

QW-430 F-NUMBERS

QW-431 GENERAL

The following F-Number grouping of electrodes and welding rods in [Table QW-432](#) is based essentially on their usability characteristics, which fundamentally determine the ability of welders to make satisfactory welds with a given filler metal. This grouping is made to reduce the number of welding procedure and performance

qualifications, where this can logically be done. The grouping does not imply that base metals or filler metals within a group may be indiscriminately substituted for a metal that was used in the qualification test without consideration of the compatibility of the base and filler metals from the standpoint of metallurgical properties, postweld heat treatment design and service requirements, and mechanical properties.

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification

F-No.	ASME Specification	AWS Classification	UNS No.
Steel and Steel Alloys			
1	SFA-5.1	EXX20	...
1	SFA-5.1	EXX22	...
1	SFA-5.1	EXX24	...
1	SFA-5.1	EXX27	...
1	SFA-5.1	EXX28	...
1	SFA-5.4	EXXX(X)-26	...
1	SFA-5.5	EXX20-X	...
1	SFA-5.5	EXX27-X	...
2	SFA-5.1	EXX12	...
2	SFA-5.1	EXX13	...
2	SFA-5.1	EXX14	...
2	SFA-5.1	EXX19	...
2	SFA-5.5	E(X)XX13-X	...
3	SFA-5.1	EXX10	...
3	SFA-5.1	EXX11	...
3	SFA-5.5	E(X)XX10-X	...
3	SFA-5.5	E(X)XX11-X	...
4	SFA-5.1	EXX15	...
4	SFA-5.1	EXX16	...
4	SFA-5.1	EXX18	...
4	SFA-5.1	EXX18M	...
4	SFA-5.1	EXX48	...
4	SFA-5.4 other than austenitic and duplex	EXXX(X)-15	...
4	SFA-5.4 other than austenitic and duplex	EXXX(X)-16	...
4	SFA-5.4 other than austenitic and duplex	EXXX(X)-17	...
4	SFA-5.5	E(X)XX15-X	...
4	SFA-5.5	E(X)XX16-X	...
4	SFA-5.5	E(X)XX18-X	...
4	SFA-5.5	E(X)XX18M	...
4	SFA-5.5	E(X)XX18M1	...
4	SFA-5.5	E(X)XX45	...
5	SFA-5.4 austenitic and duplex	EXXX(X)-15	...
5	SFA-5.4 austenitic and duplex	EXXX(X)-16	...
5	SFA-5.4 austenitic and duplex	EXXX(X)-17	...
6	SFA-5.2	All classifications	...
6	SFA-5.9	All classifications	...
6	SFA-5.17	All classifications	...
6	SFA-5.18	All classifications	...
6	SFA-5.20	All classifications	...

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Steel and Steel Alloys (Cont'd)			
6	SFA-5.22	All classifications	...
6	SFA-5.23	All classifications	...
6	SFA-5.25	All classifications	...
6	SFA-5.26	All classifications	...
6	SFA-5.28	All classifications	...
6	SFA-5.29	All classifications	...
6	SFA-5.30	INMs-X	...
6	SFA-5.30	IN5XX	...
6	SFA-5.30	IN3XX(X)	...
6	SFA-5.36	All classifications	...
Aluminum and Aluminum Alloys			
21	SFA-5.3	E1100	A91100
21	SFA-5.3	E3003	A93003
21	SFA-5.10	ER1070	A91070
21	SFA-5.10	ER1080A	A91080
21	SFA-5.10	ER1100	A91100
21	SFA-5.10	ER1188	A91188
21	SFA-5.10	ER1200	A91200
21	SFA-5.10	ER1450	A91450
21	SFA-5.10	ER3103	A93103
21	SFA-5.10	R1070	A91070
21	SFA-5.10	R1080A	A91080
21	SFA-5.10	R1100	A91100
21	SFA-5.10	R1188	A91188
21	SFA-5.10	R1200	A91200
21	SFA-5.10	R1450	A91450
21	SFA-5.10	R3101	A93103
22	SFA-5.10	ER5087	A95087
22	SFA-5.10	ER5183	A95183
22	SFA-5.10	ER5183A	A95183
22	SFA-5.10	ER5187	A95187
22	SFA-5.10	ER5249	A95249
22	SFA-5.10	ER5356	A95356
22	SFA-5.10	ER5356A	A95356
22	SFA-5.10	ER5554	A95554
22	SFA-5.10	ER5556	A95556
22	SFA-5.10	ER5556A	A95556
22	SFA-5.10	ER5556B	A95556
22	SFA-5.10	ER5556C	A95556
22	SFA-5.10	ER5654	A95654
22	SFA-5.10	ER5654A	A95654
22	SFA-5.10	ER5754	A95754
22	SFA-5.10	R5087	A95087
22	SFA-5.10	R5183	A95183
22	SFA-5.10	R5183A	A95183
22	SFA-5.10	R5187	A95187
22	SFA-5.10	R5249	A95249
22	SFA-5.10	R5356	A95356
22	SFA-5.10	R5356A	A95356

