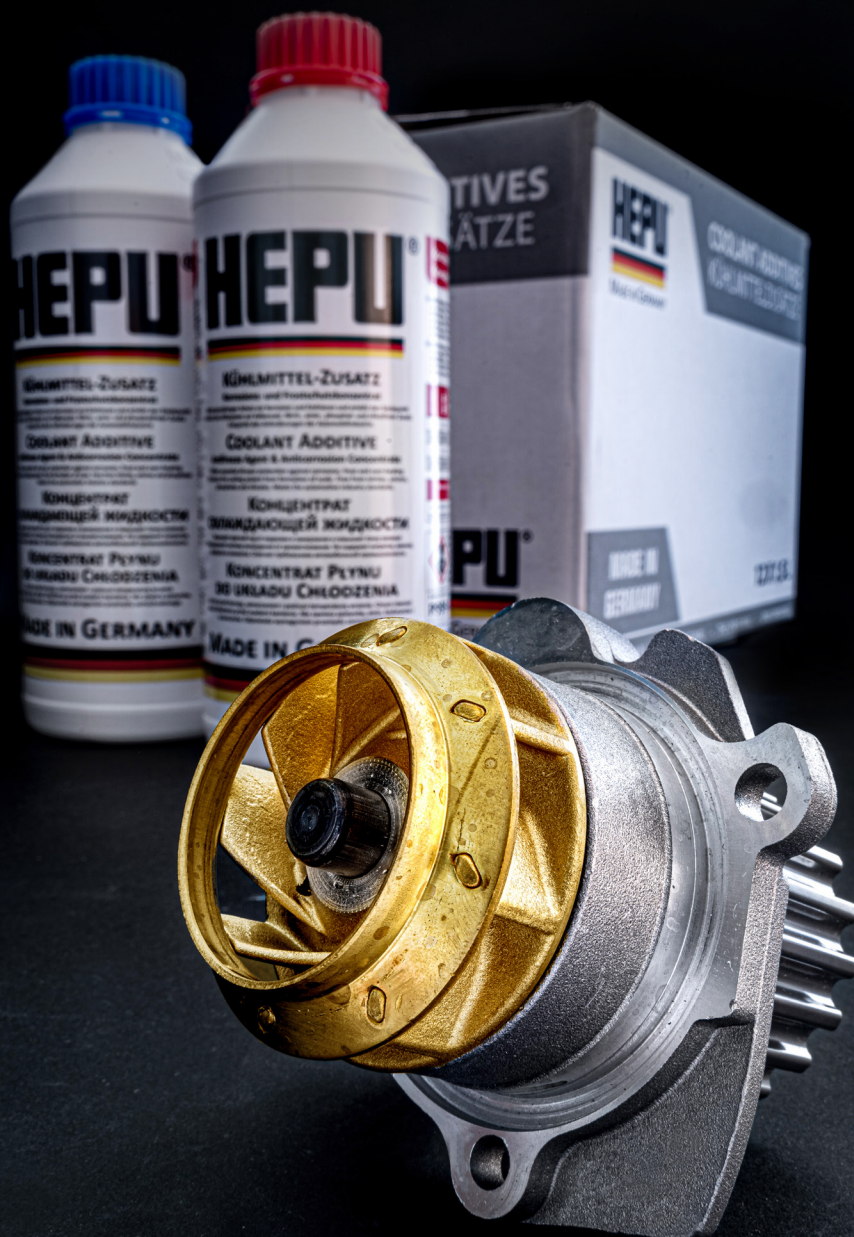


HEPU®

MADE IN GERMANY
SINCE 1958

The Ten Commandments of Water Pump Replacement in the Cooling System

10 Rules of Professional Service



PUMP TECHNOLOGIES / TIMING KITS /
THERMAL MANAGEMENT / FLUIDS



Introduction / New challenges, new standards

Over the past several years, **the cooling system in every new generation of car engines has become increasingly important**. In modern vehicles, manufacturers often do not provide for a major repair – engines are designed as “sealed” units, where the failure of a key component means replacement of the entire power unit.

