ES Multiform SL

Improved technical properties

The new special grade **ES Multiform SL** developed by EschmannStahl sets new standards both for tool and mould making as well as for engineering applications.

ES Multiform SL is supplied in the Q + T condition, 280–325 HB (950–1100 N/mm²).
Due to its special chemical composition, this new tool steel, available in thicknesses up to 600 mm, features uniform hardness levels through the entire cross-cut section.

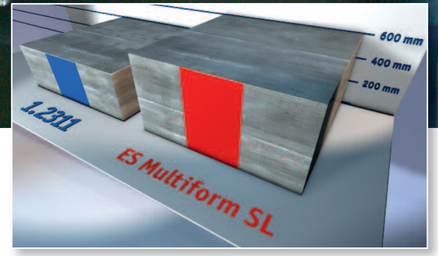


Illustration of the full hardening properties:
In comparison to the standard 1.2311 our new grade ES Multiform SL stands out due to its full hardening properties up to a thickness of 600 mm. We point out that grade 1.2311 is available only up to a thickness of 400 mm. The increased thickness range of our ES Multiform SL translates into an economical alternative to the widely used 1.2738.

Customer advantages:

- Can be used in the as-delivered state
- Stress-relieved rolled plates up to a thickness of 150 mm
- Consistent technical properties
- Uniform hardness to the core up to a thickness of 600 mm
- Significantly higher toughness
- High thermal conductivity
- Ideally suited for graining
- Good polishing properties
- ES Multiform SL can be nitrided, chromium-plated, laser hardened and welded
- Thickness up to 605 mm in stock

The better Choice

New possibilities for tool- and mould making

As a result of its specific chemical composition, the thermal conductivity of **ES Multiform SL** was improved considerably. Its thermal conductivity is significantly higher than the grade 1.2311 EST and nearly 15 % higher than 1.2738.
ES Multiform SL has a very high yield point and shows a high toughness throughout the complete cross-section This makes **ES Multiform SL** an excellent choice for general tool and mould-making applications. It is also ideally suited for moulds with thin-walled contours and critical cooling hole patterns. The outstanding features of **ES Multiform SL** are its excellent polishing properties and its suitability for graining.

This is also underlined by a documented graining test with common interior textures used by German car manufacturers. This test certifies that this material is absolutely suitable for graining.

Last but not least **ES Multiform SL** offers exceptional repair welding characteristic due to machining properties which are comparable to the steel grade 1.2311 and even better than 1.2738.

Impact value according to ISO-V: The new ES Multiform SL material surpasses the tried and tested EschmannStahl grades with a higher defined toughness, which allows a higher degree of planning reliability combined with improved crack resistance.

The effective alternative

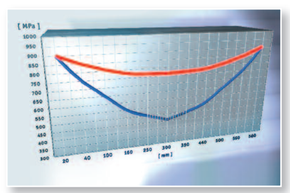
Offering a broader engineering scope

The consistent mechanical characteristics of the **ES Multiform SL** , whereby excellent toughness plays a major role, offer a convincing alternative to the conventional 42 CrMo 4 (1.7225) and is ideally suited to a wide range of applications including shafts, axles, bearings and guide rails.

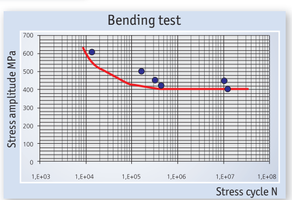
As a result of its uniform hardness properties up to a thickness of 600 mm, mechanical components can be contructed in smaller dimensions with a higher degree of planning reliability, which in turn results in smaller component weights. This has obvious positive effects. Energy and costs are minimized.

Customer advantages:

- Consistent mechanical properties
- High level of planning reliability
- Excellent weldability



Yield point:
Unlike conventional 42 CrMo 4 (1.7225) engineering steel, whereby the yield point falls sharply in cross sections bigger than Ø 160 mm to the centre, ES Multiform SL maintains consistent high values.
Even at a thickness of up to 600 mm, the new ES Multiform SL material maintains a yield point of 750 MPa.