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Aluminum and Aluminum Alloys (Cont'd)			
22	SFA-5.10	R5554	A95554
22	SFA-5.10	R5556	A95556
22	SFA-5.10	R5556A	A95556
22	SFA-5.10	R5556B	A95556
22	SFA-5.10	R5556C	A95556
22	SFA-5.10	R5654	A95654
22	SFA-5.10	R5654A	A95654
22	SFA-5.10	R5754	A95754
23	SFA-5.3	E4043	A94043
23	SFA-5.10	ER4010	A94010
23	SFA-5.10	ER4018	A94018
23	SFA-5.10	ER4043	A94043
23	SFA-5.10	ER4043A	A94043
23	SFA-5.10	ER4046	A94046
23	SFA-5.10	ER4047	A94047
23	SFA-5.10	ER4047A	A94047
23	SFA-5.10	ER4643	A94643
23	SFA-5.10	ER4943	A94943
23	SFA-5.10	R4010	A94010
23	SFA-5.10	R4011	A94011
23	SFA-5.10	R4018	A94018
23	SFA-5.10	R-A356.0	A13560
23	SFA-5.10	R357.0	A03570
23	SFA-5.10	R-A357.0	A13570
23	SFA-5.10	R4043	A94043
23	SFA-5.10	R4043A	A94043
23	SFA-5.10	R4046	A94046
23	SFA-5.10	R4047A	A94047
23	SFA-5.10	R4047	A94047
23	SFA-5.10	R4643	A94643
23	SFA-5.10	R4943	A94943
25	SFA-5.10	ER2319	A92319
25	SFA-5.10	R2319	A92319
25	SFA-5.10	R206.0	A02060
26	SFA-5.10	ER4009	A94009
26	SFA-5.10	ER4145	A94145
26	SFA-5.10	R4009	A94009
26	SFA-5.10	R4145	A94145
26	SFA-5.10	R-C355.0	A33550
Copper and Copper Alloys			
31	SFA-5.6	ECu	W60189
31	SFA-5.7	ERCu	C18980
32	SFA-5.6	ECuSi	W60656
32	SFA-5.7	ERCuSi-A	C65600
33	SFA-5.6	ECuSn-A	W60518
33	SFA-5.6	ECuSn-C	W60521
33	SFA-5.7	ERCuSn-A	C51800
33	SFA-5.7	ERCuSn-C	C52100
34	SFA-5.6	ECuNi	W60715
34	SFA-5.7	ERCuNi	C71580

**Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)**

F-No.	ASME Specification	AWS Classification	UNS No.
Copper and Copper Alloys (Cont'd)			
34	SFA-5.30	IN67	C71581
35	SFA-5.8	RBCuZn-A	C47000
35	SFA-5.8	RBCuZn-B	C68000
35	SFA-5.8	RBCuZn-C	C68100
35	SFA-5.8	RBCuZn-D	C77300
36	SFA-5.6	ECuAl-A2	W60614
36	SFA-5.6	ECuAl-B	W60619
36	SFA-5.7	ERCuAl-A1	C61000
36	SFA-5.7	ERCuAl-A2	C61800
36	SFA-5.7	ERCuAl-A3	C62400
37	SFA-5.6	ECuMnNiAl	C60633
37	SFA-5.6	ECuNiAl	C60632
37	SFA-5.7	ERCuMnNiAl	C63380
37	SFA-5.7	ERCuNiAl	C63280
Nickel and Nickel Alloys			
41	SFA-5.11	ENi-1	W82141
41	SFA-5.14	ERNi-1	N02061
41	SFA-5.30	IN61	N02061
42	SFA-5.11	ENiCu-7	W84190
42	SFA-5.14	ERNiCu-7	N04060
42	SFA-5.14	ERNiCu-8	N05504
42	SFA-5.30	IN60	N04060
43	SFA-5.11	ENiCr-4	W86172
43	SFA-5.11	ENiCrCoMo-1	W86117
43	SFA-5.11	ENiCrFe-1	W86132
43	SFA-5.11	ENiCrFe-2	W86133
43	SFA-5.11	ENiCrFe-3	W86182
43	SFA-5.11	ENiCrFe-4	W86134
43	SFA-5.11	ENiCrFe-7	W86152
43	SFA-5.11	ENiCrFe-9	W86094
43	SFA-5.11	ENiCrFe-10	W86095
43	SFA-5.11	ENiCrFe-12	W86025
43	SFA-5.11	ENiCrMo-2	W86002
43	SFA-5.11	ENiCrMo-3	W86112
43	SFA-5.11	ENiCrMo-4	W80276
43	SFA-5.11	ENiCrMo-5	W80002
43	SFA-5.11	ENiCrMo-6	W86620
43	SFA-5.11	ENiCrMo-7	W86455
43	SFA-5.11	ENiCrMo-10	W86022
43	SFA-5.11	ENiCrMo-12	W86032
43	SFA-5.11	ENiCrMo-13	W86059
43	SFA-5.11	ENiCrMo-14	W86026
43	SFA-5.11	ENiCrMo-17	W86200
43	SFA-5.11	ENiCrMo-18	W86650
43	SFA-5.11	ENiCrMo-19	W86058
43	SFA-5.11	ENiCrWMo-1	W86231
43	SFA-5.14	ERNiCr-3	N06082
43	SFA-5.14	ERNiCr-4	N06072
43	SFA-5.14	ERNiCr-6	N06076

