AMA

AMA INDUSTRIAL CO.

Established 1959

Welding Consumables
&
Cutting and Grinding Wheels

Guide Book

AMA Industrial Co.
P.O.Box: 37515-355
Tel: +98 21 44 98 39 35-44
Fax: +98 21 44 98 77 69
E-mail: contact@ama-co.com
URL: www.ama-co.com/www.ama-co.net

History of
AMA Industrial Company

AMA

History of AMA Industrial Co.

Manufacturing of welding electrodes in Iran was originated by innovation of three Industry professionals in April 1959. AMA was formally founded in October of the same year, and the mass production was initiated in March 1961 with the annual capacity of 440 MT using the machineries made inside the company.

In the years before foundation of AMA, Iranian industries used imported electrode types. In 1963, because of the increase in local requisition for welding electrodes, AMA expanded its annual production capacity to 2,200 MT.

Taking into consideration the growing industrialization process of the first years of 1960s, and increase in demand for industrial welding electrodes, in reply to various industries demands and to renovate its production technical knowledge, AMA singed an agreement for technical knowledge and experience with one of the largest and leading companies of welding consumables known as "Oerlikon Welding Technologies (Switzerland)".

In 1969, in response to numerous customers for cutting & grinding wheels, the first production unit was established by taking advantage of technical knowledge of M/S RASTA, Switzerland.

Using modern technical know - how, machineries and equipment along with cooperation of professional working forces, upgraded the quality of the products, confided customers and caused a surge of demand which finally deduced into increasing of the annual production capacity up to 24,000 tones in 1977.

After the Islamic Revolution, despite difficulties of war, AMA continued its obligation towards production and supplying the customer's demands.

By ending of war and the start of the new period of reconstruction in the country, management of AMA decided to expand their area of expertise. To do so, relying on valuable experiences of AMA group and support of ministry of industries, a development plan was programmed for production of new products and reaching to annual capacity of 45,000 MT.

In 1997, execution operation of Research and Development department was commenced in factory's new developed location in 17th kilometer of Jaddeh Makhsuse Karaj. By inauguration of the new factory in 2002, simultaneously with the 42nd anniversary of company's foundation, annual production potency of welding consumables gradually increased up to 45,000 MT. These consumables consist of:

1.Shielded metal arc welding electrodes,
2.Gas shield arc welding wires
3.Submerged arc welding wires
4.Flux-Cored arc welding wires
5.Submerged arc welding fluxes

One of the main objectives of AMA is continuous improvement of its products' quality, customer's satisfaction level and increase of domestic and international market share. In accordance with these objectives, substantial amount of equipment and capital has been invested on research, Quality Control, employment of experts and university professors, continuous training of personnel, establishment of Quality Management Systems based on international standards, undergoing technical approvals from various international institutes, establishment of marketing research and development unit, taking active part in domestic and international events, membership in creditable international welding societies and organizations, were executed.

At the moment, AMA is the largest manufacturer of high quality welding consumables in West Asia and The Middle East.

Regarding domestic demand for specialized welding training, in line with the world wide leading companies in welding industries, in the location of the first established factory AMA had based a training center named as "AMA Center of Welding Technologies (ACWT)" with granted approvals from Iran's Ministry of Mining and Industries, Ministry of Science, Research and Technologies, Vocational Training Organization of Iran and Iranian Engineering Organization in October 2008. At ACWT, by the help of experienced and educated engineers and professors and aid of best international educational centers, we hope to be more effective in improvement of welding educational level.

Table of Contents

Title	Page
Products List	4
General References	22
SMAW Electrodes	
Rutile Electrodes	40
Basic Electrodes	50
Electrodes with High Metal Recovery	60
Cellulosic Electrodes	64
Electrodes for Stainless and Heat Resistant Steels	70
Electrodes for Nickel Alloys	98
Electrodes for Creep Resistant Steels	106
Electrodes for Fine Grain Structural Steels	118
Electrodes for Cast Iron	142
Electrodes for Hardfacing Applications	148
Electrodes for Non Ferrous Metals	158
Electrode for Gouging and Cutting	162
SAW Fluxes	
Fluxes for Submerged Arc welding of General Structural Steels and Fine Grain Steels	166
Fluxes for Submerged Arc welding of Austenitic Stainless Steels	196
Fluxes for Wear Resistant and Hardsurfacing Applications	202
SAW Backing Flux	206

Table of Contents

Title **Page**

SAW Wires

Unalloyed wires for SAW 210
Low alloy wires for SAW 211
Stainless steel wires for SAW 212

GMAW Wires

MIG/MAG Wires For C-Mn Steels Welding 214
Low Alloy MIG/MAG Welding Wires 222
Stainless Steel MIG/MAG Welding Wires 230
Nickle base MIG/MAG Welding wires 242

GTAW Wires

TIG Wires for C-Mn Steels Welding 246
Low Alloy TIG Welding Wires 252
Stainless Steel TIG Welding Wires 262
Nickle base TIG Welding wires 274

Tubular Cored Wires for GAS Welding 278

Cutting and Grinding Wheels 288

Products List

AMA

Rutile Electrodes

AMA Trade Name	AWS/ASME SFA 5.1	DIN 1913	EN499	Page
23AK	E 6013	E 4322 R(C)3	E 390 RC11	42
1008A	E 7014			43
1303C	E6019		E 38 0 RC 11	44
1531	E 6013	E 4343 RR(B)7	E 38 2 RB 12	45
2000	E 6013	E 4322 R(C)3	E 380 RC11	46
2000A	E 6013	E 5122 RR6	E 420 RR12	47
Mk14	E 6013	E 4333 R(C)3	E 38 0 RC 11	48
P.L	E 6013	E 4322 R(C)3	E 38 0 RC 11	49

Basic Electrodes

AMA Trade Name	AWS/ASME SFA 5.1	DIN 1913 DIN 8529	EN499	Page
1007F	E 7016 - H8	E Y 42 55 Mn B H5	E 42 5 B 41 H5	52
1177F	E 7018 -1 - H4	E SY 4276 MnB	E426 B42 H5	53
1184 F	E 7016-1-H8	E Y 42 67 Mn B H5	E 42 6 B 42 H5	54
1230F	E 7018 - H8	E 5154 B10	E423 B42 H10	55
1235F	E 7018 - H4	E 5155 B5	E 42 5 B 42 H5	56
1239F	E7018-H8	E 51 54 B 10	E 42 4 B 42 H10	57
1280M	E 7018 - H8	E 5154 B10	E423 B42 H10	58

Electrodes with High Metal Recovery

AMA Trade Name	AWS/ASME SFA 5.1	DIN 1913	EN499	Page
1118K	E 7024	E 5122 RR 11160	E380 RR53	62
1617K	E 7028 - H8	E 5154 B(R) 12160	E385 B73 H10	63

Cellulosic Electrodes

AMA Trade Name	AWS/ASME SFA 5.1,5.5	DIN 1913	EN	Page
1047P	E 6010	E 43 43 C4	E 35 2 C 21	66
1048 P1	E 7010-P1			67
1049 P1	E 8010-P1			68
1042NP	E 7010 - A1			69

Electrodes for Stainless and Heat Resistant Steels

AMA Trade Name	AWS/ASME SFA 5.4	DIN 8556	EN1600	Page
1071R	~E 410 - 15	E 131 B20 +	EZ131 B22	72
1072D	~E410NiMO-15	E13 4 B20+	E 13 4 B 42	73
1312J	~E 310 - 15	E 2520 B20 +	E 2520 B42	74
1337 JA	E308L-15	E199 LB 20+	E199L B 42	75
1338 JB	E 316L-15	E1912 3L B 20+	E 19123L B42	76
1339 JA	E 309 L -15	E 2312 L B 20+	E 2312 L B 42	77
1340 JA	E347-15	E 19 9 Nb B 20+	E 19 9 Nb B 42	78
1367MR		E Z 16 6 Mo B 20+	E Z 16 6 Mo B 42	79
1460JA	E 308 L - 16	E 199 LR26	E 199 LR12	80
1460JB	E 316 L - 16	E 19123 LR26	E 19123 LR12	81
1461JA	E 347 - 16	E 199 Nb R26	E 199 NbR12	82
1461JB	E 318 - 16	E19123 NbR26	E19123 NbR12	83
1464Cb	E309cb-16	E2312NbR26	E 23 12 Nb R 12	84
1464JA	E 309 L - 16	E 2312 L R26	E 2312 LR12	85

AMA Trade Name	AWS/ASME SFA 5.4	DIN 8556	EN1600	Page
1464JB	E 309 MoL 16	E 23132 LR26	E 23122 LR12	86
1465J	E312-16	E 299 R26	E 29 9 R 12	87
1468J	~ E 312 - 16	E 299 R26	E 299 R12	88
1474JB7	~ E 309 L -17	E2312 L R 23	E 23 12 LR 12	89
1474MO	~E309MoL-17	E2312 2L R 23	E 2312 2LR12	90
1507JA	E 310 - 16	E 2520 R26		91
1508JC	~E 308 L -17	E 19 9 L R 23	E 19 9 L R 12	92
1509JC	~E 316 L -17	E 19 12 3 L R 23	E 19 123 LR 12	93
1510JC6	~ E 347 -17	E 19 9 Nb R 23	E 19 9 Nb R 12	94
1511JC6	~ E 318 -17	E19 123 Nb R 23	E19 123 Nb R 12	95
1560JA	E308H-16	E 199 R26	E 19 9 H R 42	96
1803J	~ E 307 - 15	E 188 Mn B20	E 188 Mn B42	97

Electrodes for Nickel Alloys

AMA Trade Name	AWS/ASME SFA 5.11	DIN 1736	EN	Page
1604G	~ E NiCrFe - 3	EL-NiCr15FeMn		100
1609G	~ E NiCrFe - 2	EL-NiCr15 FeNb		101
1611G	~ E NiCrMo - 3	EL-NiCr20Mo9Nb		102
1615G	ENiCrMo-6			103
1709G	ENiCu-7	EL-NiCu30Mn		104

Electrodes for Creep Resistant Steels

AMA Trade Name	AWS/ASME SFA 5.5	DIN 8575	EN 1599	Page
1087R3	E505-15-H8 E8018-B8-H8	ECrMo9B20+	ECrM09B42H10	107
1181NC	E 7016-A1-H8	E MoB20 +	E Mo B 4 2 H5	108
1245N	E 9018-B3-H8	E CrMo 2B20	E CrMo1B32H10	109
1261N	E 7018-A1-H8	E Mo B20 +	E MoB42 H10	110
1263N	E 8018-B2-H8	E CrMo 1B20	ECrMo1B42H10	111
1264N	E8018-B3L	E CrMo 2 B 20+	E CrMo 2 B 42 H5	112
1366N2	E 502-15-H E8018 - B6-H8	E CrMo 5B20 +	EZCrMo5B42H10	113
1379-4VN	E 8018-G-H8			114
1410N	E 8016-B2-H8	E CrMo 1 B 20+	ECrMo 1 B 42 H10	115
1419N	E 8018-B2L-H8	E CrMo 1 B 20+	ECrMo 1 B 42 H10	116
1426N	E 9018-B3L-H8	ECrMo 2 B 20+	E CrMo 2 B 42 H10	117