ES Multiform SL

Technical data

Short name:
Special alloy

Composition in %:

C	Mo	Cr	Ni	
0.39	0.2	2.0	0.2	+ trace elements

Condition as delivered:
Q + T, 280-325 HB, (950–1100 N/mm²)

Characteristics:
All-purpose tool steel, ideally suited for graining, structurally erodible with good polishing and welding properties; can be nitrided, chromium-plated; uniform hardness throughout the cross-section to a thickness of 600 mm.

Common general applications:
Injection moulds, cavity retainers for injection and die-cast moulds. Also an ideal material for engineering applications – as a high-quality alternative to the familiar engineering grades such as 42 CrMo 4.

Physical properties:

Thermal expansion coefficient:
between 20 °C and:

100	200	300	400	500	600	700 °C
12,3	12,9	13,3	13,7	14,2	14,5	14,6

Thermal conductivity:

10^{-6} x m / m x K	20	350	700 °C
	39,6	38,2	32,4

normal working hardness:
used in the as-supplied condition

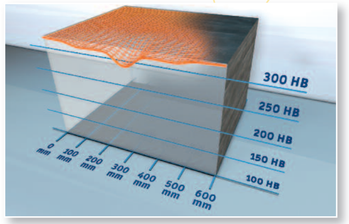
Heat treatment data:

	Temperature	Duration	Cooling
Stress relief annealing	max. 480°C	mind. 4 h	furnace

Prior to finish machining, we recommend stress relief annealing whenever more than 30 % of the material is removed.

Diameter in mm	Execution: peeled and turned						
	202	222	252	282	303	353	403
Thickness in mm	25	30	35	40	50	60	70
	1250	1250	1250	1250	1250	1250	1250
Thickness in mm	305	355	405	455	505	555	605
	1600	1600	1250	1250	1250	1250	1250

Diameter in mm	80	90	100	110	120	130	150	175	205	225	255	275
Thickness in mm	1250	1250	1250	1250	1250	1250	1250	1250	1600	1600	1600	1600

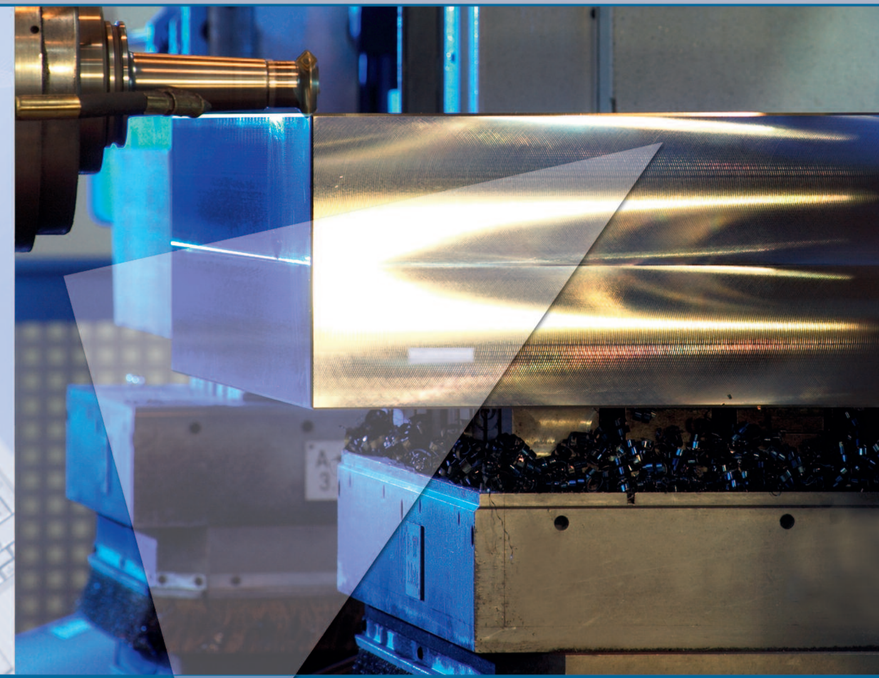


Hardness spreading:
Schematic illustration of a forged piece of ES Multiform SL cut through the centre.

The special chemical composition of the ES Multiform SL offers a high and uniform core hardness.

ES MULTIFORM SL
Creating new opportunities

FOR MOULD MAKING AND ENGINEERING



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