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Downsizing and its consequences for the cooling system:
 - Small engine displacement (1.0–1.5 liters) with high output (80–150 HP/liter)
 - Turbocharging (1.0–2.5 bar) generating exhaust gas temperatures of 800–1000°C
 - Low-viscosity oils (0W-20) with replacement intervals every 30,000 km
 - Risk of oil film breakdown under localized temperature increase
 - An overheated engine emits too many harmful substances (Euro 6d, Euro 7 standards)

The cooling system has become not only protection against overheating, but a key element of engine thermal management – its efficiency, durability, and compliance with emission standards all depend on it.



The problem of the “old school” in modern engines
Many repair techniques and methods once learned or passed down by the older generation may lead you astray when servicing modern vehicles.

Examples of outdated practices:

OLD SCHOOL	CONSEQUENCE TODAY	COST OF ERROR
Using tap water	Limescale deposits within 10,000 km	€1200–€2500
“Any pump will fit”	Incorrect performance	€1750–€3500
Filtering old coolant	Loss of chemical properties	€1200–€1750
Installation without system flushing	Contaminants destroy the new pump	€650–€1250
Using silicone “by eye”	Impeller blockage, leakage	€1200–€2800

TABLE 1: Economics of outdated practices – savings vs risk

That is why we decided to debunk the circulating myths and “old school” rules – and we have compiled the 10 most important principles for servicing water pumps in modern cooling systems.

Who is this material for?
If you already work according to these principles – well done!

But perhaps you have a demanding customer who questions your repair approach or considers certain costs “unnecessary” – this material clearly shows how a water pump in the cooling system should be serviced.

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This material is intended for:
 - Mechanics who want to update their knowledge of modern cooling systems
 - Workshops looking for arguments for customers (cost justification)
 - Customers who want to understand why professional service costs more
 - Service managers standardizing repair procedures



The Ten Commandments of Water Pump Replacement / 10 Essential Rules

RULE 1: Always select the pump according to the catalog

PROBLEM: “It will fit” – thinking based on experience from the 1990s

REALITY: It may happen that within one engine (depending on the production period), the manufacturer used pumps that differ, for example, in the number of impeller blades – and these matters.

Examples of differences between pumps for the same engine:

PARAMETER	VERSION A	VERSION B
Number of impeller blades	6	8
Flow rate	80 l/min	110 l/min
Production period	2010–2015	2015–2020
Consequence of incorrect selection	Overheating	Overheating

Do not be misled by learned patterns and the “it will fit” mindset – always select the pump according to the catalog (VIN number, OE part number, production period).

HEPU recommendation: Use the online catalog at www.hepu.de – precise selection based on VIN.



RULE 2: Avoid rotating the pump “dry”

PROBLEM: The mechanic installs a new pump, tightens the bolts, and only then fills the system with coolant.

REALITY: Do not start an engine that has not been filled with coolant – you can very quickly damage the mechanical seal (failure within 30-60 seconds).