Electrodes for Fine Grain Structural Steels

AMA Trade Name	AWS/ASME SFA 5.5	DIN 8529	EN499 EN 757	Page
1024N	E 12018-G-H4	E Y8953 Mn2NiCrMoB	E89 4 Mn2Ni1 CrMoB42H5	119
1188N	E8018-G-H4			120
1282N	E 8018-G-H4	E Y5076 Mn1NiBH5	E 506 Mn1 Ni B42 H5	121
1284N	E 8018-G-H4	E Y 5076 Mn 1 Ni B H5	E50 6 Mn1 Ni B42 H5	122
1285N	E9018-G-H4 E9018-D1-H4	EY5554 MnMoBH5	E55 3 MnMo B 4 2 H5	123
1286N	E9018-D1-H4			124
1292N	E 10018-G-H4	E Y6975 Mn2NiCrMoBH5	E 69 6 Mn 2 NiCr Mo B 4 2 H5	125
1301N	E 7018-G	E Y38651 NiCuB	E 385 ZB42	126
1385NC	E 9018-G-H4	E SY5576Mn 1NiMoBH5	E55 6 Mn 1 NiMo B 4 2 H5	127
1398N	E 7018-G-H4	E SY42761 NiBH5	E 4661 NiB42H5	128
1414N	E 7018-C2L-H4	EY4297 3Ni B H5		129
1415N	E 9016-G-H4	E SY 55 76 Mn 1 NiMo B H5	E 55 6 Mn 1 NiMo B T 4 2 H5	130
1416N	E 8018-W			131
1417N	E 8018-G			132
1418N	E 8018-C2-H4	E Y 4687 3Ni B H5		133
1420N	E 8018-C1-H4	E SY42872 NiBH5	E 4662 NiB42H5	134
1422N	E 8018-C3-H4	E SY42761 NiBH5	E 46 5 1Ni B 42 H5	135
1424N	E 7018-C3L-H4	E Y 42 76 1Ni B H5	E 46 5 1Ni B 42 H5	136
1428NC	E 9018M-H4			137
1432N	E 11018-M-H4	E Y6975 Mn2NiCrMoBH5	E69 5 Mn2NiCrMo B 4 2 H5	138
1433NA	E 12018M-H4	E Y 6955 Mn2Ni 1CrMo B H5	E 69 5 Mn2NiCrMo B 4 2 H5	139
1437B	E 7016-G-H8	E SY 42 76 1Ni B	E46 6 1Ni B 42 H5	140

Electrodes for Cast Iron

AMA Trade Name	AWS/ASME SFA 5.15	DIN 8573	EN	Page
1012G	E ST			144
1094Ni	E Ni - Cl	E Ni BG22		145
1094Mo	E Ni Cu - B	E Ni Cu BG22		146
1094Ni Fe	E Ni Fe - Cl			147

Electrodes for Hardfacing Applications

AMA Trade Name	AWS/ASME SFA 5.13	DIN 8555	EN	Page
1105V	E Fe5 - B	E4-UM-60-65-S		150
1600V	–	E6-UM-60		151
1602V	–	E10-UM-60-R		152
1621 V3		E 10-UM-60R		153
1622V	–	E1-UM-400		154
1623 V		E6-UM-60		155
1639V	–	E6-UM-55-GP		156
1760V	–	E7-UM-200KP		157

Electrodes for Non Ferrous Metals

AMA Trade Name	AWS/ASME SFA 5.3,5.6	DIN 1732 DIN 1733	EN	Page
1075SP	E 4043	EL-AlSi 5		159
1075A	E 1100	EL-AL 99.5		160
1328G	E CuSn-C	EL-CuSn 7		161

Electrodes for Gouging and Cutting

AMA Trade Name		Page
1006Y		164

Fluxes for Submerged Arc welding of General Structural Steels and Fine Grain Steels

AMA Trade Name	EN 760	DIN 32522	Page
AMA-OP 155	SA MS 189 AC	B MS 189 AC 8 SKM	168
AMA-OP 176	SAMS 188 AC H5	B MS 188 AC SK MHP5	170
AMA-OP 129	S A CS 177 AC	B CS 177 AC 10M	171
AMA-OP 119	SA CS 198 AC	B CS 198 AC 12M	173
AMA-OP 181	SA AR 188 AC	B AR 188 AC 10 SKM	175
AMA-OP 185	SA AR 188 AC	B AR 188 AC 10 SKM	177
AMA UNIVERSAL	SA AR 197 AC	B AR 197 AC 10 SKM	179
AMA -OP 123	SA AB 167 AC	B AB 167 AC 10 M	181
AMA -OP 132	SA AB 167 AC H5	B AB 167 AC 12MHP5	183
AMA -OP 139	SA AB167AC H 5	B AB 167 AC 12MHP5	184
AMA -OP 120 TT	S A FB 166 ACH5	B FB 166 AC 10 MHP5	185
AMA -OP 121 TT	SA FB 155 ACH5	B FB 155 AC 10MHP5	188
AMA -OP 122	S A FB 165 AC H5	B FB 165 AC 12MHP5	191
AMA - AP 380	SA AB 167 AC H5	B AB 167 AC12 MHP5	193
AMA - AP 380-3	SAAB167AC H5	BAB167AC12MHP5	194
AMA - AP440	SAAB167ACH5	BAB167AC12MHP5	195

Fluxes for Submerged Arc welding of Austenitic Stainless Steels

AMA Trade Name	EN 760	DIN 32522	Page
AMA-OP 71 Cr	SA FB 263 DC	B FB 563765 DC 8K	197
AMA-AP 720	SA FB 255 AC	B FB 655455 AC 8MHP5	199

Fluxes for Wear Resistant and Hardsurfacing Applications

AMA Trade Name	EN 760	DIN 32522	Page
AMA-OP 250A	SA CS 397 AC	B CS 397 CCrMo AC 8	203
AMA-OP 350A	SA CS 397 AC	B CS 397 CCrMo AC 8	204

SAW Backing Flux

AMA Trade Name	EN 760	Page
AMA-OP 10 U	~ AC S1	207

Unalloyed wires for SAW

AMA Trade Name	AWS/ASME SFA5.17	DIN EN 756	Page
50-11		S1	210
50-12		S2	210
50-13		S2Si	210
50-15		S3	210
50-16		S3Si	210
50-18		S4	210
50-51	EI12		210
50-52	EM12		210
50-53	EM12K		210
50-56	~EM13K		210
50-57	EH12K		210
50-61	EH14		210

Low alloy wires for SAW

AMA Trade Name	AWS/ASME SFA 5.23	DINEN 756	Page
50-14		S2Mo	211
50-17		S3Mo	211
50-19		S4Mo	211
50-21		S3Ni1Mo	211
50-22		S2CrMo1	211
50-23		S1CrMo2	211
50-24		S2Ni1	211
50-25		S2Ni2	211
50-54	EA 1		211
50-55	EA 2		211
50-58	EA 3		211
50-59	EA 4		211
50-62	EB 2		211
50-63	EB 3		211
50-64	EF 1		211
50-65	EF 3		211
50-66	E G		211

Stainless steel wires for SAW

AMA Trade Name	AWS/ASME SFA5.9	DIN 8556	Page
30-51	ER308L	UPX2CrNi 19 9	212
30-52	ER347	UPX5CrNiNb 19 9	212
30-53	ER316L	UPX2CrNiMo 19 12	212
30-54	ER318	UPX5CrNiMoNb19 12	212

Low Alloy MIG/MAG Welding Wires

AMA Trade Name	AWS/ASME SFA 5.18	DIN 8559	EN 440	Page
40-13M	ER 70S-3			216
40-14M	ER 70S-4			217
40-16M	ER 70S-6			218
40-18M		SG2	G3 Si1	219
40-19M		SG3	G4 Si1	220

MIG/MAG Wires For C-Mn Steels Welding

AMA Trade Name	AWS/ASME SFA 5.28	EN 440	DIN 8575	Page
80-11M	ER 80S-B2			223
80-12M	ER 80S-G ER80S-Ni1			224
80-14M	ER 70S-A1 ER 80S-G		SGMo	225
80-15 M	E R 100 S-G			226
80-16 M	E R 80 S-B6			227
80-17 M	E R 90 S-B3		SG-CrMo2	228
80-18 M	E R 80 S-Ni2	G2 Ni2		229

Stainless Steel MIG/MAG Welding Wires

AMA Trade Name	AWS/ASME SFA 5.9	DIN 8559	EN 440	Page
30-11M	ER 308 L			232
30-12M	ER 308 LSi			233
30-13M	ER 316L			234
30-14M	ER 316L Si			235
30-15M	ER 347			236
30-16M	ER 347 Si			237
30-17M	ER 309L			238
30-18M	ER 309L Si			239
30-19M	ER 310			240
30-21M	ER 318			241

Nickle base MIG/MAG Welding wires

AMA Trade Name	AWS/ASME SFA-5.14	DIN 1736		Page
90-11M	ERNiCr-3			243
90-12M	ERNiCrMo-3			244
90-13M	ERNiCu-7	SG-NiCu30MnTi		245

TIG Wires for C-Mn Steels Welding

AMA Trade Name	AWS/ASME SFA 5.18	DIN 8559	EN 1668	Page
40-13T	ER 70S-3			247
40-14T	ER 70S-4			248
40-16T	ER 70S-6			249
40-18T		WSG2	W3Si1	250

Low Alloy TIG Welding Wires

AMA Trade Name	AWS/ASME SFA 5.28	EN 440	DIN 8575	Page
80-11T	ER 80S-B2			254
80-12T	ER 80S-G ER80S-Ni1			255
80-14T	ER 70S-A1 ER 80S-G		DIN 8575 SGMo	256
80-15 T	E R 100 S-G			257
80-16 T	E R 80 S-B6			258
80-17 T	E R 90 S-B3		SG CrMo2	259
80-18 T	E R 80 S-Ni2	W2 Ni2		260

Stainless Steel TIG Welding Wires

AMA Trade Name	AWS/ASME SFA 5.9	Page
30-11T	ER 308 L	264
30-12T	ER 308 L Si	265
30-13T	ER 316 L	266
30-14T	ER 316 L Si	267
30-15T	ER 347	268
30-16T	ER 347 Si	269
30-17T	ER 309L	270
30-18T	ER 309LSi	271
30-19T	ER 310	272
30-21T	ER 318	273

Nickle base TIG Welding wires

AMA Trade Name	AWS/ASME SFA 5.14	DIN 1736	Page
90-11T	ERNiCr-3		275
90-12T	ERNiCrMo-3		276
90-13T	ERNiCu-7	SG-NiCu30MnTi	277

Tubular Cored Wires for GAS Welding

AMA Trade Name	AWS/ASME	DIN	EN 758 EN 12535	Page
200 F	E71 T1 MJ		T 42 3 PM 1 H5	280
205 F	E71 T5 for 1.2 mm E70 T5 for 1.6 mm		T 42 5 B M 1 H5 T 42 5 B C 1 H5	281
210 M	E70 C 6M H4			282
300 M	E81 T5 G H4		T 46 6 Mn 1 Ni 1 MMH5	283
305 M	E81 T5 B2			284
310 M	E91 T5 K3		T55 5 1.5NiMo MM1-H5	285
315 M	E111 T5 K3 E100 C G M H4		T69 5 Mn2NiMo MM1-H5	286
MC 56		(DIN 8555) MSG6-55		287

Cutting and Grinding Wheels

AMA Trade Name		Page
F-158 B	Cutting of Cast iron	290
L-115 B	Cutting of Aluminium and capper	290
C-144 B	Cutting of stainless steels	290
M-138	Cutting of steel	291
P-129	Cutting of Stones	291
C-144	Grinding of stainless steel	292
L-115	Grinding of Aluminium and capper	292
F-158	Grinding of Cast iron	292
M165 M-165-SUPER	Grinding of steel	293

General References

General References

The product data of the individual AMA welding products contain a detailed description of the respective consumable. They are subdivided as follows:

Standard designation

Classification according to AWS/ASME, DIN and EN Standards.

