

HIGH-PERFORMANCE PROPELLANTS – FOR MICRO GAS GENERATORS (MGG: PIN-TYPE, LEAD WIRE) AND ACTIVATORS IN THE AUTOMOTIVE INDUSTRY



Nitrochemie has been developing and producing propellants for the automotive industry for many years. Cooperating with long-standing partners, we work out system-specific solutions to optimally exploit existing potential .

Spectrum of products

- Single-base propellants
- Polymer-bonded propellants
- Auto-ignition materials

All products comply with the present toxicological requirements. Nitrochemie complies with all requirements concerning safety at work and protection of the environment and is certified according to AQAP-2110, ISO 9001 and ISO 14001.

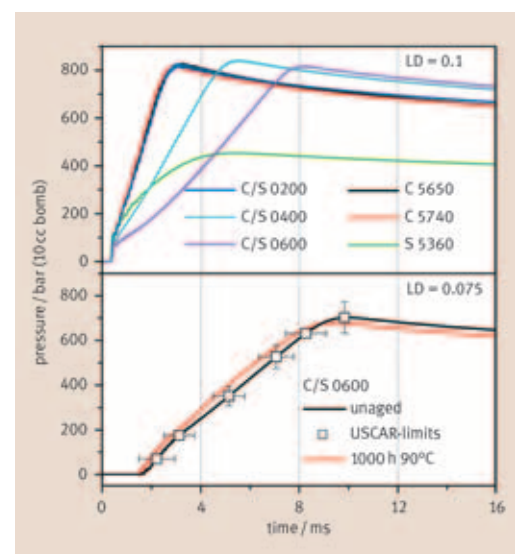
Single-base propellants

Advantages of single-base propellants

- Standard product for the automotive industry
- High gas yield (800 ml/g)
- Pressure curve is easily adjustable by means of the geometry
- Low hygroscopicity
- Self-ignition temperature 170°C
- Thermally stable, meet 1000 h/90°C (USCAR)
- Toxicologically harmless
- USCAR compliant combustion gases, except CO

Single-base propellants

Qualified in-service products of Nitrochemie (tested in the MGG: pin-type / 10 cm³ closed vessel)



Ageing for 1000 h at 90°C results in a typical weight loss of 2.5 % for single base propellants in MGG. The peak pressure reduces by approx. 2 – 4 % only.

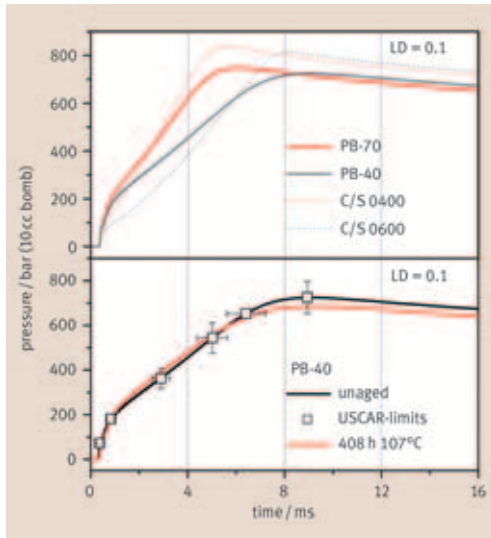
Polymer-bonded propellants

The completely new product group of the polymer-bonded propellants has been developed to comply with today's requirements in respect of stability and gas composition.

A key ingredient of the polymer-bonded propellants is ammonium perchlorate. Potential hydrochloric acid formed during combustion is bound in dissolved ionic form and thus remains within the limit specified according to USCAR.

Advantages of polymer-bonded propellants

- Ignitable with standard igniters (squib) of the automotive industry
- High gas yield (600 ml/g)
- Pressure curve is easily adjustable by means of the geometry and composition
- Thermally stable, meet 408h/107°C (USCAR)
- USCAR compliant combustion gases



Pressure curves of two polymer-bonded propellants: PB-40, PB-70 (tested in the MGG: pin-type/10 cm³ closed vessel)

Thermal stability complies in full with USCAR requirements

Ageing 408 h at 107°C in MGG:

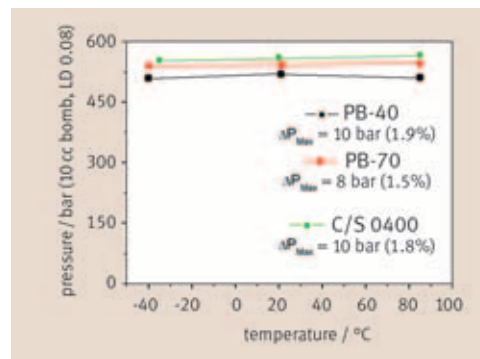
- Weight loss = approx. 2%
- Peak pressure loss = approx. 4.0%



The gas composition according to the USCAR requirements is within the specified limits. Loading charge: 800 mg (tested in the MGG: pin-type/10 cm³ closed vessel)

Temperature behaviour in the range -40°C / +95°C (tested in the MGG: pin-type/10 cm³ closed vessel)

gas	2.83 m ³		limit
	PB-40	PB-70	
ppm			1/16 USCAR
CO	29	26	29
CO ₂	46	47	1875
NO	0.1	0.1	4.6875
NO ₂	< 0.02	< 0.02	0.3125
HCl	0.04	0.07	0.3125
NH ₃	< 0.02	< 0.02	2.1875
HCN	0.04	0.04	0.2938
H ₂ S	< 0.004	0.01	0.9375
SO ₂	0.15	0.1	0.3125
HCHO	< 0.002	< 0.002	0.125
COCl ₂	< 0.002	< 0.002	0.071
Cl ₂	< 0.002	< 0.002	0.0625



Thermal cycling of an ammonium perchlorate-based formulation in the temperature range -40 to +95°C (DIN EN 60068-2-14 Na) proved the absence of critical phase transitions. After 100 cycles a peak pressure loss of less than 2% was observed.



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