

## ES 275 K ESR

**Name:**

**45 NiCrMo 16**

**Material No.:**

1.2767 ESR

**Typical analysis in %:**

	C	Cr	Mo	Ni
	0.45	1.4	0.3	4.0

**As-supplied condition:**

Soft-annealed to max. 285 HB  
(965 N/mm<sup>2</sup>)

**Characteristics:**

Through-hardening steel with the highest toughness, low distortion. ESR technology provides this material with high polishability.

**General fields of application:**

Solid coining dies for the highest toughness requirements, extremely highly loaded cutlery presses, tools for heavy cold forming, hobbing tools, shearing blades and cutters for cutting very thick material; plastic, compression and injection moulds, which require high hardness combined with the highest toughness.

**Heat treatment data:**

	Temperature	Duration	Cooling
Soft annealing	620 - 650 °C	2 - 5 h	furnace
Stress-relief annealing	600 - 650 °C	min. 4 h	furnace
Hardening	840 - 870 °C	Group II	oil, air WB 200° C
Tempering	180 - 600 °C see tempering curve	min. 2 h depending on cross section	still air

**Physical characteristics:**

**Coefficient of thermal expansion:** between 20 °C and:

10 <sup>-6</sup> x m	100	200	300	400	500	600	700 °C
m x K	11.8	12.5	12.8	13.1	13.4	13.8	13.6

**Thermal conductivity:**

W	20	350	700 °C
m x K	30.0	30.5	32.0

**Normal working hardness:** 50 - 56 HRC

**Continuous time-temperature-transformation diagram**

**Tempering curve**