Application, Properties

Description of the most important fields of application and characteristic properties of the welding products.

Materials

Listing of the most important base metal groups and individual base metals for which the welding products is intended.

In case the base metal to be welded by you should not be included therein, or if you should have any further question on the subject, our quality control and research Department will be pleased to assist you.

Qualification tests, Approvals

In the respective data sheets, there are indicated the Technical Inspection & Approval Authorities by which the welding consumable was approved at the time of printing. Ama industrial Co, had been approved by Iranian national standards Institute, LR, GL, BV, DNV some of its products, and D.N.V. Holland for its ISO 9001 qualityassurance system.
However we recommend to inquire for any special test or approval for welding consumable in question. In this regard please contact:

R & D.Dept. Tel:+98 21 44 98 39 35-43

Fax: +98 21 44 98 77 69

Weld metal analysis

The chemical composition of the weld metal is indicated by typical values. They refer to the all-weld metal and were determined by means of our routine quality control. For determining the analysis, a weld pad according to international standards is used.

Mechanical properties

The specified mechanical properties are typical value and refer to all-weld metal, with the exception of covered electrodes for welding aluminium and its alloys, in which case values will refer to the properties of the welded joint. For producing the weld test piece, electrodes of 4mm core wire diameter were employed. For welding, The current setting shall 10% below the maximum value indicated on the lable affix to the package. Indications as to preheating and interpass temperatures, as weld as post-weld treatment shall conform to the respective consumable standard. It must be taken into account that the mechanical properties of welded joints, depending on the type of base metal, dimensions of the component, Welding position and welding parameters. May deviate from those of the all-weld metal.

Certificates on Material Testing

If Required, the quality of welding consumables may be certified in the form of attestation of material testing to EN 10 204 .

These standards provide for various types of attestation, the most common being listed below:

Type of Certification	Testing & Issuing Authority	Scope of Certification
Works certification EN 10 204-2.1 DIN 50049-2.1	Manufacturer	No test results, general details of Type & Typical values
Works certification EN 10 204-2.2 DIN 50049-2.2	Manufacturer	Typical values based on in-process data recording or works internal quality control records, test results on the basis of non-specific tests
Acceptance test Certificate B EN 10 204-3.1 DIN 50049-3.1	Manufacturer`s quality assurance inspector	Recorded test results on batch according to customer`s, terms of delivery or, on demand, also as to official directions and the pertaining Technical Rules and Regulations
Acceptance test Certificate C EN 10 204-3.1 DIN 50049-3.1	Quality assurance inspector entrusted by customer	Recorded test results on batch according to customer`s, terms of delivery or

Whenever possible, certificates on welding consumables should be requested when placing the order.

If certification to EN 10 204 is required, first of all the exact type shall be specified. General designations as “works attestation” are not acceptable. In addition, the customers shall specify the precise scope of testing. It is standard producer to test the all-weld metal. It will be the responsibility of the customer to specify whether the weld metal is to be heat-treated, the type of specimen to be taken and to state temperature at which testing shall be performed.

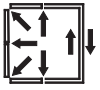
Symbols for type of current and polarity

For indicating the proper type pf current and polarity, the following symbols are used in the product data sheets:

= +	DC, electrode connected to positive pole
= −	DC, electrode connected to negative pole
= ±	DC, electrode connected to either positive or negative pole
~	AC
= + ~	Preferably DC, electrode connected to positive pole, AC
= − ~	Preferably DC, electrode connected to negative pole, AC
= ± ~	Preferably DC, electrode connected to either positive or negative pole, AC
~ = +	Preferably AC, DC electrode connected to positive pole
~ = −	Preferably AC, DC electrode connected to negative pole,

Welding positions

The different welding positions are symbolized in the product data sheets as follows:


All positions

All positions except vertical down and over head

All positions, except vertical down

Flat butt and fillet welds only

Vertical down only

Vertical up only

Flat butt welds only

Redrying, rebaking

As a rule, covered electrodes should be used in dry condition. Before being used, it is advisable to store the electrodes in a dry room and in their undamaged packages. Most electrodes can be welded right out of package without being redried. Redrying of the electrodes is recommended for the fallowing application or is imperiously required.

- Rulile, rutile-cellulosic, rutile - acid and rutile - basic covered electrodes need only be redried if the covering exhibits an unacceptably high water content as a result of improper storage or for other reasons, which may be recognized by unsatisfactory weld performance or increased spatter and formation of pores. These electrodes can be redried at 100 - 1 20 ° C.

- Basic type electrodes shall be imperiously redried as follows at 300 - 350 °C for 2 hours. The total drying time is limited to 10 hours. The redried electrode shall be stored in a drying oven or heated quiver at approximately 150 ° C.

Stainless steel covered electrodes shall be redried according to following on:

Rutile type (16,17) : 350 to 400 C for 2 hours

Basic type (15) : 300C for 2 hours

Functions of welding fluxes

Welding fluxes are granulated, meltable mineral materials accomplishing the some Function in submerged - arc welding as the covering of electrodes, namely:

(a facilitating arc striking and stabilizing the arc by improving conductivity of arc gap.

(b formation of a slag covering for protecting the metal droplet transfer and the weld pool, as well as shaping the weld bead and reducing cooling rate.

(c metallurgical effect on weld metal occurring in the gaseous phase of the arc cavity through reaction of molten, flux and weld metal,

(d deoxidation and alloying by adding deoxidizing agents and if necessary, alloying elements, e.g. Cr, Mo,Ni, to the flux.

Manufacture of welding fluxes

According to the production process, welding fluxes are subdivided into:

(a fused fluxes

(b agglomerated fluxes

(c sintered fluxes

Since sintered fluxes are not produced by AMA due to it's Environmental problem, they will not be considered in this context.

Fused fluxes are manufactured by fusing together a mixture of finely ground raw materials. The molten product is quenched, crushed and sieved to the requisite grain size. The bulk density and consumption of such fluxes are higher.

Fused fluxes have the advantage that moisture doesnot become chemically bonded, only being absorbed on the grain surface. This can be readilyremoved by redrying at approximately 150 °C. Fused fluxes can be produced at a relatively fow price.

Agglomerated fluxes are manufactured by initially dry mixing several finely ground raw materials. Bonding agents, e.g. sodium and potassium silicates, are added and the wet mix agglomerated to form small granules. The flux is then baked between 600 and 800 ° C. Since the baking temperatures range below the reactivity of the raw materials used, this permits the incorporation of deoxidants and ferro-alloys, thus favorably influencing operating characteristics and mechanical properties. While the manufacture of agglomerated fluxes results more expensive, their consumption is lower due to lower bulk density.

Types of flux

In accordance with DIN EN 760, welding fluxes are subdivided as to their mineralogical composition into the following groups and classified in accordance with their reference analysis.

Identification of submerged - arc welding fluxes according to DIN EN 760

Symbol Type of flux MS Manganese-silicate	Chemical composition, Main constituents	Threshold values
MS Manganese-silicate	MnO + SiO 2 CaO	min. 50 % max. 1 5 %
CS Calcium - silicate	CaO + MgO + SiO 2 CaO + MgO	min. 55 % min. 1 5 %
ZS Zirconium - silicate	ZrO 2 + SiO 2 +MnO ZrO 2	min. 45 % min. 1 5 %
RS Rutile - silicate	TiO 2 + SiO 2 TiO 2	min. 50 % min. 20 %
AR Aluminate - rutile	Al 2 0 3 + TiO 2	min. 40 %
AB Aluminate - basic	Al 2 0 3 + CaO + MgO Al2O3 CaF 2	min. 40 % Min.20% max.22 %
AS Aluminate - silicate - basic	Al2O3 + SiO2 + ZrO2 CaF 2 + MgO ZrO 2	Min.40% min. 30 % min. 5 %
AF Aluminate - fluoride basic	Al 2 0 3 + CaF 2	min.70 %
FB Fluoride - basic	CaO + MgO +CaF 2 + MnO SiO 2 CaF 2	min. 50 % max. 20 % min. 15 %
Z	Any other composition	---

Recommendations for storing and processing of welding fluxes

Owing to their mineralogical composition and production method, welding fluxes are more or less susceptible to moisture.
Agglomerated fluxes are bonded mixtures of finely ground raw materials tending, more than fused fluxes, to absorb moisture from the atmosphere. This can seriously affect their ability to be stored for a longer period of time. In order to avoid serious impairment of weldment, damp fluxes must be redried before use.
AMA - welding fluxes are usually packed in paper bags with PE - Liner of 25 kg. It is recommended to store the fluxes in a dry place and, if possible, at a constant temperature. Fluxes stored in such a way and with undamaged containers may be kept for a period of up to 2 years. Since there may appear deviations as to the composition of some fluxes, specifications given by the manufacturer shall be binding.

AMA-welding fluxes shall be redried as follows:
agglomerated fluxes - not less than 2 hours at 300 - 350 ° C.
fused fluxes - not less than 2 hours at 250 ° C.
Maximum admissible redrying time is 10 hours, also in case of repeated redrying.

Reuse and dressing of fluxes

The portion of flux not fused during welding will be reused. Circulation of the flux in the feeding system may be repeated various times, provided the feeding system adapts itself to the peculiarities of agglomerated fluxes, that is, the feeding speed should not be too high and the feeding route should be short and without sharp bends.
When sucking off the flux, a certain change of grain size cannot always be avoided. Therefore, after having consumed about 50 - 60% of the flux in circulation, dry, unused flux should be added, thus assuring that the flux circulating in the feeding system is always mixed with fresh flux.

