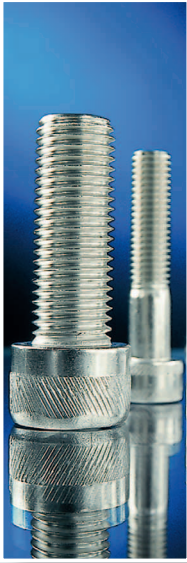


## Wire

### Cold Heading



### Bright Forming



### Spoke



Thanks to a company history starting already 1873, Fagersta Stainless belongs to one of the world leading producers of stainless wire rod and wire. With customized chemistries the products fulfill everything from simple to high demanding applications.

## IMPORTANT PROPERTIES FOR COLD HEADING

To get best possible properties for cold heading, following parameters are important:

- Tight chemistry for identical properties
- Mechanical properties and deformation hardening
- Corrosion properties
- Surfaces and lubricants
- Dimension tolerances

## STANDARD STEEL GRADES FOR COLD HEADING

Due to a close cooperation with our suppliers we have the possibility to offer customized chemistries on top of the grades we have in our standard range. Our grades have tight chemistries and low slag concentrations and therefore equal properties from delivery to delivery. We recommend following standard grades:

EN. Nr	TYPE / AWS		FAGERSTA	C	Si	Mn	Cr	Ni	Mo	N	TS	CWH	Md30	PRE
				%	%	%	%	%	%	%	N/mm <sup>2</sup>		Nohara	
1.4512	409 Ti		R 109.11	0.030*	0.50	0.55	11.30	0.50*	0.10*	0.040*	360-460			12
1.4016	430		R 250.11	0.020*	0.30	0.70	16.40	0.30*	0.10*	0.030*	420-520			17
1.4016	430		R 250.30	0.020*	0.30	0.70	16.40	0.30*	0.10*	0.050	430-530			17
1.4301	302		R 320.14	0.050	0.40	0.75	17.80	8.60	0.60*	0.035	580-680	120	-1	19
1.4301	304		R 350.19	0.030	0.40	1.50	18.20	8.20	0.60*	0.050*	550-650	108	9	20
1.4303	305		R 390.21	0.015*	0.40	0.55	17.70	11.20	0.60*	0.030*	490-590	91	-47	19
1.4307	304 L		R 350.20	0.025*	0.45	1.20	18.50	9.75	0.60*	0.030*	500-600	90	-25	20
1.4307	304 L		R 350.43	0.020*	0.50	1.15	18.30	8.50	0.60*	0.060*	530-630	93	2	20
1.4404	316 L		R 425.10	0.020*	0.35	1.55	16.80	11.20	2.10	0.050*	520-620	92	-90	24
1.4436	316 L		R 440.10	0.030*	0.50	1.55	16.80	11.60	2.60	0.050*	520-620	91	-103	26
1.4567	304 Cu	302 HQ	R 575.21	0.015*	0.40	0.55	17.90	9.70	0.40*	0.025*	450-550			19
1.4578	316 Cu		R 545.11	0.030*	0.35	0.55	17.00	10.80	2.20	0.040*	460-560			25
	660	A286 VAR	R 569.60	0.050	0.20	1.00	14.60	24.70	1.20	0.020*	530-630			19

(Other grades from our standard range are displayed on the reverse side)

## MECHANICAL PROPERTIES

We can control mechanical properties by choosing a specific grade and how we process it in production:

**Tensile strength:** Customized levels  
 Max 40 N/mm<sup>2</sup> variation within a coil  
 Max 100 N/mm<sup>2</sup> variation from delivery to delivery

**Elongation:** With customized chemistries we can control elongation in relation to tensile strength

## CORROSION

PRE (= Pitting Resistance Equivalent = Cr + 3.1 x Mo + 25 x N) is a factor comparing properties of different chemistries with regards to pitting and crevice corrosion in corrosive environments. A higher value means better resistance. In the table above, PRE is shown for the grades we recommend for cold heading.