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Nickel and Nickel Alloys (Cont'd)			
43	SFA-5.14	ERNiCr-7	N06073
43	SFA-5.14	ERNiCrCoMo-1	N06617
43	SFA-5.14	ERNiCrFe-5	N06062
43	SFA-5.14	ERNiCrFe-6	N07092
43	SFA-5.14	ERNiCrFe-7	N06052
43	SFA-5.14	ERNiCrFe-7A	N06054
43	SFA-5.14	ERNiCrFe-8	N07069
43	SFA-5.14	ERNiCrFe-11	N06601
43	SFA-5.14	ERNiCrFe-12	N06025
43	SFA-5.14	ERNiCrFe-13	N06055
43	SFA-5.14	ERNiCrFe-14	N06043
43	SFA-5.14	ERNiCrFeAl-1	N06693
43	SFA-5.14	ERNiCrMo-2	N06002
43	SFA-5.14	ERNiCrMo-3	N06625
43	SFA-5.14	ERNiCrMo-4	N10276
43	SFA-5.14	ERNiCrMo-7	N06455
43	SFA-5.14	ERNiCrMo-10	N06022
43	SFA-5.14	ERNiCrMo-13	N06059
43	SFA-5.14	ERNiCrMo-14	N06686
43	SFA-5.14	ERNiCrMo-16	N06057
43	SFA-5.14	ERNiCrMo-17	N06200
43	SFA-5.14	ERNiCrMo-18	N06650
43	SFA-5.14	ERNiCrMo-19	N06058
43	SFA-5.14	ERNiCrMo-20	N06660
43	SFA-5.14	ERNiCrMo-21	N06205
43	SFA-5.14	ERNiCrMo-22	N06035
43	SFA-5.14	ERNiCrWMo-1	N06231
43	SFA-5.30	IN52	N06052
43	SFA-5.30	IN62	N06062
43	SFA-5.30	IN6A	N07092
43	SFA-5.30	IN82	N06082
43	SFA-5.34	All classifications	...
44	SFA-5.11	ENiMo-1	W80001
44	SFA-5.11	ENiMo-3	W80004
44	SFA-5.11	ENiMo-7	W80665
44	SFA-5.11	ENiMo-8	W80008
44	SFA-5.11	ENiMo-9	W80009
44	SFA-5.11	ENiMo-10	W80675
44	SFA-5.11	ENiMo-11	W80629
44	SFA-5.14	ERNiMo-1	N10001
44	SFA-5.14	ERNiMo-2	N10003
44	SFA-5.14	ERNiMo-3	N10004
44	SFA-5.14	ERNiMo-7	N10665
44	SFA-5.14	ERNiMo-8	N10008
44	SFA-5.14	ERNiMo-9	N10009
44	SFA-5.14	ERNiMo-10	N10675
44	SFA-5.14	ERNiMo-11	N10629
44	SFA-5.14	ERNiMo-12	N10242
45	SFA-5.11	ENiCrMo-1	W86007
45	SFA-5.11	ENiCrMo-9	W86985
45	SFA-5.11	ENiCrMo-11	W86030

**Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)**

F-No.	ASME Specification	AWS Classification	UNS No.
Nickel and Nickel Alloys (Cont'd)			
45	SFA-5.14	ERNiCrMo-1	N06007
45	SFA-5.14	ERNiCrMo-8	N06975
45	SFA-5.14	ERNiCrMo-9	N06985
45	SFA-5.14	ERNiCrMo-11	N06030
45	SFA-5.14	ERNiFeCr-1	N08065
46	SFA-5.11	ENiCrFeSi-1	W86045
46	SFA-5.14	ERNiCrFeSi-1	N06045
46	SFA-5.14	ERNiCoCrSi-1	N12160
Titanium and Titanium Alloys			
51	SFA-5.16	ERTi-1	R50100
51	SFA-5.16	ERTi-11	R52251
51	SFA-5.16	ERTi-13	R53423
51	SFA-5.16	ERTi-17	R52253
51	SFA-5.16	ERTi-27	R52255
51	SFA-5.16	ERTi-2	R50120
51	SFA-5.16	ERTi-7	R52401
51	SFA-5.16	ERTi-14	R53424
51	SFA-5.16	ERTi-16	R52403
51	SFA-5.16	ERTi-26	R52405
51	SFA-5.16	ERTi-30	R53531
51	SFA-5.16	ERTi-33	R53443
51	SFA-5.16	ERTi-3	R50125
51	SFA-5.16	ERTi-15A	R53416
51	SFA-5.16	ERTi-31	R53533
51	SFA-5.16	ERTi-34	R53444
52	SFA-5.16	ERTi-4	R50130
53	SFA-5.16	ERTi-9	R56320
53	SFA-5.16	ERTi-9ELI	R56321
53	SFA-5.16	ERTi-18	R56326
53	SFA-5.16	ERTi-28	R56324
54	SFA-5.16	ERTi-12	R53400
55	SFA-5.16	ERTi-5	R56400
55	SFA-5.16	ERTi-23	R56408
55	SFA-5.16	ERTi-29	R56414
55	SFA-5.16	ERTi-24	R56415
55	SFA-5.16	ERTi-25	R56413
55	SFA-5.16	ERTi-38	R54251
56	SFA-5.16	ERTi-32	R55112
Zirconium and Zirconium Alloys			
61	SFA-5.24	ERZr2	R60702
61	SFA-5.24	ERZr3	R60704
61	SFA-5.24	ERZr4	R60705
Hard-Facing Weld Metal Overlay			
71	SFA-5.13	ECoCr-A	W73006
71	SFA-5.13	ECoCr-B	W73012
71	SFA-5.13	ECoCr-C	W73001
71	SFA-5.13	ECoCr-E	W73021

