

## WELDABILITY

### EXCELLENT WELDABILITY OF THE BASE MATERIAL

For endurance dynamic, a micro-alloyed, thermomechanically rolled steel (SxxxM) with a particularly low content of carbon (C), phosphorus (P), sulphur (S) and nitrogen (N) is used. Due to the low content of these elements, which are disadvantageous for welding processing, the weldability of the used base material is excellent.

In this context, it should be explicitly mentioned that even in the radius area, welding can be performed without limitations. Hydrogen embrittlement, microstructure hardening and ageing phenomena are thus reduced to a negligible degree. Preheating is generally not necessary due to the low carbon content.

#### Typical alloy content

Figures in (%)

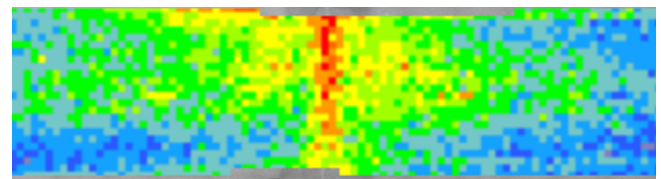
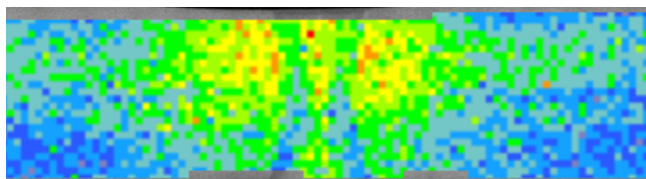
	C	P	S	N
<b>S420M</b> endurance dynamic, example	<b>0,078</b>	<b>0,007</b>	<b>0,001</b>	<b>0,004</b>
<b>S420MC</b> (EN10149-2), acc. to standard	≤ 0,12	≤ 0,025	≤ 0,015	-
<b>S355J2H</b> (EN 10219), typical value	0,170	0,012	0,004	0,005
<b>S355J2H</b> (EN 10210), typical value	0,160	0,015	0,002	0,005

### HOMOGENEOUS LONGITUDINAL WELD SEAM

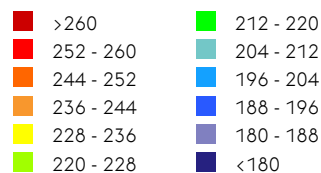
Low carbon contents ensure that there is less hardening in the weld seam. This results in a homogeneous hardness profile across the weld seam and the formation of a metallurgical notch is reduced, resulting in improved fatigue strength.

S420M endurance<sup>®</sup>  
dynamic

S355J2H  
Hollow section EN 10219

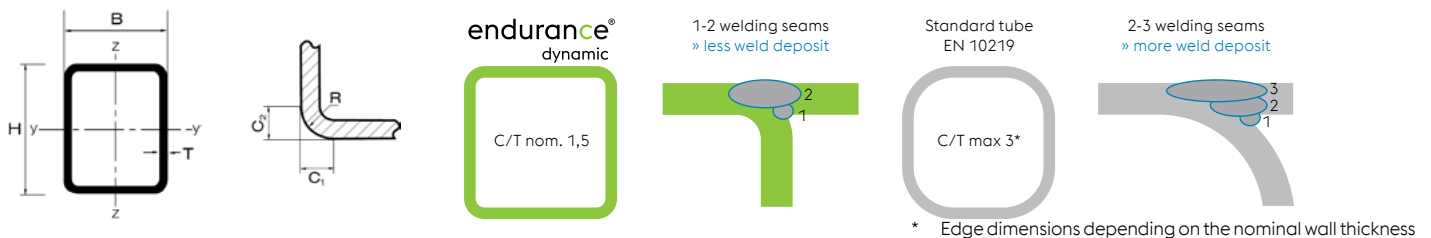


HV01



## EFFICIENT WELDING

A very good degree of purity and the specially adjusted homogeneous microstructure further improve formability. The narrow chamfer of the radii brings advantages in welding processes.



Calculation example: 100mm long weld seam, pipe joint, hollow profile 100x100x8mm

	Standard tube EN 10219	endurance <sup>®</sup> dynamic	
Required seam volume	13,8 cm <sup>3</sup>	7,8 cm <sup>3</sup>	By using endurance dynamic with a narrow chamfer of the radii, a reduction of 43% in filler metal and 56% in actual welding time can be achieved.
Required number of layers	3	2	
Total welding time	1,4 min	0,6 min	

## WELDING PROCESSING RECOMMENDATIONS

Material	Process	Filler material solid wire (135)	Filler material cored wire (136)	Shielding gas	Preheating [°C]	Interpass temperatures [°C]	t <sub>8/5</sub> -Range <sup>4)</sup> [s]
S355M	GMAW	e.g. BÖHLER EMK 6, UNION K 52, ... ER70S-6 (acc. AWS A5.18)	e.g. BÖHLER HL 46-MC, BÖHLER Ti 52-FD, ... E70T15, E71T1 (acc. AWS A5.36)	M21 (z.B. CORGON 18, ...)	--- <sup>1), 2)</sup>	--- <sup>3)</sup>	5 - 25
S420M S460M S500M S550M	GMAW	e.g. BÖHLER NiMo 1-IG, UNION MoNi, ... ER90S-G (acc. AWS A5.28)	e.g. BÖHLER HL 53T-MC, BÖHLER Ti 60T-FD, ... E80T15, E81T1 (acc. AWS A5.36)	M21 (z.B. CORGON 18, ...)	--- <sup>1), 2)</sup>	--- <sup>3)</sup>	5 - 25
S600M	MAG	e.g. BÖHLER NiCrMo 2,5-IG, ... ER110S-G (acc. AWS A5.28)	e.g. BÖHLER HL 75T-MC, BÖHLER Ti 80T-FD, ... E101T15, E111T1 (acc. AWS A5.36)	M21 (e.g. CORGON 18, ...)	--- <sup>1), 2)</sup>	--- <sup>3)</sup>	5 - 25

1) Depending on the atmospheric conditions (temperature below dew point, condensation of humidity), edge drying is recommended at least 80 °C immediately before welding.

2) In complex welded construction (e.g. out of position welding, accumulation of welds, ...) preheating according to EN 1011-2 is recommended.

3) It is recommended that the interpass temperature is adjusted in such a manner, that the maximum measured t<sub>8/5</sub> time is not exceeded.

4) Cooling time between 800°C and 500°C, measured according to EN 1011-2 (Appendix D.8)