## SURFACES AND LUBRICANTS

Different end treatments of wire rod combined with various processes during the drawing operations, we can reach the surface smoothness needed for different applications. With our collection of lubricants we can adjust the wire to the customers requirements regarding tool wear, product geometries etc:

<b>Stearate:</b>	FAGERSTA XFK-coating	Na and K based
	FAGERSTA XFT-coating	Synthetic
	FAGERSTA XFN-coating	Na based
	FAGERSTA XF-coating	Synthetic and Ca based
<b>Oil / Grease:</b>	FAGERSTA XFO-coating	Oil
	FAGERSTA XFH-coating	Grease
<b>Metal:</b>	FAGERSTA Cu-coating	Copper
	FAGERSTA Ni-coating	Nickel

## DIMENSIONS

1.50 16.00

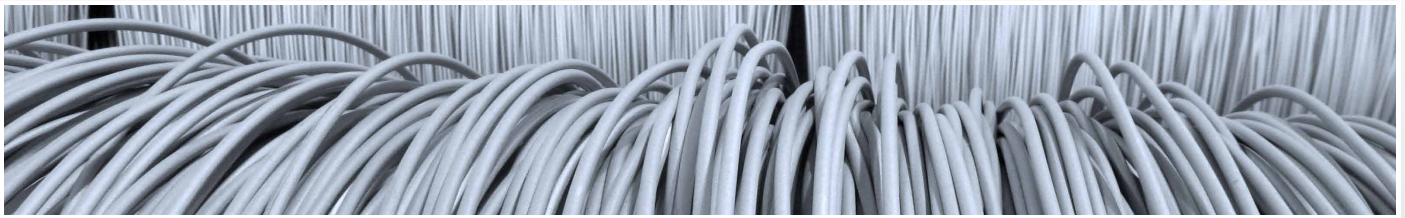
**Standard:** 1.50 – 16.00 mm (.059" - .630")

<b>Tolerance:</b>	h9 according to EN 10278	1.50 – 3.00	+ 0 / - 0.025
		3.01 – 6.00	+ 0 / - 0.030
		6.01 – 10.00	+ 0 / - 0.036
		10.01 – 16.00	+ 0 / - 0.043

**Ovality:** Max 50% of the total tolerance span

## PACKAGING METHODS

The wire is supplied in various packagings depending on the needs of the customer. See separate leaflet.