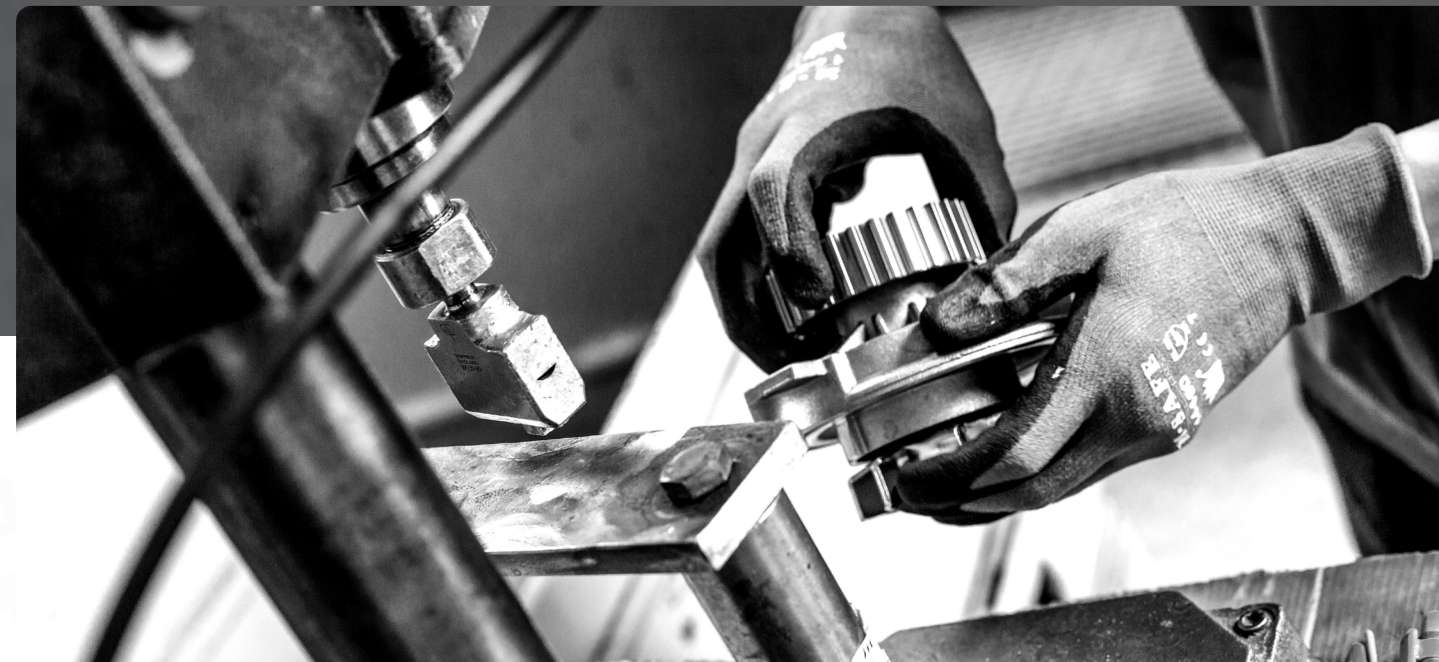
❌ Failure mechanism:

- The pump runs “dry” without coolant
- The mechanical seal is not lubricated (no fluid film)
- Seal temperature rises to 150–200°C within 30 seconds
- The seal loses elasticity and cracks
- Coolant leakage ➔ Engine overheating

✅ Correct procedure:

- Install the pump
- Fill the system with coolant (check the level in the expansion tank)
- Bleed the system (open bleed screws)
- Only then start the engine

Cost of error: Destruction of a new pump within 1 minute of operation.



RULE 3: Thoroughly clean the mating surface between block and pump

PROBLEM: The mechanic installs a new pump on the surface with remnants of the old gasket, rust, or deposits.

REALITY: If the surface is not properly prepared, you will not seal it with silicone – the sealing compound will not adhere to a dirty surface.

- ✔ **Proper cleaning procedure:**
- Remove remnants of the old gasket – plastic scraper (not metal – risk of scratching)
 - Clean the surface – deposit remover, acetone, degreaser
 - Check flatness – straightedge, gauge (especially after engine overheating)
 - Remove rust – wire brush, sandpaper (fine grit)
 - Dry the surface – compressed air, clean lint-free cloth



- ✔ **Flatness control:**
- If the engine has overheated, the mating surface may be deformed (warping of 0.1–0.3 mm). In such cases:
 - Surface machining (mechanical resurfacing)
 - Engine block replacement (if deformation >0.5 mm)

Cost of error: Coolant leakage after 1,000–5,000 km ➤ Disassembly and reinstallation.

RULE 4: Apply only a thin, precise bead of sealing compound

PROBLEM: “Silicone is the enemy of the cooling system” – a myth circulating in workshops.

REALITY: Silicone (as a general term for sealing compounds) is not the enemy of the cooling system, but only if used correctly.

- ✔ **Proper use of sealing compound:**
- Thin bead – diameter 1–2 mm (not a wide strip)
 - Even application – no gaps, no excess
 - Must not enter the working area of the pump – excess compound can block the impeller
 - Curing time – after applying silicone and installing the pump, do not fill the system or start the engine until the compound has set (15–30 minutes)

Typical mistakes:

ERROR	CONSEQUENCE	SYMPTOMS
Too thick layer	Compound flows into the pump interior	Impeller blockage
Uneven application	Leakage at points without compound	Coolant loss
Starting before curing	Compound does not adhere	Immediate leakage
Dirty surface	Compound does not hold	Leakage after 1,000 km

TABLE 2: Errors in the use of sealing compound and their consequences

HEPU recommendation: Use high-temperature silicone compounds (resistant up to 300°C) – standard silicone loses its properties at 150°C.