Data sheets

The mechanical properties indicated in the following data sheets are to be understood as typical values, obtained from testing all - weld metal, deposited in accordance with DIN 32525, Form 5. The weld metal shall be produced under the following conditions: Interpass temperature:

a(unalloyed and alloy steels: 150 - 200 ° C.
b(creep resistant steel: according to base metal
c(CrNi - steels: 100 - 150 ° C.

Welding parameters:

a(for unalloyed and alloy steels, as well as creep resistant steels

wire diameter:	4,0 mm
welding current:	600 A
voltage:	30 V
welding speed:	60 cm / min.

B(for CrNi - steels

wire diameter:	4,0 mm
welding current:	550 A
voltage:	30 V
welding speed:	70 cm / min.

Depending on base metal quality, edge preparation, welding parameters and cooling conditions, welded joints having different mechanical properties may result. Thus, for instance, the portion of fused base metal in a square butt joint may be as high as 75%. in such a weld, the mechanical properties are most certainly to deviate from those given in the respective data sheet. In the case of multipass joints, however, the technological properties of the all-weld metal produced by the wire / flux combination employed will more likely be the criterion for weld quality. For the above reasons, it is therefore advisable to carry through welding tests on the base metal to be used, applying the appropriate welding parameters. This should also be performed if the welded joint is to be heat-treated.

Classification and designation of covered electrodes according to DIN 1913 for joint welding of unalloyed and low alloy steels

E	51	4	3	B(R)	10
	Table 1	Table 2	Table 3	Table 4	Table 5

Symbol for manual arc welding

Table 1

Code number for tensile strength , yield strength and elongation

Tensile strength Rm (N/mm2)	Yield strength Reh (N/mm2)	Minimum elongation A5,(%)	Code number
430-550	>355	22	43
510-650	>380	22	51

Table 2

First code digit for impact energy:
(Minimum value obtained from 3 specimens 28 J, lowest individual value 20 J)

ISO-V notch specimen, C	Code digit
Not specified	0
+20	1
0	2
-20	3
-30	4
-40	5

Table 3

Second code digit for elevated impact energy:

(Minimum value obtained from 3 specimens 47 J, lowest individual value 32 J)

ISO-V notch specimen, C	Code digit
Not specified	0
+20	1
0	2
-20	3
-30	4
-40	5

Table 4

Symbol for indicating covering	
Acid covering	A
Rutile covering (thin and medium thick)	R
Rutile covering (thick)	RR
Rutile-acid covering (mixed type)	AR
Cellulosic covering	C
Rutile-Cellulosic covering (medium thick)	R (C)
Rutile-Cellulosic covering (thick)	RR (C)
Basic covering	B
Basic covering with non-basic components	B (R)
Rutile-basic covering (thick)	RR (B)

Table 5

Class	Covered electrode type	Covering	Correlated with welding position*	this type are type of current**
2	A2	Thin acid covering	1	5
	R2	Thin rutile covering	1	5
3	R3	Medium rutile covering	2(1)	2
	R (C)3	Medium thick rutile cellulosic covering	1	2
4	C4	Medium thick cellulosic covering	1(***)	0 + (6)
5	RR5	thick rutile-covering	2	2
	RR(C)5	thick rutile -cellulosic-covering	1	2
6	RR6	thick rutile covering	2	2
	RR(C)6	thick rutile - cellulosic -covering	1	2
7	A7	thick acid-covering	2	5
	AR7	thick acid -rutile covering	2	5
	RR(B)7	thick basic-rutile covering	2	5
8	RR8	thick rutile covering	2	2
	RR(B)8	thick basic -rutile covering	2	5
9	B9	thick basic covering	1(***)	0 + (6)
	B(R)9	thick basic covering with non-basic components	1(***)	6
10	B10	thick basic covering	2	0 + (6)
	B(R)10	thick basic covering with non-basic components	2	6
11	RR11	thick rutile-covering, efficiency>105%	4(3)	5
	AR11	thick acid-rutile covering, efficiency > 105%	4(3)	5
12	B12	thick basic covering efficiency > 120%	4(3)	0 + (6)
	B(R)12	thick basic covering with non-basic components, efficiency > 120%	4(3)	0 + (6)

Welding positions	Letter symbols as specified in DIN 1912	Code digit
All position	w h hu s f qu	1
All position except vertical downward	w h hu s qu	2
Butt weld, flat position Fillet weld, flat position Fillet weld, horizontal position	w w h	3
Butt weld, flat position Fillet weld, flat position	w w	4

Code digit or symbol

Polarity of covered electrode	Code digit or symbol			
Any polarity	0	1	4	7
Negative	0 -	2	5	8
Posetive	0 +	3	6	9
d.c.		d.c. or a.c.		
		minimum 50	70	80

Open-circuit voltage with a.c.

Code digits for metal recovery

120 ≤ 115% < 125%	170 ≤ 165% < 175%
130 ≤ 125% < 135%	180 ≤ 175% < 185%
140 ≤ 135% < 145%	190 ≤ 185% < 195%
150 ≤ 145% < 155%	200 ≤ 195% < 205%
160 ≤ 155% < 165%	

* Bracketed code digits indicating the welding position shall apply to small core wire diameters and/or low efficiency.
** Bracketed code digits for the type of current indicate limited suitability.
*** Preferably for the vertical downward position.

Guide to EN 499.For covered electrodes for manual arc welding of non-alloyed and fine grain steels

E 46 3 1Ni B 5 4 H5

Symbol for strength and elongation

Symbol	min.yield strength (MPa) (1)	Tensile strength (MPa)	min.elon-gation (%) (2)
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	560-720	18

1) For the yield strength the lower yield (Rel)shall be used when yielding occurs, otherwise the 0.2%proof stress (Rp0.2) shall be used
2) L0=5d

Symbol for impact properties

Symbol	Minimum av.impact energy 47J°C
Z	no requirements
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60

Symbol for chemical composition of all weld metal

Alloy symbol	chemical composition1)2)3)		
	Mn	Mo	Ni
no symbol	2.0	-	-
Mo	1.4	0.3-0.6	-
MnMo	>1.4-2.0	0.3-0.6	-
1Ni	1.4	-	0.6-1.2
2Ni	1.4	-	1.8-2.6
3Ni	1.4	-	>2.6-3.8
Mn1Ni	>1.4-2.0	-	0.6-1.2
1NiMo	1.4	0.3-0.6	0.6-1.2
Z	Any other agreed composition		

1) If not specified: Mo<0.2,Ni<0.3,Cr<0.2 V<0.05,Nb<0.05,Cu<0.3 (electrodes without gas shield only)
2) Single values shown in the table mean maximum values
3) The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B Rule A.

Symbol for diffusible hydrogen (optional)

Symbol	Max.hydrogen content,ml/100g deposited weld metal
H5	5
H10	10
H15	15

Symbol for the welding position

The Welding positions are symbolised by a digit designating the positions for which the electrode is tested according to prEN-3(00121205)

1:all positions
2:all positions
3:flat butt weld, flat fillet weld, horizontal/vertical weld
4:flat butt weld,flat fillet weld
5:as 3 and recommended vertical down welding

Symbol for recovery and type of current

Symbol	Weld metal recovery%		Type of current1)2)
1	<105		ac+dc
2	<105		dc
3	>105	<125	ac+dc
4	>105	<125	dc
5	>125	<160	ac+dc
6	>125	<160	dc
7	>160		ac+dc
8	>160		dc

1)In order to demonstrate operability on ac, tests shall be carried out withno load voltage not higher than 65V
2) ac=alternation current
dc=direct current

Symbol for type of electrode covering

A	Acid
C	Cellulosic
R	Rutile
RC	Rutile - cellulosic
RA	Rutile-acid
RB	Rutile-basic
B	Basic

Flux for submerged arc welding classification according to DIN EN 760

S	A	FB	1	66	AC	H10

Fulx/submerged arc welding

Symbol for the method of manufacture

F	Fused flux
A	Agglomerated flux
M	Mixed flux

Code digits for the application, fluxe class

Code digits	
1	Fluxes for submerged arc welding of unalloyed and low alloy steels, such as structural steels, high tensile steels and creep resisting steels. The fluxes do not contain alloying elements other than Mn and Si, thus the weld metal analysis is predominantly influenced by the composition of the wire electrode and metallurgical reactions. The fluxes arc suitable for both joint welding and surfacing.
2	Fluxes for joint welding and surfacing of austenitic stainless and heat resisting chromium and chromium-nickel steels and/or nickel and nickel - base alloys and unalloyed fluxes for hard facing.
3	Fluxes mainly for surfacing purposes yielding a wear resistant weld metal by transfer of alloying elements from the flux, such as C, Cr, or Mo

Symbol for type of flux, characteristic constituents

Symbol	characteristic constituents	Threshold values (%)
MS Manganese-silicate	MnO + SiO2 CaO	min. 50 % max. 1 5 %
CS Calcium - silicate	CaO+MgO+SiO2 CaO + MgO	min. 55 % min. 1 5 %
ZS Zirconium - silicate	ZrO2+SiO2+MnO ZrO2	min. 45 % min. 1 5 %
RS Rutile - silicate	TiO2 + SiO2 TiO2	min. 50 % min. 20 %
AR Aluminate - rutile	Al2O3 + TiO2	min. 40 %
AB Aluminate - basic	Al2O3+CaO+MgO A2O3 CaF2	min. 40 % min.20% max.22 %
AS Aluminate - silicate - basic	Al2O3+SiO2+ZrO2 CaF2+MgO ZrO2	min.40% min. 30 % min. 5 %
AF Aluminate - fluoride basic	Al2O3 + CaF2	min.70 %
FB Fluoride - basic	CaO+MgO+CaF2+MnO SiO2 CaF2	min. 50 % max. 20 % min. 15 %
Z	Any other composition	

Symbol for the hydrogen content of the all-weld metal

Symbol	hydrogen content ml/100 grams deposited weld metal max
H5	5
H10	10
H15	15

Symbol for type of current

Symbol	Type of current
DC	Direct current
AC	Alternating current

Code digits for the metallurgical behavior of welding fluxes of class 1

Metallurgical behaviour	Code digits	Amount by flux in the weld metal (%)
Burn-out	1	over 0.7
	2	over 0.5 up to 0.7
	3	over 0.3 up to 0.5
	4	over 0.1 up to 0.3
Pick-up and/or burn-out	5	0 up to 0.1
Pick-up	6	over 0.1 up to 0.3
	7	over 0.3 up to 0.5
	8	over 0.5 up to 0.7
	9	over 0.7

Pick-up and burn-out of the elements Si and Mn are indicated in this order

Wire/flux combination for submerged arc welding classification according to EN 756

S	46	3	AB	S2

wire electrode and/or wire - flux combination used in submerged arc welding

Symbol for tensile peroperties by multi-run technique

Symbol	Min, yield strenght N/mm2	Tensile strenght N/mm2	Minimum elongation
35	355	440 - 570	22
38	380	470 - 600	20
42	420	500 - 640	20
46	460	530 - 680	20
50	500	560 - 720	18

1) For yield strength the lower yield strenght (ReI) shall be used when yielding occurs, otherwise, the 0.2% proof strength (Rpo2) shall be used.