Structure	STEEL GRADES														CWH	Ms30	PRE	USAGE				
	EN. Nr	TYPE / AWS	Designation	FAGERSTA										Nohara	°C	Welding	Cold heading	Spring	High temperature	Bright forming	Spoke	
				C	Si	Mn	Cr	Ni	Mo	N	Others											
				%	%	%	%	%	%	%	%	%										
Ferritic		409 Cb	R 108.10	0.030	0.60	0.60	11.30	0.35	0.10*	0.040*	Nb 0.50				12	•						
	1.4512	409 Ti	R 109.11	0.030*	0.50	0.55	11.30	0.50*	0.10*	0.040*	Ti 0.75				12		•		•			
	1.4016	430	R 250.11	0.020*	0.30	0.70	16.40	0.30*	0.10*	0.030*					17		•			•		
	1.4016	430	R 250.17	0.050	0.40	0.50	16.80	0.30*	0.50*	0.050*					17						•	
	1.4016	430	R 250.30	0.020*	0.30	0.70	16.40	0.30*	0.10*	0.050					17		•				•	
		430 LCb	R 258.10	0.020*	0.40	0.50	18.20	0.30*	0.30*	0.024*	Nb 0.45				20	•						
		439 Ti	R 259.12	0.020*	0.70	0.70	17.50	0.25*	0.10*	0.025*	Ti 0.40				18	•						
	446	R 270.70	0.050	0.50	1.00	23.90	0.50*	0.54*	0.085					27								
Austenitic	1.4301	302	R 320.14	0.050	0.40	0.75	17.80	8.60	0.60*	0.035				120	-1	19		•				
	1.4301	304	R 350.19	0.030	0.40	1.50	18.20	8.20	0.60*	0.050*				108	9	20		•			•	
	1.4303	305	R 390.21	0.015*	0.40	0.55	17.70	11.20	0.60*	0.030*				91	-47	19		•				
	1.4307	304 L	R 350.20	0.025*	0.45	1.20	18.50	9.75	0.60*	0.030*				90	-25	20		•				
	1.4307	304 L	R 350.43	0.020*	0.50	1.15	18.30	8.50	0.60*	0.060*				93	2	20		•			•	
	1.4310	302	R 300.15	0.100	1.10	1.25	16.80	7.70	0.65	0.045				149	-5	20			•			
	1.4310	302	R 300.20	0.052	0.45	1.20	17.40	8.25	0.60*	0.050				128	4	19			•			
	1.4310	302	R 300.31	0.100	0.90	1.25	17.30	8.20	0.60*	0.030*				139	-8	19			•			
	1.4310	302	R 320.17	0.070	0.45	1.25	18.35	8.10	0.60	0.040				130	-10	20			•			
	1.4372	201	R 520.12	0.090	0.45	5.90	17.00	5.30	0.60*	0.070						20						
	1.4401	316	R 420.18	0.050	0.35	1.55	16.80	10.70	2.10	0.060*				102	-85	24			•			
	1.4404	316 L	R 425.10	0.020*	0.35	1.55	16.80	11.20	2.10	0.050*				92	-90	24			•			
	1.4436	316 L	R 440.10	0.030*	0.50	1.55	16.80	11.60	2.60	0.050*				91	-103	26			•			
	1.4539	385	904 L	R 840.70	0.015*	0.35	1.75	20.00	25.00	4.50	0.050	Cu 1.50			35		19		•		•	
	1.4541	321		R 359.10	0.030	0.50	1.15	17.80	9.20	0.60*	0.020*	Ti 0.35			94	5	19			•		
	1.4547		254 SMO	R 847.10	0.018*	0.35	0.45	19.90	17.90	6.10	0.200	Cu 0.70			44		19			•		
	1.4567	304 Cu	302 HQ	R 575.21	0.015*	0.40	0.55	17.90	9.70	0.40*	0.025*	Cu 3.50			19		19		•			
	1.4571	316 Ti		R 429.15	0.030*	0.40	1.75	16.60	10.60	2.10	0.030*	Ti 0.20			94	-58	24			•		
	1.4578	316 Cu		R 545.11	0.030*	0.35	0.55	17.00	10.80	2.20	0.040*	Cu 3.20			25		19		•			
	1.4828			R 323.10	0.045	1.95	1.20	19.30	11.70	0.60*	0.030				93	-130	21				•	
	1.4835		253 MA	R 327.10	0.075	1.60	0.50	21.00	10.20	0.30*	0.165	Ce 0.055			26		19				•	
				R 823.11	0.030*	2.70	1.75	23.50	19.40	0.60*	0.060*				26		19					•
	1.4841	314		R 823.13	0.020*	2.25	1.75	24.30	20.70	0.50*	0.050*				26		19					•
	1.4845	310 S		R 820.10	0.045	0.65	1.50	24.70	19.40	0.60*	0.050*				26		19					•