RULE 5: Follow the correct tightening sequence and torque specifications

PROBLEM: The mechanic tightens bolts “by feel” or in a random order.

REALITY: When installing a pump, always follow the correct bolt tightening sequence and use the specified torque values. This is especially important for fluid management modules made of plastic.

Why does the sequence matter?

- Even distribution of stress in the pump housing
- Avoidance of deformation of the mating surface
- Proper sealing (no gasket distortion)

Typical tightening sequence (cross pattern method):

- Tighten all bolts by hand until seated (do not fully tighten)
- Tighten in a cross pattern: 1 ➤ 3 ➤ 2 ➤ 4
- First pass: 50% of target torque (e.g. 5 Nm)
- Second pass: 100% of target torque (e.g. 10 Nm)

Typical tightening torques:

BOLT TYPE	TIGHTENING TORQUE	NOTES
M6 (aluminum)	8–12 Nm	Easy to strip the thread
M8 (aluminum)	18–25 Nm	Torque wrench control required
M8 (cast iron)	25–30 Nm	Higher strength
Plastic	5–8 Nm	Very easy to damage

Cost of error: Cracked pump housing (aluminum), cracked module (plastic), loosened bolts ➤ leakage.

RULE 6: Apply only a thin, precise bead of sealing compound

PROBLEM: The mechanic drains the old coolant and immediately fills in new fluid.

REALITY: Before filling with new coolant, thoroughly flush the system – this protects the new pump from premature failure. Simply draining the old fluid does not ensure proper cleaning – solid contaminants remain in the system and must be removed.

What remains in the system after draining:

- Limescale deposits (if tap water was used)
- Old coolant residues (20–30% remains in the block, radiator, hoses)
- Corrosion products (rust, metal oxides)
- Mechanical contaminants (rubber particles from hoses, metal particles)
- Organic deposits (bacteria, algae – if the coolant was very old)

System flushing procedure:

- Drain the old coolant
- Fill with demineralized water (or a dedicated flushing fluid)
- Start the engine and bring it to operating temperature (thermostat opens)
- Drain the water (it will be dirty – visible contaminants)
- Repeat flushing until the water runs clear
- Fill with new coolant

HEPU® flushing fluids

HEPU® offers dedicated flushing agents that remove:

- Limescale deposits (organic acids)
- Rust and corrosion (corrosion inhibitors)
- Organic deposits (biocidal agents)

Cost of error: New pump destroyed by old contaminants within 10,000–20,000 km (cost: €70–€180 + labor).



RULE 7: Always fill the system with new, high-quality coolant

PROBLEM: “We’ll filter the old coolant and it will be as good as new” – a risky saving.

REALITY: Filtering old coolant is ineffective and makes no sense – the fluid has already lost its essential properties (corrosion inhibitors, antifreeze performance, lubricating properties).

- ✗ **What filtering does NOT restore:**
- Loss of corrosion inhibitors (chemical depletion)
 - Loss of antifreeze properties (glycol degradation)
 - Loss of lubricating properties (additive depletion)
 - Dissolved contaminants (salts, acids)
- ✓ **Functions of coolant (often overlooked):**
- Engine cooling – heat dissipation (primary function)
 - Corrosion protection – inhibitors protect aluminum, cast iron, copper
 - Lubrication – coolant lubricates the pump, thermostat, valves (no lubrication = accelerated wear)
 - Freeze protection – glycol prevents freezing (down to -35°C or -50°C)
 - Deposit prevention – additives prevent limescale formation

Coolant is not the place to save money: The difference between a low-cost coolant and a high-quality HEPU coolant is about €6–€7 per 5 liters of concentrate – in practice, this is negligible for the customer (but critical for engine durability).

PARAMETER	LOW-COST COOLANT	HEPU COOLANT
Price per 5 L concentrate	14-15 euro	20-22 euro
Difference	–	+ 6-7 euro
Service life	2 years / 60,000 km	5 years / 240,000 km
Failure risk	High	Minimal

TABLE 3: Coolant cost comparison – the economics of quality

Customer argument: 6 euro savings = Risk of a 1000 euro repair.



RULE 8: Bleed the system, warm up the engine, check the temperature

PROBLEM: The mechanic fills the coolant, runs the engine for 2 minutes, and returns the car to the customer.