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Hard-Facing Weld Metal Overlay (Cont'd)			
71	SFA-5.13	ECuAl-A2	W60617
71	SFA-5.13	ECuAl-B	W60619
71	SFA-5.13	ECuAl-C	W60625
71	SFA-5.13	ECuAl-D	W61625
71	SFA-5.13	ECuAl-E	W62625
71	SFA-5.13	ECuMnNiAl	W60633
71	SFA-5.13	ECuNi	W60715
71	SFA-5.13	ECuNiAl	W60632
71	SFA-5.13	ECuSi	W60656
71	SFA-5.13	ECuSn-A	W60518
71	SFA-5.13	ECuSn-C	W60521
71	SFA-5.13	EFe1	W74001
71	SFA-5.13	EFe2	W74002
71	SFA-5.13	EFe3	W74003
71	SFA-5.13	EFe4	W74004
71	SFA-5.13	EFe5	W75110
71	SFA-5.13	EFe6	W77510
71	SFA-5.13	EFe7	W77610
71	SFA-5.13	EFeCr-A1A	W74011
71	SFA-5.13	EFeCr-A2	W74012
71	SFA-5.13	EFeCr-A3	W74013
71	SFA-5.13	EFeCr-A4	W74014
71	SFA-5.13	EFeCr-A5	W74015
71	SFA-5.13	EFeCr-A6	W74016
71	SFA-5.13	EFeCr-A7	W74017
71	SFA-5.13	EFeCr-A8	W74018
71	SFA-5.13	EFeCr-E1	W74211
71	SFA-5.13	EFeCr-E2	W74212
71	SFA-5.13	EFeCr-E3	W74213
71	SFA-5.13	EFeCr-E4	W74214
71	SFA-5.13	EFeMn-A	W79110
71	SFA-5.13	EFeMn-B	W79310
71	SFA-5.13	EFeMn-C	W79210
71	SFA-5.13	EFeMn-D	W79410
71	SFA-5.13	EFeMn-E	W79510
71	SFA-5.13	EFeMn-F	W79610
71	SFA-5.13	EFeMnCr	W79710
71	SFA-5.13	ENiCr-C	W89606
71	SFA-5.13	ENiCrFeCo	W83002
71	SFA-5.13	ENiCrMo-5A	W80002
71	SFA-5.13	EWCX-12/30	...
71	SFA-5.13	EWCX-20/30	...
71	SFA-5.13	EWCX-30/40	...
71	SFA-5.13	EWCX-40	...
71	SFA-5.13	EWCX-40/120	...
72	SFA-5.21	ERCCoCr-A	W73036
72	SFA-5.21	ERCCoCr-B	W73042
72	SFA-5.21	ERCCoCr-C	W73031
72	SFA-5.21	ERCCoCr-E	W73041
72	SFA-5.21	ERCCoCr-G	W73032