2) Gauge length is equal to five times the specimen diameter.

Symbol for tensile properties by two-run technique

Symbol	Min, parent material yieldstrenght in N/mm2	Min, Tensile strenghtof the weldingjoint in N/mm2
2T	275	370
3T	355	470
4T	420	520
5T	500	600

Symbol for type of welding flux

Type of flux	Symbol
Manganese - Silicate	MS
Calcium - Silicate	CS
Zirconium - Silicate	ZS
Rutile - Silicate	RS
Aluminate - rutile	AR
Aluminate - basic	AB
Aluminate - Silicate	AS
Aluminate - fluoride basic	AF
Fluoride - basic	FB
Any other type	Z

Symbol for impact properties of all-weld metal or two-run welded joint

Symbol	Temperaturefor minimumaverage impact energy of 47J C
Z	–
A	+20
0	0
2	- 20
3	- 30
4	- 40
5	- 50
6	- 60
7	- 70
8	- 80

Chemical composition of wire electrodes for submerged arc welding (values as percentages by mass)

Symbol	Chemical composition, as percentages by mass 1)2)3)							
	C	Si	Mn	P	S	Mo	Ni	Cr
S0	Any other agreed composition							
S1	0.05-0.15	0.15	0.35-0.60	0.025	0.025	0.15	0.15	0.15
S2	0.07-0.15	0.15	0.80-1.30	0.025	0.025	0.15	0.15	0.15
S3	0.07-0.15	0.15	>1.30-1.75	0.025	0.025	0.15	0.15	0.15
S4	0.07-0.15	0.15	>1.75-2.25	0.025	0.025	0.15	0.15	0.15
S1 Si	0.07-0.15	0.15-0.40	0.35-0.60	0.025	0.025	0.15	0.15	0.15
S2 Si	0.07-0.15	0.15-0.40	0.80-1.30	0.025	0.025	0.15	0.15	0.15
S2 Si2	0.07-0.15	0.40-0.60	0.80-1.30	0.025	0.025	0.15	0.15	0.15
S3 Si	0.07-0.15	0.15-0.40	>1.30-1.85	0.025	0.025	0.15	0.15	0.15
S4 Si	0.07-0.15	0.15-0.40	>1.85-2.25	0.025	0.025	0.15	0.15	0.15
S1 Mo	0.05-0.15	0.05-0.25	0.35-0.60	0.025	0.025	0.45-0.65	0.15	0.15
S2 Mo	0.07-0.15	0.05-0.25	0.80-1.30	0.025	0.025	0.45-0.65	0.15	0.15
S3 Mo	0.07-0.15	0.05-0.25	>1.30-1.75	0.025	0.025	0.45-0.65	0.15	0.15
S4 Mo	0.07-0.15	0.05-0.25	>1.75-2.25	0.025	0.025	0.45-0.65	0.15	0.15
S2 Ni1	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.15	0.80-1.20	0.15
S2 Ni1.5	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.15	>1.20-1.80	0.15
Si2 Ni2	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.15	>1.80-2.40	0.15
S2 Ni3	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.15	>2.80-3.70	0.15
S2 Ni1 Mo	0.07-0.15	0.05-0.25	0.80-1.30	0.020	0.020	0.45-0.65	0.80-1.20	0.20
S3 Ni1.5	0.07-0.15	0.05-0.25	>1.30-1.70	0.020	0.020	0.15	>1.20-1.80	0.20
S3 Ni1 Mo	0.07-0.15	0.05-0.25	>1.30-1.80	0.020	0.020	0.45-0.65	0.80-1.20	0.20
S3 Ni1.5 Mo	0.07-0.15	0.05-0.25	1.20-1.80	0.020	0.020	0.45-0.5	1.20-1.60	0.20

1) Finished product chemical composition , Cu inclusive of copper coating : <0.30%, Al: < 0.030%
2) Single values shown in the table are maximum values.
3)The rules shall be rounded to the same number of significant figures as for the specified value using the rules in accordance with Annex B, Rule A, in ISO 31-0:1992

CLASSIFICATION OF WELDING CONSUMABLES. TUBULAR CORED ELECTRODES FOR METAL ARC WELDING WITH AND WITHOUT A GAS SHIELD OF NON ALLOY AND FINE GRAIN STEELS

T	46	2	--	P	M	2	H5

FLUX CORED WIRE

SYMBOL	Rs (N/mm2)	Rm (N/mm2)	A5D %
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
46	460	530-680	20
50	500	560-720	18

SYMBOL	Average 3KV>47J at temperature
Z	NO REQUIREMENTS
A	+20C
0	0C
2	-20C
3	-30C
4	-40C
5	-50C
6	-60C

SYMBOL	Chemical composition%		
	Mn	Ni	Mo
/	2	/	/
Mo	1.4	/	0.3-0.6
MnMo	1.4-2.0	/	0.3-0.6
1Ni	1.4	0.6-1.2	/
1.5Ni	1.6	1.2-1.8	/
2Ni	1.4	1.8-2.6	/
3Ni	1.4	2.6-3.8	/
Mn1Ni	1.4-2.0	0.6-1.2	/
1NiMo	1.4	0.6-1.2	0.3-0.6
Z	Other agreed composition		

No	H ml/100g
H5	5
H10	10
H15	15

No	DESCRIPTION
1	All positions
2	All positions except vertical down
3	Flat butt weld, flat fillet weld, horizontal-vertical fillet weld
4	Flat butt weld&flat fillet weld
5	Vertical down and positions according to symbol3

No	DESCRIPTION
M	Mixed gas
C	Carbon dioxide
N	Nogas shield

No	DESCRIPTION
R	Rutile, slow freezing slag
P	Rutile, fast freezing slag
B	Basic
M	Metal-powder
V	Rutile or basic/fluoride
W	Basic/fluoride, slow freezing slag
Y	Basic/fluoride, fast freezing slag
Z	Other types

Wire and Gas for gas metal arc welding classification according to EN 440

Gas metal arc welding	G	42	3	C	G3 Si 1

Symbol for strength and elongation of all-weld metal

Symbol	Min, yield strength N/mm2	Tensile strength N/mm2	Minimum elongation %
35	355	440 - 570	22
38	380	470 - 600	20
42	420	500 - 640	20
46	460	530 - 680	20
50	500	560 - 720	18

1) For yield strength the lower yield strenght (ReI) shall be used when yielding occurs, otherwise, the 0.2% proof strength (Rpo2) shall be used.
2) Gauge length is equal to five times the specimen diameter.

Symbol for impact properties of all-weld metal

Symbol	Temperature for minimum average impact energy of 47 J C
Z	–
A	+20
0	0
2	- 20
3	- 30
4	- 40
5	- 50
6	- 60

Symbol for shielding gas

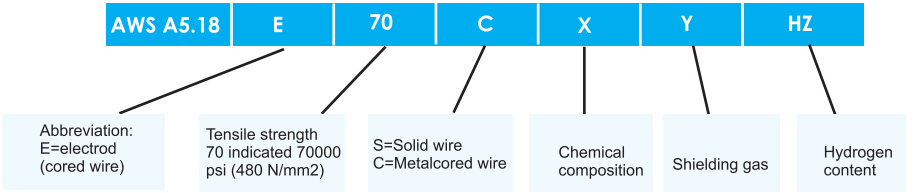
M *	For mixed gases	
C **	For oxidizer gas or mixed gases	
* M2	Without helium	
** C1	Carbon dioxide	

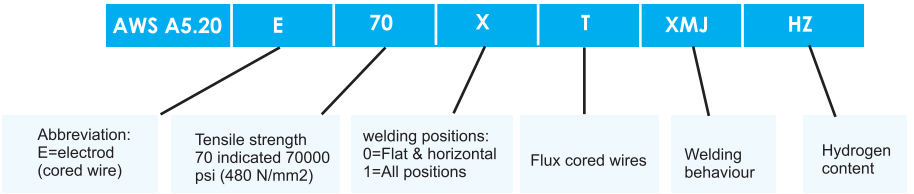
Symbol for chemical composition of wire electrodes

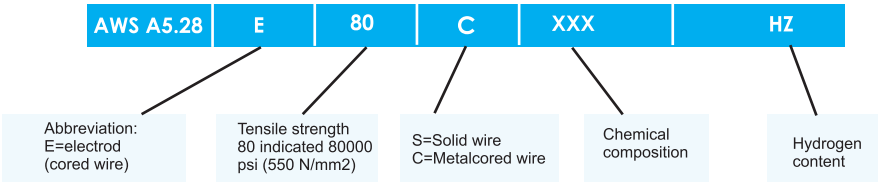
Symbol	Chemical composition in % (m/m)1)2)3)								
	C	Si	Mn	P	S	Ni	Mo	Al	Ti+Zr
G0	Any agreed analysis not specified in this standard								
G2 Si	0.06-0.14	0.50-0.80	0.90-1.30	0.025	0.025	0.15	0.15	0.02	0.15
G3 Si1	0.06-0.14	0.70-1.00	1.30-1.60	0.025	0.025	0.15	0.15	0.02	0.15
G4 Si1	0.06-0.14	0.80-1.20	1.60-1.90	0.025	0.025	0.15	0.15	0.02	0.15
G3 Si2	0.06-0.14	1.00-1.30	1.30-1.60	0.025	0.025	0.15	0.15	0.02	0.15
G2 Ti	0.04-0.14	0.40-0.80	0.90-1.40	0.025	0.025	0.15	0.15	0.05-0.20	0.05-0.25
G3 Ni1	0.06-0.14	0.50-0.90	1.00-1.60	0.020	0.020	0.80-1.50	0.15	0.02	0.15
G2 Ni2	0.06-0.14	0.40-0.80	0.80-1.40	0.020	0.020	2.10-2.70	0.15	0.02	0.15
G2 Mo	0.08-0.12	0.30-0.70	0.90-1.30	0.020	0.020	0.15	0.40-0.60	0.02	0.15
G4 Mo	0.06-0.14	0.50-0.80	1.70-2.10	0.025	0.025	0.15	0.40-0.60	0.02	0.15
G2 Al	0.08-0.14	0.30-0.50	0.90-1.30	0.025	0.025	0.15	0.15	0.35-0.75	0.15

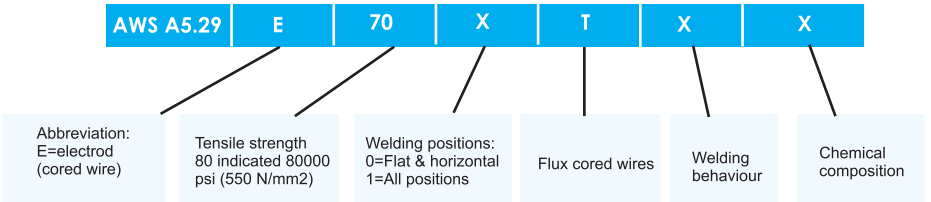
1) If not specified Cr <0.35 and V <0.03 . Residual copper content in the steel plus any coating shall not exceed 0.35%(m/m)
2) Single values shown in the table mean maximum values.
3) The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31.0, annex B, Rule A.