REALITY: Do not rush – wait until the cooling fans activate (this confirms the full operating cycle of the cooling system).

✓ **System bleeding procedure:**

- Fill coolant into the expansion tank (to MAX level)
- Open bleed screws (if present – e.g. VAG, BMW)
- Start the engine and let it idle
- Observe coolant flow from bleed screws (close when no air bubbles are present)
- Warm up the engine to operating temperature (thermostat opens – 85-95°C)
- Wait for the cooling fans to activate (full cycle)
- Check coolant level in the tank (top up if necessary)
- Check for leaks

✓ **Why wait for the fans?**

- Confirmation of thermostat opening (system is functioning)
- Confirmation of pump operation (coolant circulation)
- Confirmation of temperature sensor operation
- Removal of remaining air pockets

Waiting time: 10–20 minutes (depending on ambient temperature and engine).

Cost of rushing: Air in the system ➤ Overheating ➤ Failure (cost: PLN 5,000–10,000).

RULE 9: Tell the customer when to check the coolant

PROBLEM: The customer collects the car after service and does not monitor coolant level.

REALITY: Remind the customer to check coolant level every 500–1000 km. Any noticeable drop indicates a leak and requires immediate action.

✓ **What to tell the customer:**

- “After pump replacement, check the coolant level every 500 km for the first 2,000 km”
- “If the level drops – return to the workshop immediately”
- “Do not top up with tap water – only use coolant according to specification”
- “Coolant loss is not normal – it indicates a problem”

✗ **Causes of coolant loss after replacement:**

- Leak at pump-to-block connection (installation error)
- Damaged pump seal (dry running)
- Leaking hoses (old clamps, cracked hoses)
- Radiator leakage (corrosion, mechanical damage)
- Thermostat leakage (damaged seals)
- Customer education = Early problem detection
= Lower repair costs.



RULE 8: Remind the customer about coolant replacement intervals

PROBLEM: The customer believes coolant lasts “forever” (like water or old Petrygo fluids).

REALITY: Although coolant is directly related to the water pump, its replacement intervals are completely different. Customers accustomed to older vehicles and practices (like using water or legacy fluids such as Petrygo) may simply not be aware of this.
Invite the customer for coolant replacement after 2 years or 120,000 km (whichever comes first). Explain that after this period, the coolant loses its properties.

Coolant replacement intervals:

COOLANT TYPE	TIME INTERVAL	MILEAGE INTERVAL
G11 (standard)	2 years	60,000–120,000 km
G12+ (enhanced)	3 years	120,000–180,000 km
G12++ (longlife)	5 years	240,000 km
G13 (eco-friendly)	5 years	240,000 km

✓ Why does coolant degrade?

- Corrosion inhibitors break down (chemical depletion)
- Glycol undergoes hydrolysis (exposure to water and high temperatures)
- Lubricating additives lose their properties
- Coolant becomes acidic (pH drops from 8.0 to 6.0 ▶ corrosion)

Customer argument: “Replacing coolant every 2 years (cost: €12–€16) protects against pump replacement (cost: €55–€85) and engine repair (cost: €400–€800)”.



HEPU® products – complementing the Ten Commandments



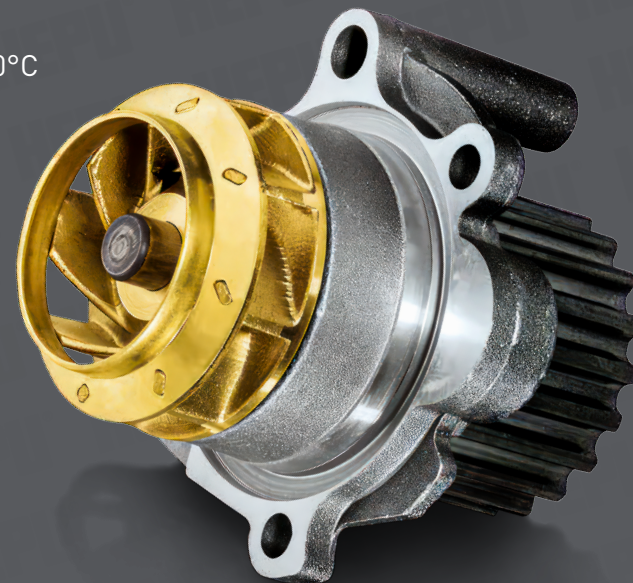
✓ HEPU® coolant fluids and concentrates

HEPU® offers a full range of coolant products:

