

Steel with low reactivity nordic GALVANIZERS

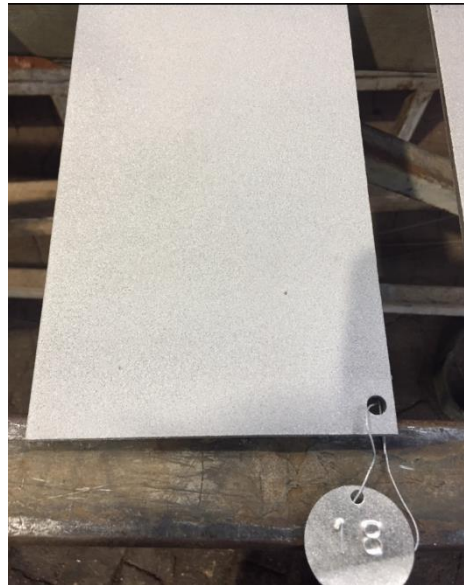
Background:

- Steels are produced with ultra-low Si contents and higher Al (>~0.04%) contents to facilitate laser cutting
- However, these steels are not new and it may be that a very smooth surface finish is the new aspect?
- Grit blasting before galvanizing is normally the most appropriate recommendation in this case – but costs money and also consume zinc...



Reactivity study

Nordic Galvanizers, DOT and a steel supplier have performed a number of dipping trials to try to find out more....



Conditions

Pre treatment	Density	pH	Other information
Degreasing	1.22	10.22	Soap point 16.5
Pickling	1.34		Acid 47.8 g/l Fe 164.3 g/l
Fluxing	1.22	4.34	Ammonium chloride 213.2 g/l Zinc chloride 238.7 g/l

Degreasing: 30 min

Pickling: 90 min

Dipping: 3 min



Bath analyze

Al: 0.0014

Fe: 0.027

Ni: 0.046

Sn: 0.019

Bi: 0.017



Result....

	Identity	Marking	Si	P	Si+P	Al	Local1	Local2	Local3	Req	Average	Req	Approved
S355J2+N	217063	A1-5 3mm	0.02	0.014	0.034	0.049	49	50	50	45	50	55	No
S355J2+N	211484	A1-5 5mm	0.01	0.014	0.024	0.053	51	46	50	55	49	70	No
S355J2+N	204561	A1-5 10mm	0.01	0.011	0.02	0.054	45	51	45	70	47	85	No
S355J2+N	204566	A1-5 12mm	0.01	0.011	0.021	0.054	49	51	44	70	48	85	No
S355MC	204611	C1-5 3mm	0.01	0.012	0.022	0.062	42	39	48	45	43	55	No
S355MC	214324	C1-5 5mm	0.01	0.007	0.017	0.056	47	51	45	55	48	70	No
S355MC	213211	C1-5 10mm	0.01	0.008	0.018	0.058	43	46	44	70	45	85	No
S355MC	206144	C1-5 12mm	0.01	0.014	0.024	0.053	49	43	44	70	45	85	No
LSR355MCPL	207149	D1-5 3mm	0.01	0.006	0.016	0.050	50			45	51	55	No
LSR355MCPL	207149	D1-5 3mm	0.01	0.006	0.016	0.050	122	Blasted		45	122	55	Yes
LSR355MCPL	207137	D1-5 5mm	0.01	0.006	0.016	0.050	52			55	52	70	No
LSR355MCPL	207137	D1-5 5mm	0.01	0.006	0.016	0.050	140	Blasted		55	140	70	Yes
LSR355MCPL	206543	D1-5 10mm	0.01	0.007	0.017	0.063	52	51	50	70	51	85	No
LSR355MCPL	207451	D1-5 12mm	0.01	0.009	0.019	0.058	42	43	48	70	44	85	No
S235	203500	E1-5 3mm	0.01	0.007	0.017	0.046	41	45	39	45	41	55	No
S235	216081	E1-5 5mm	0.01	0.013	0.023	0.049	46	51	44	55	47	70	No
S235	216044	E1-5 10mm	0.01	0.013	0.023	0.049	44	44	41	70	43	85	No
S235	202042	E1-5 12mm	0.01	0.008	0.018	0.047	44	46	45	70	45	85	No
S355J2+N	218141	F1-5 10mm	0.01	0.011	0.021	0.038	56	51	44	70	50	85	No
S235 "Si"	80463 021	B1 -5 5mm	0.20	0.007	0.207	0.028	78	78	82	55	79	70	Yes
S235 "Si"	78994 011	B1-5 10mm	0.21	0.005	0.215	0.038	87	89	91	70	89	85	Yes
<i>Plate-material</i>													
Laser 355ML Plus	83256 013	G1 - 5 10mm	0.02	0.012	0.032	0.042	41	40	40	70	40	85	No



Conclusion.

- **Beware when grid blasting. The zinc consumption will be very high. Alternatively use smaller grid size.**
- **Choose Si-killed steel with 0,2% Si. This gives an okay safety margin in accordance with ISO 1461.**
- **Prolonged dipping time seems only to be an option at 3 mm. (More economic than blasting).**
- **Steel plants satisfy the laser cutters with regards to cutting speed by making very smooth surfaces. This "backfires" when the steel has to be galvanized....**

