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Small super-charged engines developed on the principle of the DVL super-charge process in the BMW 132 N-single cylinder.

I. Dimensions and Test Conditions for small super-charged engines.

The small super-charged engines developed on the basis of the DVL super-charge method are shown below in order of cylinder capacity.

	Capacity	Compression ratio	Boost air temp.	Coolant	Engine speed	Ignition	
I.G. Test engine	0.33 ltr.	variable	125°	Water	600/min	22°	Carburettor
Ruhrbenzin N.S.U.	0.50 ltr.	fixed 7.3	130°	Air	1600/"	30°	Suction stroke injection
Hirth	1.00 ltr.	fixed 7.0	130°	Air	1520/"	30°	"
I.G. Experimental engine (VMK)	1.06 ltr.	fixed 6.5	130°	Water	1600/"	30°	"

The Ruhrbenzin, Hirth and I.G. experimental engines closely resemble the BMW 132 single cylinder as regards compression ratio, ignition timing, boost air temperature, engine speed, and fuel feed, while the I.G. test engine differs considerably.

Also, in contrast to the DVL super-charge method and the other small super-charged engines, we cannot with the I.G. test engine determine any engine data, such as b.m.e.p., or boost pressure at the knock limit, but only a new octane number, lying between the motor and research octane numbers.

The I.G. test engine and the I.G. VMK are water-cooled, thus dispensing with the air cooling fan.

The I.G. test engine and the Ruhrbenzin super-charged engine have the smallest capacity and thus the lowest fuel consumption for recording a knock-limit curve.

II. Knock Behaviour of the small super-charged engines.

The knock limit curves obtained in three small super-charged engines, the I.G. test engine, the Hirth engine, and the I.G. VMK with six DVL samples are compared with those of the BMW 132 single cylinder in plates T.Pr.S. No. 1924, 1925, 1928, 1929 and 1930. As regards the results with the Hirth engine, the knock limit curves for samples 4 and 5, which are incomplete, should run somewhat differently.[x)] Therefore, leaving these two samples out of account, the order of rating the six DVL samples and the steepness of the knock limit curves agree very well, if the Hirth engine and the I.G. VMK are compared with the BMW 132 single cylinder. The difference in b.m.e.p. in the three engines is due to their different construction. The method of evaluation on the I.G. test engine is somewhat different, as is shown by the octane number limit curves obtained with the I.G. test engine, plates T.Pr.S. 1929 and 1930. In these two plates the limit curves are entered linearly and on a distorted scale, the latter being chosen the better to express the greater steepness of the knock limit curves of aromatic fuels.

As there were no knock limit curves for the 6 DVL samples in the Ruhrbenzin NSU engine, plates T.Pr.S. 1931 and 1934 compare the results for this engine of knock limit curves of four other fuels, B4, C3, C2 and ET 100, with the BMW 132 super-charged engine. The fuels are rated in the same order, and the steepness of the curves of the highly aromatic samples C3 and C2 is expressed, although the steepness of the C3 and C2 knock limit curves is not so pronounced as with the BMW 132 single cylinder, where the knock limit curve for ET 100, which is flat, is cut by that of C2.

Titles of Diagrams.

Sheet 1. Knock limit curves by the Super-charge Method for BMW 132.
Useful MEP (atu) v. excess air ratio.

Sheet 2. Knock limit curves by the Super-charge Method for VMK.
Useful MEP (atu) v. excess air ratio.

Sheet 3. Knock limit curves by the Super-charge Method for Hirth-Motor.
Useful MEP (atu) v. excess air ratio.

Sheet 4. Knock limit curves by the Oppau Method. Engine P.13
O.N. (Oppau method) v. excess air ratio.

Sheet 5. Knock limit curves by the Oppau Method. Engine P.13.
O.N. (Oppau method) v. excess air ratio.

Sheet 6. Knock limit curves by the Super-charge Method. NSU Engine.
Useful MEP (atu) v. excess air ratio.

Sheet 7. Knock limit curves by the Super-charge Method. BMW 132.
Useful MEP (atu) v. excess air ratio.

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x) There might have been errors in measurement.