CLASSIFICATION OF TUBULAR CORED ELECTRODES ACCORDING TO AWS STANDARD









Rutile Electrodes

AMA

AMA 23 AK

Standards:

EN 499	E 380 RC 11
DIN 1913	E 43 22 R (C) 3
AWS/ASME SFA - 5.1	E 6013
ISO2560	E380 RC11

Application / Properties: Rutile - Cellulosic type for general assembly work, also on lighter sheet. Highly suitable for sheet metal containers, storage vessels and tanks. Excellent all-position weld ability including vertical - up and down .Ideal for fillet welding in the vertical - down position

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	0.50	0.30	<0.02	<0.02

Mechanical Properties of all -weld metal:
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	0 °C
450-550	>360	>22	>60	>50

= — ~

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	350	350	450
Amperage(A)	60 - 85	90 - 130	130 - 180	180 - 240

Materials

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GS-38 ; GS-52.

EN Standard S235JR to S275JR; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying : If necessary 1 h at 100 -120 C

AMA 1008 A

Standards: AWS/ASME SFA - 5.1 E 7014

Application / Properties: High metal recovery rutile electrode, due to iron power. Suitable for welding AC and DC. Easy removal & smooth bead appearance.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.09	0.45	0.35	0.02	0.02

Mechanical Properties of all-weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
>490	>400	>20	>70

=	—	~

Welding Parameters		
Diameter (mm)	4	5
Length (mm)	350	450
Amperage(A)	150-190	180- 280

Materials:

DIN Standard St 37-2 to St 52-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GS-38 ; GS-52.

EN Standard S235JR to E295; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45, 50, 55; A607 Gr. 45, 50; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.

Redrying : If necessary 1 h at 100-120C

AMA 1303 C

Standards: AWS/ASME SFA - 5.1 E 6019
EN 499 E 38 0 RC 11

Application / Properties: Rutile electrode with suitable penetration and mechanical properties. This electrode use for thick section steel fabrication. Easy arc stricking, weldability in all position are some property of this electrode

Weld metal analysis in % (ty pical values):

C	Mn	Si	S	P
0.08	0.5	0.25	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V -18 °C
400-550	>360	>22	>27

= — ~

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	350	350	450
Amperage(A)	60 - 85	90 - 130	135 - 160	160 - 210

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GS-38 ; GS-52.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying: If necessary 1 h at 100-120 C

AMA 1531

Standards:

EN499	E 38 2RB12
DIN 1913	E 43 43 RR (B) 7
AWS/ASME SFA-5.1	E 6013
ISO 2560	E 38 2 RB12

Application / Properties: Rutile-Basic electrode for welding structural steels. Having a slow Si-content, Weld metal is particularly suited for subsequent galvanizing.

Weld metal analysis in % (typical values):

C	Si	Mn
0.08	0.2	0.6

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 20 °C
450-550	>360	>22	100	70

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	350	350	450
Amperage(A)	70 - 90	100 - 150	140 - 190	220 - 260

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; WStE 255 to WStE 380; GS-38 ; GS-52.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; P255NH-P355NH
.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C ,A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying : If necessary 1 h at 100 - 120 C

AMA 2000

Standards:

EN 499	E 380 RC 11
DIN 1913	E 43 22 R (C) 3
AWS/ASME SFA - 5.1	E 6013
ISO 2560	E 380 RC 11

Application / Properties: Rutile covered electrode for welding general structural steels, shipbuilding, pressure vessels, pipe steels, whit easy arc striking and restriking, very smooth and finely, ripple weld base blend into base metal without undercut..

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	0.50	0.40	<0.02	<0.02

Mechanical Properties of all -weld metal:
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
450-550	>360	>22	>60

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	350	350	450
Amperage(A)	60 - 85	90 - 130	135 - 160	160 - 210

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII; GS-38 ; GS-45.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying : If necessary1 h at 100 -120C
Approval: LRS

AMA 2000 A

Standards:

EN 499	E 420 RR 12
DIN 1913	E 51 22 RR 6
AWS/ASME SFA - 5.1	E 6013
ISO 2560	E 380 RR 11

Application / Properties: Thick-coated, rutile type electrode for light section iron & steel fabrication, regular bead appearance of butt and fillet welds, absence of undercutting and self-detaching slag.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	0.60	0.45	<0.02	< 0.02

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	0 °C
>450	>360	>22	>60	>50

= — ~

Welding Parameters				
Diameter (mm)	2. 5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	70 - 100	110 - 140	140 - 190	160 - 220

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GS-38 ; GS-45.

EN Standard S235JR to S275JR; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying: If necessary 1 h at 100 -120 C

AMA MK 14

Standards: AWS/ASME SFA - 5.1 E 6013
DIN 1913 E 4333 R (C) 3
ISO 2560 E 380 RC 11

Application / Properties: Medium coated rutile-electrode, suitable for welding of mild steel application. Easy arc striking, weldability in all position, easy detachable slag & clean without undercut, are some properties of this electrode.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	0.6	0.45	<0.02	<0.02

Mechanical Properties of all -weld metal:
(single values are typical values)

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	0 °C
450-570	>360	>22	>60	>50

= — ~

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	350	350	450
Amperage(A)	60 - 85	90 - 140	130 - 180	180 - 240

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GS-38 ; GS-52.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying : If necessary1 h at 100 -120 C

AMA PL

Standards: AWS/ASME SFA - 5.1 E 6013
DIN 1913 E 4322 R (C) 3
ISO 2560 E 380 RC 11

Application / Properties: rutile-Cellulosic electrode, suitable for welding of the small diameter gas pipes in vertical down position. Good penetration easy striking and restriking, smooth bead appearance without undercut and low spatter arc some properties of this electrode.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.07	0.40	0.35	<0.02	<0.02

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
450-550	>360	>22	>60

Welding Parameters	
Diameter (mm)	2.5
Length (mm)	300
Amperage(A)	50 - 85

Materials:

DIN Standard St 37-2 to St 44-2; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8.

EN Standard S235JR to S275JR; P235T1 to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH.

ASTM Standard ASTM A36 a. A53 Gr. all; A106 Gr. A, B, C, A 135 Gr. A, B; A283 Gr. A, B, C, D; A366; A285 Gr. A, B, C; A500 Gr. A, B, C; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr.45; A936 Gr. 50.
API 5 L Gr. B, X42 - X46

Redrying : If necessary 1 h at 100 - 120 C

Basic Electrodes

AMA

AMA 1007 F

Standards: DIN 8529 — E Y 42 55 Mn B H5
AWS/ASME SFA - 5.1 — E 7016-H8
EN 499 — E 42 5 B 41 H5

Application / Properties: Multi-purpose electrode for assembly work, workshop & repair welding; also approved for rail joint welding. Smooth and clean weld blending into base metal without undercut. Good gap bridging properties. The electrode has a stable and concentrated arc and good suitability for AC welding. It is specially suited for root pass and positional welding. Welds are of X-ray quality.

Weld metal analysis in % (typical values):

C	Mn	Si
0.08	1.3	0.45

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V -51 °C
500-640	>420	>22	180	80

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	350-450	350-450	350-450	350-450
Amperage(A)	60 - 90	90 - 140	135 - 190	190 - 260	300 - 380

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to ;St52.4 ; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JR to E335; S235J2G3to S355J2G3; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Rebaking: required at300 °C to 350 °C for 2 hrs

AMA 1177 F

Standards: EN 499 — E 42 6 B 42 H 5
DIN 8529 — E SY 42 76 Mn B
AWS/ASME SFA - 5.1 — E 7018 - 1 - H4

Application / Properties: Electrode for producing crack- free and tough welding joints, also suited for welding steels having a carbon content of up to 0.6%. The weld metal has very low hydrogen content and is resistant to ageing. Approved for rail joint welding. Good gap bridging properties. The electrode has a stable and concentrated arc is therefore well suited for positional welding. Welds are if X-ray quality. CTOD - tested for offshore application.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.06	1.50	0.30	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C	Heat Treatment
500-640	>420	>22	180	70	AW
500-640	>420	>22	160	60	SR

= +

AW= as- welding

SR = Stress- relieved 15hrs./580C

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 240	250 - 330

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4 ; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N - S355N; P255NH to P355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Rebaking: required at 300° C to 350 ° C for 2hrs.

Approval: LR ,GL , BV , DNV

AMA 1184 F

Standards: EN 499 E 42 6 B 42 H5
DIN 8529 E Y 42 67 Mn B H5
AWS/ ASME SFA 5.1 E 7016-1-H8

Application / Properties: Multi-purpose electrode for assembly work, workshop & repair welding; also approved for rail joint welding. Smooth and clean weld blending into base metal without undercut. Good gap bridging properties. The electrode has a stable and concentrated arc and good suitability for AC welding. It is specially suited for root pass and positional welding. Welds are of X-ray quality.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.06	1.5	0.3	<0.02	< 0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
500-640	>420	>22	200	80

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	350-450	350-450	350-450	350-450
Amperage(A)	60 - 90	90 - 140	135 - 190	190 - 260	300 - 380

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NH to P355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Rebaking: required at300 °C to 350 °C for 2 hrs

Approval: DNV

AMA 1230 F

Standards:

EN 499	E 42 3 B 42 H 10
DIN 1913	E 51 54 B 10
AWS/ASME SFA - 5.1	E 7018 - H8
ISO 2560	E 423 B 42 H 10

Application / Properties: Electrode for producing crack- free and tough welding joints, Weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties. Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to 0.4)

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.07	1.2	0.55	<0.02	<0.02

Mechanical Properties of all -weld metal:

(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 30 °C
500-640	>420	>22	140	90

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	65 - 90	100 - 140	140 - 190	190 - 250	260 - 340

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1to P355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1Sto S355G3S; S255Nto S355N; P255NH to P355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Redrying: required at 300° C to 350° C for 2hrs.
Approval: LR ,GL , BV , DNV

AMA 1235 F

Standards: DIN 1913 — E51 55 B5
AWS/ASME SFA-5.1 — E 7018-H4
ISO 2560 — E 42 5 B 42 H5

Application / Properties: Electrode for producing crack- free and tough welding joints, Weld metal recovery is approx. 115% . The electrode has Good arc ability. Welds are X-ray quality. Suitable of welding steels having up to 0.4% C

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	1.40	0.4	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (J) ISO - V +20 °C	- 30 °C
500-620	>400	>22	140	120

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 90	90 - 130	140 - 180	190 - 230

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JR to E335; S235J2G3 to S355J2G3; P235T1toP355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NHtoP355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Rebaking : required at 300 °C to 350 °C for 2 hrs .

