

## SPECTROTEST & SPECTROPORT mobile metal analyzers

# Verification of Duplex Steels By Its Nitrogen Content

- Capabilities that other mobile instruments can't match
- Precise verification of duplex steels
- Easy, accurate measurement of the key grade differentiator: nitrogen content
- Unequaled analytical stability and range in a mobile analyzer

SPECTROTEST, the flagship mobile metal analyzer from SPECTRO Analytical Instruments, is the ideal instrument for onsite quality control. It helps prevent grade mix-ups of incoming materials on the production floor, at the shipping dock, or in the welding shop. And SPECTROPORT delivers many advantages of the SPECTROTEST, but in a smaller, lighter package.

A critical task: onsite verification of duplex steels – but not for SPECTROTEST and SPECTROPORT.

Both have the ability to accurately verify duplex steel grades onsite, to differentiate them from other stainless steels and to verify the grade specifications – by measuring their content of alloyed nitrogen. That's something that cannot be handled by all spectrometers.

Based on advantages such as an optical system with high stability, plus the widest wavelength range in its class (174 to 670 nanometers), SPECTROTEST performs this difficult verification with ease: in just 10 s. It also offers shortest measuring times starting at 2 seconds in arc mode, and 5 seconds in spark mode with argon atmosphere. This high-productivity throughput is critical when large numbers of samples must be tested. The more compact SPECTROPORT can be used equally well for high sample throughput or duplex steel verification.

Duplex steels must be accurately verified to ensure the right application match, to assess weldability, or to prevent damage to processing tools such as saws or shears. Prized for their mix of excellent corrosion resistance with high strength, these steels combine austenitic and ferritic grades structure to achieve their desired toughness and processing characteristics. (Although their high strength means more difficult formability and machinability plus comparatively lower ductility than pure austenitic grades, limiting use in applications where these requirements are paramount.) Nitrogen is added as a stabilizing alloy element for its low cost compared to nickel, and for alloys' weldability and their quality of requiring less thickness and weight to realize the same strength. Typical nitrogen content in duplex/ super duplex steels ranges from 0.08 to 0.40%; 0.30 to 0.60% for hyper duplex steels.

These steels are widely used in applications including pharmaceuticals and biotechnology; oil and gas, petrochemicals, and chemicals; offshore, marine, and other corrosive environments; pressure vessels and structural components; and large constructions such as bridges, storage tanks, and wind turbines. Both, SPECTROTEST and SPECTROPORT, can provide fast, reliable verification of duplex steel grades for all these purposes and more.



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High stability and a wide spectral range: recent testing shows that field-proven SPECTROTEST and SPECTROPORT technology provides reliable results when measuring nitrogen in duplex steels. Measurement time is 10 s for each single measurement in spark mode. The measurements were done on tubes with 19 mm outside diameter.

UNS S32750 (2507/EN1.4410/ ASTM A182 Grade F53) - a very common 25Cr super duplex grade

	C [%]	Si [%]	Mn [%]	P [%]	S [%]	Cr [%]	Mo [%]	Ni [%]	Al [%]	Co [%]	Cu [%]	B [%]	N [%]	Fe [%]
1	0.0250	0.19	0.44	0.0147	0.0058	24.95	4.05	6.84	0.0856	0.0398	0.32	0.0029	0.24	62.6
2	0.0208	0.19	0.45	0.0156	0.0061	25.12	3.93	6.74	0.0635	0.0400	0.32	0.0024	0.23	62.7
3	0.0214	0.18	0.45	0.0170	0.0065	25.41	3.86	6.74	0.0672	0.0394	0.32	0.0023	0.24	62.5
4	0.0220	0.17	0.45	0.0175	0.0069	25.54	3.84	6.69	0.0639	0.0395	0.33	0.0025	0.24	62.4
5	0.0203	0.23	0.43	0.0109	0.0069	25.57	3.84	6.79	0.0696	0.0398	0.30	0.0031	0.24	62.3
min.						24.0	3.0	6.0					0.24	
AVG	0.0219	0.19	0.45	0.0151	0.0064	25.32	3.91	6.76	0.0700	0.0397	0.32	0.0026	0.24	62.5
max.	0.03		1.2			26.0	5.0	8.0			0.50		0.32	

Values were obtained using SPECTROTEST. Expect similar results with SPECTROPORT.

UNS 32205 X2CrNiMoN 22-5-3 (2205/ 1.4462/ ASTM A182 F51) is a 22Cr standard duplex grade – the workhorse of duplex steels

	C [%]	Si [%]	Mn [%]	P [%]	S [%]	Cr [%]	Mo [%]	Ni [%]	Al [%]	Co [%]	Cu [%]	B [%]	N [%]	Fe [%]
1	0.0290	0.40	0.71	0.0163	0.0065	22.38	3.34	5.18	0.0190	0.0542	0.17	0.0037	0.18	67.3
2	0.0284	0.40	0.71	0.0177	0.0074	22.43	3.26	5.16	0.0181	0.0551	0.17	0.0033	0.21	67.3
3	0.0267	0.40	0.71	0.0159	0.0068	22.59	3.24	5.19	0.0190	0.0551	0.17	0.0029	0.17	67.2
4	0.0253	0.42	0.70	0.0151	0.0065	22.65	3.21	5.18	0.0181	0.0555	0.16	0.0033	0.19	67.2
5	0.0259	0.41	0.71	0.0163	0.0060	22.74	3.17	5.17	0.0191	0.0555	0.16	0.0028	0.17	67.2
6	0.0269	0.42	0.71	0.0172	0.0064	22.86	3.11	5.17	0.0181	0.0557	0.17	0.0027	0.15	67.1
min.						22.0	3.0	4.5					0.14	
AVG	0.0270	0.41	0.71	0.0164	0.0066	22.61	3.22	5.18	0.0185	0.0552	0.17	0.0031	0.18	67.2
max.	0.03		2.0			23.0	3.5	6.5					0.20	

Values were obtained using SPECTROTEST. Expect similar results with SPECTROPORT.