technical data

S690 QL/S690 QL1

High Strength, Water Quenched & Tempered Fine-Grain Structural Steel

Works Designation

DIN EN S690Q /S690QL/S690QL1

Condition of Delivery

Water quenched and tempered.

Typical Applications

Heavy road vehicles: chassis, dumper bodies. Cranes construction: booms of mobile cranes. Structural steelworks: bridges, bridge components, components for offshore structures. Pressure vessels: fixed and transportable storage tanks, vessels. Power plants: penstocks, spiral cases. Materials handling: lifting and mobile equipment. Mining and earthmoving equipment: roof supports. Agricultural equipment and trailers.

Chemical Composition (Heat analysis in %)

C	Si	Mn	P	S	Cr	Mo	Ni	Al
0.20 max.	0.80 max.	1.70 max.	0.020 max.	0.005 max.	1.50 max.	0.70 max.	2.0 max.	0.100 max.

In addition: Ti or/and V or/and Nb.

Mechanical Properties

Plate Thickness mm	Yield Point R_e MPa	Tensile Strength R_m MPa	Elongation at Rupture A_5 %
≤ 50	690	770 - 940	14
> 50 ≤ 100	650	760 - 930	14
> 100 ≤ 150	630	710 - 900	14

Notch Impact Energy

Steel Grade	Position of Samples	0°C	-20°C	-40°C	-60°C
S690Q	Longitudinal Transverse	40 J 30 J	30 J 27 J	-- --	-- --
S690QL	Longitudinal Transverse	50 J 35 J	40 J 30 J	30 J 27 J	-- --
S690QL1	Longitudinal Transverse	60 J 40 J	50 J 35 J	40 J 30 J	30 J 27 J

Number of Tests

Tensile test and impact test (3 samples) every 40 t or per heat treatment unit respectively.

A.J. Marshall
Abrasion Resistant, High Strength, COR-TEN ® & Manganese Steel Plates

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Processing

Cold-Forming

The steel is suitable for cold-forming adhering to a bending or folding radius of > 4 times plate thickness longitudinal and > 3 times plate thickness transverse to rolling direction. A subsequent stress relief annealing is possible up to a temperature of 580°C.

Hot-Forming

Hot-forming above 580°C is possible. A subsequent quenching and tempering has to be carried out according to the delivery condition.

Milling

Drilling with cobalt-alloyed high-speed steels HSSCO, the cutting speed should be approximately 17 - 19 m/min. If HSS drills are used, it should be approximately 3 - 5 m/min. cutting speed should be approximately 3 - 5 m/min.

Flame-Cutting

The material temperature should be at least room temperature. We recommended the following preheating temperatures: for plate thicknesses > 40mm up to 100°C, > 80mm up to 150°C and > 100mm up to 175°C.

Welding

The steel is suitable for all known welding methods. The material temperature should be at least room temperature. We recommended the following preheating temperatures: for plate thicknesses > 20mm up to 75°C, > 40mm up to 100°C, > 60mm up to 150°C and > 100mm up to 175°C. Interpass temperature should be between 150°C - 225°C.

These indications are standard values only. In general indications of SEW 088 should be adhered to. The $t_{8/5}$ times should be between 5 and 15 s, depending on the welding technique used. A subsequent stress relief annealing for constructional reasons should be done in the temperature range of 530°C - 580°C.

Filler Metals

Welding Method	Type of Electrode		
E-Hand	FOX EV 85 OK 75.75	E11018-GHR4R E11018-G	Böhler ESAB
UP	3NiCrMo 2,5-UP/BB24 UP-101 NiCrMo 2,5 3NiMoCr-UP/BB 418TT OK Autrod 13.43/OK Flux 10.62 OK Tubrod 15.27S/OK Flux 10.62	EF6, F11A8-EM4(mod.)-M4 EF6, F11A8-EM4-M4 F11A8-EG-F6 F11A8-EG-G F11A8-EC-G	Böhler FLIESS Böhler ESAB ESAB
MAG	X70-IG/M21 ED-FK 1000 OK AristoRod 69/OK Tubrod 14.03	ER110S-G ER110S-G ER100S-G, E110C-G	Böhler FLIESS ESAB

Full specification and details are available on request.
The above information is provided for guidance purposes only.
For specific design requirements please contact our technical sales staff.

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