AMA 1239 F

Standards: AWS/ASME SFA - 5.1 E 7018 - H8
ISO 2560 E 42 4 B 42 H10
DIN 1913 E 51 54 B10

Application / Properties: Electrode for producing crack- free and tough welding joints, Weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties. Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to 0.4)

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.08	1.3	0.65	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V - 30 °C
500-610	>420	>22	80

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	65-90	100-140	140-190	190-250	260-340

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JRtoE335; S235J2G3 to S355J2G3; P235T1toP355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NHtoP355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Redrying: required at 300° C to 350° C for 2hrs.

AMA 1280 M

Standards: EN 499 — E - 42 3 B 42 H10
DIN 1913 — E 51 54 B H10
AWS/ASME SFA - 5.1 — E 7018 - H8
ISO 2560 — E 423 B 42 H 10

Application / Properties: Electrode for producing crack- free and tough welding joints, Weld metal recovery is approx. 115%. Smooth and clean welds blending into base metal without undercut. Good gap bridging properties. Welds are X-ray quality. Suitable for depositing layers on steels having higher carbon content (up to 0.4) Owing to its double covering (up to 3.25 mm), the electrode shows a stable and concentrate arc.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.07	1.10	0.50	<0/02	<0/02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	- 30 °C
500-610	>420	>22	150	70

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	65-90	100-140	140-190	190-250	260-340

Materials:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 360.7 TM; St 35.8 to St 45.8; HI; HII;17mn4; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235JRtoE335; S235J2G3 to S355J2G3; P235T1toP355T1; P235T2; P355T2; L210 to L360NB; L290MB to L360MB; P235G1TH; P255G1TH; P235GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S355N; P255NHtoP355NH; S255NL to S355NL .

ASTM Standard A27 a. A36 Gr. all; A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X42 - X56

Redrying: required at 300° C to 350° C for 2hrs.

Elecirodes with High Metal Recovery

AMA

AMA 1118 K

Standards: EN 499 E 380 RR 53
DIN 1913 E 51 22 RR 11 160
AWS/ASME SFA - 5.1 E 7024

Application / Properties: High-efficiency electrode having a weld metal recovery of approx 155%. It is suited for welding long fillet welds of small throat thickness. Easy arc striking and restriking. Smooth welds blending into base metal without undercut. Slag partly self-releasing.

Weld metal analysis in % (typical values):

C	Mn	Si
0.08	0.8	0.4

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
470-600	>380	>22	100

~ | = −

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	140 - 160	180 - 230	260 - 340

Materials:

DIN Standard St 37-2 to St 50-2 ; HI ; HII; 17 Mn 4; St 37-3 to St 52-3; StE 285 to StE 355 ; GS-38; GS-52 .

EN Standard S235JR to E295; P235GH; P265GH; P295GH ; S235J2G3 to S355J2G3; S255N to S355N ;

ASTM Standard ASTM A36 Gr. all; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50

Redrying: If necessary 1 h at 100-120 C^{o}
Approval: LRS

AMA 1617 K

Standards: EN 499 E 38 5 B 73 H10
DIN 1913 E 51 54 B (R) 12 160
AWS/ASME SFA - 5.1 E 7028 - H8

Application / Properties: High-efficiency electrode having a weld metal recovery of approx 165%.preferably used for welding fillets. Weld metal is crack- free and very tough. Smooth and clean welds blending into base metal without undercut. Suitable for welding primer painted component. Slag is easily removable. Welds are of X-ray quality.

Weld metal analysis in % (typical values):

C	Mn	Si
0.08	1.15	0.55

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 30 °C
470-600	>380	>22	150	80

~ | = +

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	130 - 170	160 - 220	220 - 320

Materials:

DIN Standard St 37-2 to St 50-2 ; HI ; HII; 17 Mn 4; St 37-3 to St 52-3; StE 285 to StE 355 ; GS-38; GS-52 ; WStE 255 - WStE 355 .

EN Standard S235JR to E295; P235GH; P265GH; P295GH ; S235J2G3 to S355J2G3; S255N - S355N ; P255NH - P355NH .

ASTM Standard ASTM A36 Gr. all; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A366; A570 Gr. 30, 33, 36, 40, 45; A607 Gr. 45; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A935 Gr. 45; A936 Gr. 50

Rebaking: required at 300 °C to 350 °C for 2 hrs

Cellulosic Electrodes

AMA

AMA 1047 P

Standards: DIN 1913 — E 4343 C4
AWS/ASME SFA - 5.1 — E 6010
EN 499 — E 35 2 C 21

Application / Properties: Medium-coated Cellulosic electrode for welding vertical-down in pipeline and storage tank construction. Suitable for root and filler passes un pipeline application. Due to its arc intensity, it can be used in the vertical-down position without difficulty.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P
0.12	0.5	0.15	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 30 °C
>420	>360	>22	80	>27

= +

Welding Parameters				
Diameter (mm)	2.25	3.25	4.0	5.0
Length (mm)	350	350	350	350
Amperage(A)	60-80	90 - 120	110 - 140	140 - 220

Materials:

DIN Standard St 37.0 to St 52.0 ; St 37-3 to St 52-3 ; St 37.4 to St 52.4 ; St 35.8 to St 45.8 ; HI ; HII; StE 210.7 to StE415.7 ; StE 290.7 TM to StE 415.7 TM .
Root pass up to StE 555.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH
Root pass up to L555NB, L555MB

API Standard API Spec. 5 L: A, B, X 42, X 46, X 52 Root pass up to X 80

Approval: LRS

AMA 1048 P1

Standards: AWS/ASME SFA - 5.5 E 7010 -P1

Application / Properties: Cellulosic electrode for welding of large diameter and high strength pipes using the vertical down technique. It is suitable for welding root passes, hot passes, filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.1	0.5	0.1	0.27	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V - 30 °C
>500	>400	>22	>27

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	350	350
Amperage(A)	60-80	80 - 120	110 - 140	140 - 200

Materials:

DIN Standard St 37.0 to St 52.0 ; St 37-3 to St 52-3 ; St 37.4 to St 52.4 ; St 35.8 to St 45.8 ; HI ; HII; StE 210.7 to StE415.7 ; StE 290.7 TM to StE 415.7 TM . Root pass up to StE 555.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH
Root pass up to L555NB, L555MB

API Standard API Spec. 5 L: A, B, X 42, X 46, X 52

* This electrode covers E7010-G properties.
* Preheat and interpass temprature is selected according to grade and thickness of pipe.

AMA 1049 P1

Standards: AWS/ASME SFA - 5.5 E 8010 - P1

Application / Properties: Cellulosic electrode for welding of large diameter and high strength pipes using the vertical down technique. It is suitable for welding root passes hot passes filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Ni	Mo	S	P
0.11	0.7	0.1	0.65	0.25	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V -30 °C
>550	>460	>19	>27

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	350	350
Amperage(A)	60-80	80 - 120	110 - 140	140 - 200

Materials:

DIN Standard	STE 415.7 to STE485.7; StE 415.7 TM to StE 480.7 TM.
EN Standard	L415NB to L485NB ; L415MBto L485MB
API Standard	API Spec. 5 L: A, B, X 42, X 46, X 52, X 56, X 60 , X 70.

* This electrode covers E8010-G properties.
* Preheat and interpass temprature is selected according to grade and thickness of pipe.

AMA 1042 NP

Standards: AWS/ASME SFA - 5.5 E 7010 - A1

Application / Properties: Cellulosic electrode for welding of pipelines using the vertical down technique. It is suitable for welding root passes, hot passes. filler and cover passes.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.10	0.5	0.15	0.50	<0.02	<0.02

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V + 20 °C
500-600	>400	>22	>80

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	350	350
Amperage(A)	60-80	80-120	110-140	140-200

Materials:

DIN Standard St 37.0 to St 52.0 ; St 37-3 to St 52-3 ; St 37.4 to St 52.4 ; St 35.8 to St 45.8 ; HI ; HII; StE 210.7 to StE415.7 ; StE 290.7 TM to StE 415.7 TM . Root pass up to StE 555.7 TM

EN Standard S235JR; S275JR; S235J2G3; S275J2G3; S355J2G3; P235GH; P265GH; P355T1; P235T2 to P355T2; L210 to L415NB; L290MB to L415MB; P235G1TH; P255G1TH
Root pass up to L555MB

ASTM Standard API Spec. 5 L: A, B, X 42, X 46, X 52, X 56, X 60.

Electrodes for Stainless & Heat Resistant Steels

AMA

AMA 1071 R

Standards: DIN 8556 E13 1 B20 +
Comparable No.of material 1.4018
prEN 1600 E Z 13 1 B 22
AWS/ASM E SFA-5.4 ~ E 410 - 15

Application / Properties: Electrode for welding of stainless and heat resistance chromium steels or cast steels having a chromium, content of up to 13%. It is used for corrosion and abrasion resistance surfacing welds (contact surfaces of gas, water and steam fittings) subjected to operation temperatures up to 450C Depending on type of base metal and wall thickness, preheating and enter pass temperatures from 100 to 400C and tempering at 650 to 750C are advisable. Weld is non-scaling up to 850C.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.06	0.60	0.20	13	1

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Hardness (HB)
AW	1050	900	5	350
T	700	550	20	50 *

AW : as – weld ed
T : tempered 8 hrs. At 680 °C , Furnace cooling.
* Impact energy (j) at + 20 °C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	60-80	85 - 120	110 - 160	150 - 190

Materials:

DIN EN standard 1.4000 X6Cr 13 ; 1.4002 X6CrAl13 ; 1.4006 X10Cr13 G-X12Cr 13 ; 1.4008 G-XCrNi 13 ; 1.4021 X20Cr 13 ; 1.4024 X15Cr 13 ; 1.4027 G-X20Cr 14
other Standard AISI 410 , 420

Rebaking: required at 300 °C to 350 °C for 2 hrs .

AMA 1072 D

Standards: DIN 8556 E13 4 B20+
EN 1600 E 13 4 B 42
AWS/ASME SFA 5.4 ~E410NiMO-15

Application / Properties: Basic electrode for welding of Cr-Ni martensitic stainless steels. In welding of plates with higher than 10 mm thickness, the maximum preheat temperature is 150°C. Afte welding, post weld heat treatment shall be applied.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo
0.04	0.6	0.2	12.5	4.5	0.5

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (J) ISO - V + 20 °C
T_1	850	650	20	70
T_2	850	650	20	70
N+T	850	650	20	70

T1: Tempered 8 hrs. at 580°C, Furnace cooling.
T2: tempered 5 hrs. at 610°C , Air cooling.
N+T: Normalized 1 h at 1020°C, Air cooling + Tempered 15 hrs at 610°C, Furnace cooling.

