

## WELDABILITY & FATIGUE STRENGTH

### 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.

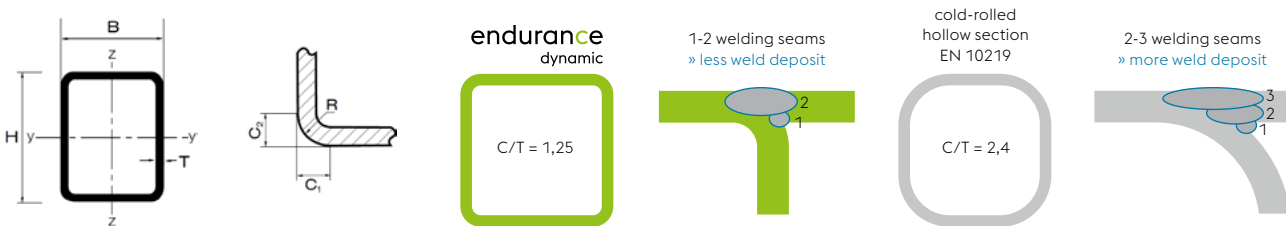
Hydrogen embrittlement, microstructure hardening and ageing phenomena are thus reduced to a negligible degree. Preheating is generally not necessary due to the low carbon content.

#### Typical alloy content

Figures in (%)	C	P	S	N
<b>S420M</b> endurance dynamic, typical value	<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

### EFFICIENT WELDING

A very good degree of purity and the specially adjusted homogeneous microstructure further improve formability. A C/T ratio of up to 1.25 can consequently be achieved.



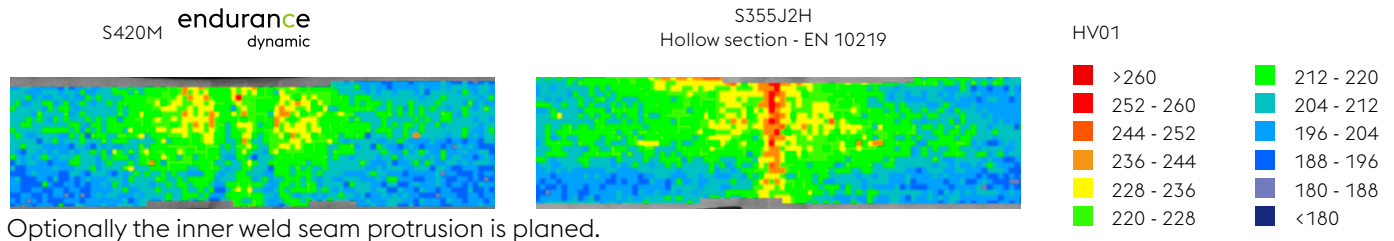
Calculation example: 100mm long weld seam, pipe joint, hollow profile 100x100x8mm

	endurance dynamic	Hollow section EN 10219
Required seam volume	7,8 cm <sup>3</sup>	13,8 cm <sup>3</sup>
Required number of layers	2	3
Total welding time	0,6 min	1,4 min

Based on the calculation example, we can show that a reduction of 43% in filler metal and 56% in actual welding time can be achieved by using endurance dynamic with a narrow chamfer of the radii.

## 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.



## IMPROVED FATIGUE STRENGTH

In many cases, rectangular and square tubes are welded together to form a framework or other components are welded onto the tube. Under cyclic loads, geometric and metallurgical notch effects are the main determinants of fatigue strength in most applications. For endurance dynamic, the geometric notch effect is reduced by a narrower C/T ratio and the metallurgical notch effect is lowered by using thermomechanically rolled steel.

To illustrate the good fatigue loading properties of welded joints, dynamic load tests were carried out on welded sample assemblies. Woehler lines of the two types - S420M endurance dynamic and the hollow section in S355J2H according to EN10210 - are almost identical. This results in an almost identical fatigue strength behaviour of both versions.

