

Cold formed welded structural hollow sections acc. to DIN EN 10219

Material Data Sheet

Steel designation:	Name	Material No.
	S235JRH	1.0039
	S275J0H	1.0149
	S355J0H	1.0547
	S355J2H	1.0576

Scope

This data sheet applies for cold formed welded structural hollow sections of non-alloy steel.

Application

This steel is standard for general metal, civil engineering and bridge engineering as well as for water engineering, vehicle construction and mechanical engineering.

Chemical composition for product thicknesses ≤ 40 mm (Heat analysis in %)

Steel grade	Material number	Type of deoxidation ¹⁾	C	Si	Mn	P	S	N ²⁾
S235JRH	1.0039	FF	≤ 0,17	-	≤ 1,40	≤ 0,040	≤ 0,040	≤ 0,009
S275J0H	1.0149		≤ 0,20	-	≤ 1,50	≤ 0,035	≤ 0,035	≤ 0,009
S355J0H	1.0547		≤ 0,22	≤ 0,55	≤ 1,60	≤ 0,035	≤ 0,035	≤ 0,009
S355J2H	1.0576		≤ 0,22	≤ 0,55	≤ 1,60	≤ 0,030	≤ 0,030	-

¹⁾ FF = Fully killed steel containing nitrogen binding elements in amounts sufficient to bind available nitrogen (e. g. min. 0,020 % total Al or 0,015 % soluble Al).

²⁾ The maximum value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % with a minimum Al/N ratio of 2:1, or if sufficient other N-binding elements are present. The N-binding elements shall be recorded in the Inspection Document.

Steel grade	Material number	Carbon equivalent in %, max. for Nominal wall thickness ≤ 40 mm
S235JRH	1.0039	0,35
S275J0H	1.0149	0,40
S355J0H	1.0547	0,45
S355J2H	1.0576	0,45

For determination of the carbon equivalent the following formula should be applied:

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

Mechanical properties at room temperature

Steel grade	Material number	Yield strength R_{eH} N/mm ² min.		Tensile strength R_m N/mm ²		Elongation $A^{4)}$ % min. for nominal wall thickness in mm	Impact energy KV ⁵⁾ J min. at a temperature °C of		
		for nominal wall thickness in mm		for nominal wall thickness in mm			-20	0	+20
		≤ 16	> 16 ≤ 40	< 3	≥ 3 ≤ 40				
S235JRH ¹⁾	1.0039	235	225	360 - 510	360 - 510	24 ²⁾	-	-	27
S275J0H ¹⁾	1.0149	275	265	430 - 580	410 - 560	20 ³⁾	-	27	-
S355J0H	1.547	355	345	510 - 680	470 - 630	20 ³⁾	-	27	-
S355J2H	1.0576						27	-	-

¹⁾ The impact test has to be proved only if option 1.3 is determined.

²⁾ For wall thicknesses > 3 mm and section sizes $D/T < 15$ (circular) and $(B+H)/2T \times 12,5$ (square or rectangular) the minimum elongation is reduced by 2. For wall thicknesses ≤ 3 mm the minimum value for elongation is 17 %.

³⁾ For section sizes $D/T < 15$ (circular) and $(B+H)/2T \times 12,5$ (square or rectangular) the minimum elongations is reduces by 2.

⁴⁾ For wall thickness below 3 mm see DIN EN 10219-1, 9.2.2.

⁵⁾ For impact tests with test pieces with reduced cross-section see DIN EN 10219-1, 6.7.2.

Reference data for some physical properties

Density at 20°C Kg/dm ³	Modulus of elasticity kN/mm ² at				Thermal conductivity at 20 °C W/m K	spec. thermal capacity at 20 °C J/kg K	spec. electrical resistivity at 20 °C Ω mm ² /m
	20 °C	100 °C	200 °C	300 °C			
7,85	210	205	197	190	54	461	0,15

Linear coefficient $10^{-6} K^{-1}$ of thermal expansion between 20 °C and

100 °C	200 °C	300 °C
11,1	12,1	12,9

Hot forming / Heat treatment (for guidance only)

Hot Forming		Heat Treatment		
Temperature °C	Cooling Type	Normalizing ¹⁾	Stress relieving anneal ²⁾	Cooling Type
700 - 750	Air	850 - 950 °C	580 - 630 °C	Air

¹⁾ Normalizing: Holding time 1 minute per mm plate thickness, minimum 30 minutes

²⁾ Stress relieving anneal: Holding time 1-2 minutes per mm plate thickness, minimum 30 minutes

Processing / Welding

Standard welding processes for these steel grades are:

TIG– welding

Arc welding (E)

MAG– welding massive wire

Submerged arc welding (SAW)

MAG– welding cored wire

For these steel grades as filler metal the following electrodes and welding wires are recommended:

Process	Filler metal	
TIG	Union I 52	
MAG solid wire	Union K 52 Union K56	
MAG cored wire	Union MV 70 Union BA 70 (Union RV 71)	
Arc welding (E)	Phoenix 120K Phoenix Special D	
SAW	Wire	Powder
	Union S 2 (Union S 2)	UV 400 (UV 306)

These steels can be welded within all thickness ranges according to the afore mentioned welding processes considering the general rules of technology by hand and automatically welding.

The mentioned filler metals apply for highest demands. The details in brackets are for lower demands.

Burning, preheating, welding and stress relieving annealing should occur under consideration of Stahl-Eisen-Material bulletin 088.

Specifications and standards concerning stress relieving anneal have to be observed.

Remark

The material is magnetizable.

References

ThyssenKrupp
DIN EN 10210-1:2006-07

Important Hint

Information given in this data sheet about property or applicability of materials respective products are no assurance of characteristics but serve for description.

Information, with which we like to advise you, relate to the experience of the producers and our own.

Warranty for the results of the treatment and application of the products cannot be granted.