	1.4864			R 860.10	0.030*	1.25	1.80	15.30	33.50	0.60*	0.070				18		19					•
	1.4886	330		R 860.13	0.030*	1.25	0.75	18.50	34.50	0.50*	0.060*				21		19					•
			Incoloy DS	R 863.13	0.030*	2.30	1.20	18.00	36.50	0.50*	0.070				21		19					•
		330 Cb	35-19 Cb	R 868.11	0.025*	1.85	0.50	19.50	34.50	0.30*	0.060*	Nb 0.87			21		19					•
		18 8 SiMn	307	R 526.18	0.070	0.90	6.90	19.10	8.80	0.30*	0.045				21		19		•			
		18 8 SiMn	307	R 526.70	0.080	0.87	7.00	18.20	8.00	0.34*	0.060*	S 0.009			20		19		•			
	19 12 3 Nb	ER 318		R 448.11	0.040	0.40	1.80	19.30	11.60	2.60	0.040	S 0.011	Nb 0.62		29		19		•			
	19 12 3 SiNb	ER 318 Si		R 448.12	0.035	0.75	1.35	18.90	11.80	2.70	0.050	S 0.011	Nb 0.65		28		19		•			
	19 12 3 L	ER 316 L		R 466.10	0.015*	0.40	1.75	18.30	12.20	2.60	0.040	S 0.010			27		19		•			
	19 12 3 L	E 316 L		R 466.70	0.018*	0.12	1.75	18.40	11.45	2.65	0.040	S 0.011			28		19		•			
	19 12 3 L	ER 316 L		R 466.71	0.018*	0.40	1.75	18.60	12.30	2.60	0.030	S 0.010			28		19		•			
	19 12 3 LSi	ER 316 LSi		R 466.72	0.023*	0.90	1.80	18.35	12.25	2.60	0.050	S 0.011			28		19		•			
	19 13 4 L	ER 317 L		R 476.25	0.020*	0.40	1.50	18.80	13.70	3.60	0.050	S 0.010			31		19		•			
	19 9 NbSi	ER 347 Si		R 358.16	0.035	0.85	1.30	19.40	9.80	0.30*	0.040	S 0.010	Nb 0.60		21		19		•			
	19 9 Nb	ER 347		R 358.22	0.050	0.47	1.80	19.60	9.20	0.30*	0.030	S 0.009	Nb 0.60		21		19		•			
	19 9 H	ER 308		R 326.12	0.050	0.40	1.80	20.25	9.25	0.30*	0.050	S 0.010			23		19		•			
	19 9 L	ER 308 L		R 366.10	0.015*	0.40	1.80	19.70	10.20	0.20*	0.050	S 0.011			21		19		•			
	19 9 L	ER 308 L		R 366.19	0.020*	0.20*	1.80	19.90	10.10	0.24*	0.050				21		19		•			
	19 9 L	E 308 L		R 366.70	0.012*	0.12	1.80	20.00	10.00	0.10*	0.040	S 0.008			21		19		•			
	19 9 L	ER 308 L		R 366.71	0.023*	0.40	1.80	19.70	10.10	0.30*	0.055	S 0.011			22		19		•			
	19 9 LSi	ER 308 LSi		R 366.72	0.023*	0.90	1.80	19.85	10.35	0.30*	0.065	S 0.011			22		19		•			
	23 12 L	ER 309 L		R 806.20	0.018*	0.42	1.80	23.50	13.70	0.30*	0.080	S 0.010			26		19		•			
	23 12 LSi	ER 309 LSi		R 806.24	0.025*	0.90	1.60	23.30	13.80	0.30*	0.120	S 0.010			27		19		•			
	23 12 2 L	309 LMo	P5	R 816.10	0.015*	0.37	1.50	21.50	15.00	2.70	0.060				31		19		•			
	25 20	E 310		R 826.20	0.100	0.45	1.75	25.90	20.80	0.30*	0.060*				27		19		•			
	25 20	ER 310		R 826.70	0.120	0.40	1.75	25.90	20.80	0.30*	0.060*				27		19		•			
	Duplex	1.4162		2101	R 617.10	0.030	0.70	5.00	21.50	1.50	0.30	0.220	Cu 0.30		28		19					•
		1.4362		2304	R 630.10	0.015	0.45	0.95	22.50	4.70	0.25	0.110	Cu 0.20		26		19					
1.4362			2304	R 630.21	0.015	0.45	0.95	22.50	4.70	0.25	0.110	Cu 0.20		26		19						
1.4662			2209	R 646.21	0.013*	0.50	1.60	23.00	8.75	3.15	0.160			37		19		•				
1.4462			2205	R 647.70	0.017	0.50	0.85	22.20	5.20	3.20	0.180			37		19		•				
	312	29-9	R 656.70	0.100	0.40	1.85	30.35	9.20	0.34*	0.055			32		19		•					
1.4568	631	17-7 PH																				