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Hard-Facing Weld Metal Overlay (Cont'd)			
72	SFA-5.21	ERCuAl-A2	W60618
72	SFA-5.21	ERCuAl-A3	W60624
72	SFA-5.21	ERCuAl-C	W60626
72	SFA-5.21	ERCuAl-D	W61626
72	SFA-5.21	ERCuAl-E	W62626
72	SFA-5.21	ERCuSi-A	W60657
72	SFA-5.21	ERCuSn-A	W60518
72	SFA-5.21	ERCuSn-D	W60524
72	SFA-5.21	ERCFE-1	W74030
72	SFA-5.21	ERCFE-1A	W74031
72	SFA-5.21	ERCFE-2	W74032
72	SFA-5.21	ERCFE-3	W74033
72	SFA-5.21	ERCFE-5	W74035
72	SFA-5.21	ERCFE-6	W77530
72	SFA-5.21	ERCFE-8	W77538
72	SFA-5.21	ERCFEcr-A	W74531
72	SFA-5.21	ERCFEcr-A1A	W74530
72	SFA-5.21	ERCFEcr-A3A	W74533
72	SFA-5.21	ERCFEcr-A4	W74534
72	SFA-5.21	ERCFEcr-A5	W74535
72	SFA-5.21	ERCFEcr-A9	W74539
72	SFA-5.21	ERCFEcr-A10	W74540
72	SFA-5.21	ERCFEMn-C	W79230
72	SFA-5.21	ERCFEMn-F	W79630
72	SFA-5.21	ERCFEMn-G	W79231
72	SFA-5.21	ERCFEMn-H	W79232
72	SFA-5.21	ERCFEMnCr	W79730
72	SFA-5.21	ERCNiCr-A	W89634
72	SFA-5.21	ERCNiCr-B	W89635
72	SFA-5.21	ERCNiCr-C	W89636
72	SFA-5.21	ERCNiCrFeCo	W83032
72	SFA-5.21	ERCNiCrMo-5A	W80036
72	SFA-5.21	ERCoCr-A	R30006
72	SFA-5.21	ERCoCr-B	R30012
72	SFA-5.21	ERCoCr-C	R30001
72	SFA-5.21	ERCoCr-E	R30021
72	SFA-5.21	ERCoCr-F	R30002
72	SFA-5.21	ERCoCr-G	R30014
72	SFA-5.21	ERCuAl-A2	C61800
72	SFA-5.21	ERCuAl-A3	C62400
72	SFA-5.21	ERCuAl-C	C62580
72	SFA-5.21	ERCuAl-D	C62581
72	SFA-5.21	ERCuAl-E	C62582
72	SFA-5.21	ERCuSi-A	C65600
72	SFA-5.21	ERCuSn-A	C51800
72	SFA-5.21	ERCuSn-D	C52400
72	SFA-5.21	ERFe-1	T74000
72	SFA-5.21	ERFe-1A	T74001
72	SFA-5.21	ERFe-2	T74002
72	SFA-5.21	ERFe-3	T74003

Table QW-432
F-Numbers
Grouping of Electrodes and Welding Rods for Qualification (Cont'd)

F-No.	ASME Specification	AWS Classification	UNS No.
Hard-Facing Weld Metal Overlay (Cont'd)			
72	SFA-5.21	ERFe-5	T74005
72	SFA-5.21	ERFe-6	T74006
72	SFA-5.21	ERFe-8	T74008
72	SFA-5.21	ERFeCr-A	...
72	SFA-5.21	ERFeCr-A1A	...
72	SFA-5.21	ERFeCr-A3A	...
72	SFA-5.21	ERFeCr-A4	...
72	SFA-5.21	ERFeCr-A5	...
72	SFA-5.21	ERFeCr-A9	...
72	SFA-5.21	ERFeCr-A10	...
72	SFA-5.21	ERFeMn-C	...
72	SFA-5.21	ERFeMn-F	...
72	SFA-5.21	ERFeMn-G	...
72	SFA-5.21	ERFeMn-H	...
72	SFA-5.21	ERFeMnCr	...
72	SFA-5.21	ERNiCr-A	N99644
72	SFA-5.21	ERNiCr-B	N99645
72	SFA-5.21	ERNiCr-C	N99646
72	SFA-5.21	ERNiCr-D	N99647
72	SFA-5.21	ERNiCr-E	N99648
72	SFA-5.21	ERNiCrFeCo	F46100
72	SFA-5.21	ERNiCrMo-5A	N10006
72	SFA-5.21	ERWCX-20/30	...
72	SFA-5.21	ERWCX-30/40	...
72	SFA-5.21	ERWCX-40	...
72	SFA-5.21	ERWCX-40/120	...
72	SFA-5.21	RWCX-20/30	...
72	SFA-5.21	RWCX-30/40	...
72	SFA-5.21	RWCX-40	...
72	SFA-5.21	RWCX-40/120	...