- Standard fluids and concentrates (G11, G12)
- Longlife fluids (G12++, G13) compliant with VAG standards
- Specialized fluids approved by Mercedes-Benz, Ford, GM Group
- Flushing fluids for system cleaning prior to replacement

✓ Original HEPU® coolant fluids and concentrates provide:

- Reliable corrosion protection – dedicated inhibitors for aluminum, iron, and copper
- Overheating protection – optimal thermal conductivity
- Scale prevention – anti-deposit additives
- Efficient heat dissipation – stable viscosity from -40°C to +130°C
- They meet automotive industry requirements and are a perfect complement to HEPU® water pumps and complete kits.



HEPU® products – complex solutions



✓ New HEPU® packaging – protection against counterfeits

Since August 2020, HEPU® coolant fluids and concentrates feature new packaging:

- Embossed HEPU® The Original logo
- “Made in Germany” marking
- Embossed elements emphasizing product individuality
- Security features protecting customers from potential counterfeits
- The introduction of embossed elements highlights the individuality and quality of HEPU® products and helps protect customers from counterfeit products.

✓ HEPU® water pumps – OEM standard

- To ensure maximum performance and durability, all HEPU® pumps undergo rigorous testing.

✓ Advantages of HEPU® pumps:

- Special bearings and hardened shafts – high load capacity in extreme conditions
- Modern mechanical seals – virtually eliminate premature leakage
- Precision manufacturing – proper fit and easier installation
- Optimal performance – maximum pressure resistance
- OEM standard – supplier for original equipment lines (VAG, BMW, Mercedes-Benz)

✓ HEPU® water pumps:

- Not only protect against overheating
- Optimize fuel consumption (faster achievement of operating temperature)
- Reduce emissions (precise temperature control)



Summary – professionalism in practice / The Ten Commandments as a workshop standard

The 10 rules of water pump replacement in the cooling system are not a wish list, but the minimum standard of professional service in modern, technologically advanced engines.

Coolant replacement intervals:

OMITTED RULE	SAVING	FAILURE COST
1. Selection according to catalog	0 euro	1900–3500 euro
2. Dry running	0 euro	250–500 euro
3. Surface cleaning	20 minutes	200–350 euro
4. Proper use of sealant	0 euro	1200–2800 euro
5. Tightening torques	0 euro	250–1900 euro
6. System flushing	15 min + 2 euro	700–1400 euro
7. New coolant (not filtered)	20 euro	1900–2800 euro
8. Bleeding the system	15 minutes	1200–2500 euro
9. Customer education (level checks)	2 minutes	Early detection
10. Customer education (replacement intervals)	2 minutes	Extended lifespan

Savings-to-risk ratio: Unacceptable.

Customer communication – a key skill

The Ten Commandments are not only a technical procedure, but also a powerful communication tool with the customer.

-  **What to say to a customer questioning the costs:**
- “Replacing a pump is not just about removing four bolts – it is a comprehensive 10-step procedure”.
 - “Every skipped step carries a risk of a 1200 euro – 3500 euro repair”
 - “Saving 25 euro today = Risking 2500 euro next month”
 - “Professional service is not expensive – it is an investment in durability”

-  **The role of HEPU® – a partner for mechanics**
HEPU® supports mechanics in their daily work:
- Complete repair kits (pump + accessories in one box)
 - Installation instructions available online (hepu.de)
 - Technical training (hundreds of mechanics per year)
 - Technical hotline (support in complex cases)
 - Online catalogs with precise VIN-based selection

HEPU® – professional parts for professional workshops.

**In the era of downsizing and advanced technologies,
replacing a water pump in the cooling system
requires not only technical knowledge,
but above all an awareness of consequences.**

The 10 rules of water pump replacement in the cooling system are not a wish list, but the minimum standard of professional service in modern, technologically advanced engines.

A mechanic who follows the HEPU® Ten Commandments:

- Performs the repair once – for years (no complaints)
- Protects the workshop's reputation (satisfied customers)
 - Educates customers (builds trust)
 - Saves time and stress (no disputes)

**HEPU® – a guarantee of durability
for modern engines.**