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	450
Amperage(A)	60 - 80	85 - 120	110 - 160	150 - 190

Materials:

DIN EN standard 1.4313 X5CrNi 13 4 G-X5CrNi 13 4 ; 1.4407 G-X5CrNiMo 13 4 ; 1.4413 X3CrNiMo 13 4 ; 1.4414 G-X4CrNiMo13 4

other Standard ACI Gr. CA 6 NM, S41500

Rebaking : required at 300°C to 350°C for 2hrs

AMA 1312 J

Standards: DIN 8556 — E 25 20 B 20 +
Comparable No. of material — 1.4842
prEN 1600 — E 25 20 B 42
AWS/ASME SFA - 5.4 — ~ E 310 - 15 (mod.)

Application / Properties: Electrode for welding of heat resistance chromium and chromium-nickel steels or cast steels. Fully austenitic metal, non-scaling up to +1200 C. Weld metal is not resistance to sulphurous combustion gases.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.10	3	0.5	25	20

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	400	35	100

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	350
Amperage(A)	65 - 80	90 - 120	115 - 150	160 - 210

Materials:

DIN EN standard 1.4745 G-X40CrSi 23 ; 1.4823 G-X40CrNiSi 27 4 ; 1.4832 G-X25CrNiSi 20 14 ; 1.4833 X7CrNi 23 14 ; 1.4841 X15CrNiSi 25 20 ; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12 ; 1.4840 G-X15CrNi 25 20 ; 1.4846 G-X40CrNi 25 21 ; 1.4826 G-X40CrNiSi 22 9 ; 1.4713 X10CrAl7; 1.4724 X10CrAl 13 ; 1.4742 X10CrAl 18 ; 1.4762 X10CrAl 25 ; 1.4710 G-X30CrSi 6 ; 1.4740 G-X40CrSi 17

other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1337 JA

Standards: DIN 8556 E19 9L B 20+
Comparable No. of material 1.4316
prEN 1600 E19 9L B42
AWS/ASME SFA - 5.4 E 308 L -15

Application / Properties: Basic electrode for welding of austenitic stainless Cr-Ni-Steels having an extra low carbon content, as well as for temperatures up to +350 C; non-scaling up to +800°C.The electrode has a stable arc.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	1	0.4	19	10

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
580	400	38	75

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45-80	70-120	100-150	130-230

Materials:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Rebaking : required at 300°C for 2hrs.

AMA 1338 JB

Standards: DIN 8556 E19 12 3L B20+
Comparable No. of material 1.4430
prEN 1600 E19 12 3L B42
AWS/ASME SFA - 5.4 E 316 L -15

Application / Properties: Basic electrode for welding of austenitic stainless Cr-Ni-Mo Steels having an extra low carbon content, as well as for temperatures up to +400 C. The electrode has a stable arc.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo
0.025	1	0.4	18.5	11.5	2.7

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	420	35	75

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	45-80	70-120	100-150	140-210

Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Rebaking : required at 300°C for 2hrs.

AMA 1339 JA

Standards: DIN 8556 E 2312 LB20+
Comparable No. of material 1.4332
prEN 1600 E2312 LB 42
AWS/ASME SFA - 5.4 E 309 L -15

Application / Properties: Basic electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300 C, at higher temperature 1604 G electrode shall be used. The electrode has a stable arc.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	1	0.5	24	13

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	400	34	75

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	60 - 90	90 - 120	100 - 160	140 - 210

Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Rebaking: required at 300 °C for 2hrs.

AMA 1340 JA

Standards: DIN 8556 E 19 9 Nb B 20+
EN 1600 E 19 9 Nb B 42
Comparable No.of material 1.4551
AWS/ASME SFA-5.4 E 347-15

Application / Properties: Basic electrode for welding of stabilized austenitic stainless Cr - Ni- steels and cast steels, as well as for stainless or heat resistant.
non-scaling up to +800C.
The electrode has a stable arc.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Nb
0.025	1	0.4	19	10	0.4

Mechanical Properties of all weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
620	420	35	70

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4	5
Length (mm)	250	300-350	350	350
Amperage(A)	45-80	70-120	100-140	140-210

Materials:

DIN EN standard 1.4550 X6CrNiNb1810 ; 1.4541 X6CrNiTi 18 10 ; 1.4552 G-X5CrNiNb18 9 ; 1.4301 X5CrNi 18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4546 X5CrNiNb18-10 ; 1.4311 X2CrNiN 18 10 1.4306 X2CrNi 19 11 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi 17 7; 1.4319 X5CrNi18 7.

other Standard AISI 347, 321, 302, 304, 304L, 304LN; ASTM A296 Gr. CF 8 C; A157 Gr. C9; A320 Gr. B8C.

Rebaking: required at 300 °C for 2hrs.

AMA 1367 MR

Standards: DIN 8556 E Z 16 6 Mo B 20+
EN 1600 E Z 16 6 Mo B 42

Application / Properties: Basic electrode for welding chromium steels resistance to heat and corrosion and for surfacing of corrosion resistance parts (ie. steam, Gas and water valves). Heat will be determined according to the steel grade.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo
<0.07	<0.8	<0.5	15.5-17.5	5.5-6.5	0.35

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)
>760	>540	>15

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	300-350	350	350
Amperage(A)	60 - 80	80 - 110	110 - 140	140 - 180

Materials:

DIN EN standard 1.4405 G-X5CrNiMo 16 5 ; 1.4418 X4CrNiMo 16 5

other Standard ASTM A312 Gr.(TP) 316LN ; A240 Gr.316LN

Rebaking: required at 350°C to 2hrs.

AMA 1460 JA

Standards:

DIN 8556	E 19 9 R 26
Comparable No. of material	1.4316
prEN 1600	E 19 9 L R 12
AWS/ASME SFA - 5.4	E 308 L -16

Application / Properties: Electrode for welding of austenitic stainless Cr-Ni-Steels having an extra low carbon content, as well as for temperatures up to +350 C; non-scaling up to +800°C. Fine-droplet metal transfer, good wash-in of joint sides, finely rippled bead surface, easily removable slag. Easy arc striking and restriking.

W eld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	0.8	0.9	19	10

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
580	400	35	65

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	130 - 230

Materials:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Rebaking : required at 350°C to 400°C for 2hrs.

AMA 1460 JB

Standards: DIN 8556 E 19 12 3 L R 26
Comparable No. of material 1.4430
prEN 1600 E 19 12 3 L R 12
AWS/ASME SFA - 5.4 E 316 L -16

Application / Properties: Electrode for welding of austenitic stainless Cr-Ni-Mo-steels or cast steels having and extra low carbon content. suitable for operating temperatures up to +400 C. fine droplet metal transfer,/good wash-in of joint sides, finely rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo
0.025	0.8	0.9	18.5	12	2.7

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	420	33	60

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2
G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ;
1.4406 X2CrNiMoN 17 12 2 ; 1.4408
G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ;
1.4581 G-X5CrNiMoNb 18 10 ;
1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ;
1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1461 JA

Standards:

DIN 8556	E 19 9 Nb R 26
Comparable No. of material	1.4551
prEN 1600	E 19 9 Nb R 12
AWS/ASME SFA - 5.4	E 347 -16

Application / Properties: Electrode for welding of stabilized austenitic stainless Cr-Ni- steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800C fine droplet metal transfer, good wash-in of joint sides, finely, rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Nb
0.025	0.8	0.9	19	10	0.4

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
620	420	33	60

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C

Rebaking : required at 350°C to 400°C for 2hrs.

AMA 1461 JB

Standards:

DIN 8556	E 19 12 3 Nb R 26
Comparable No. of material	1.4576
prEN 1600	E 19 12 3 Nb R 12
AWS/ASME SFA - 5.4	E 318 -16

Application / Properties: Electrode for welding of stabilized austenitic stainless Cr-Ni- steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800C fine droplet metal transfer, good wash-in of joint sides, finely, rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typica l values):

C	Mn	Si	Cr	Ni	Mo	Nb
0.025	0.8	0.9	18.5	12	2.7	0.4

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
630	450	30	60

= + ~ 0CV >70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb17 12 2 ; 1.4583 X10CrNiMoNb 18 12

other Standard AISI 316L, 316Ti, 316Cb

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1464 Cb

Standards: DIN 8556 E2312 Nb R 26
AWS/ASME SFA5.4 E309 Cb-16
EN 1600 E 23 12 Nb R 12

Application / Properties: Electrode for for joining of dissimilar steels (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal resistant to grain boundary corrosion.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Cb (Nb)
0.07	0.8	0.9	24	13	0.8

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
620	430	30	60

= + ~ OCV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	60 - 90	90 - 120	100 - 160	140 - 210

Materials:

DIN EN standard 1.4308 G-X6CrNi18 9 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb18 10 ; 1.4406 X2CrNiMoN 17 11 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4311 X2 CrNiN 18 10 ; 1.4452 G-X5CrNiNb 19 10

other Standard ASTM/ACI A240/A312/A351: (TP)304L ; CF-3 ; (TP)304LN ; (TP)304 ; CF-8; (TP)321 ; (TP)321H ; (TP)347 ; (TP)347H ; CF-8C

Rebaking : required at 350° C to 400°C for 2hrs.

AMA 1464 JA

Standards:

DIN 8556	E 23 12 L R 26
Comparable No. of material	1.4332
prEN 1600	E 23 12 L R 12
AWS/ASME SFA - 5.4	E 309 L -16

Application / Properties: Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300 C, at higher temperature 1604 G electrode shall be used. Fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	0.70	0.9	24	13

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	400	30	60

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	350
Amperage(A)	60 - 90	90 - 120	100 - 160	140 - 210

Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Rebaking: required at 350 °C to 400 °C for 2hrs.

AMA 1464 JB

Standards:

DIN 8556		E 23 13 2 L R 26
Comparable No. of material		1.4459
prEN 1600		E 23 12 2 L R 12
AWS/ASME SFA - 5.4		E 309 MoL-16

Application / Properties: Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature 1604 G electrode shall be used. fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values) :

C	Mn	Si	Cr	Ni	Mo
0.025	0.7	0.9	22.5	13.5	2.6

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
640	420	30	50

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	60 - 90	90 - 120	100 - 160	140 - 210

Materials:

DIN EN standard	1.4401 X5CrNiMo17 12 2 ;1.4404 X2CrNiMo17 13 2 ; 1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4436 X5CrNiMo17 13 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4573 X10CrNiMoTi 18 12 ; 1.4580 X6CrNiMoNb 17 12 2 G-X10CrNiMoNb 18 10.
other Standard	ASTM/ACI A240/A312/A351: (TP)316L ; CF-3M ; (TP)316L ; (TP)316LN ; (TP)316 ; 316Ti ; 316Ti ; 316Cb

Rebaking : required at 350 C to 400 C for 2hrs.

AMA 1465 J

Standards: DIN 8556 E 29 9 R26
AWS/ASME SFA - 5.4 E 312-16
EN 1600 E 29 9 R 12

Application / Properties: Austenitic-ferritic electrode containing 25-30% ferrite. Due to crack resistance of its weld metal, it is an appropriate electrode for welding hard to weld steels & joining of different steels like super alloys & non-alloyed steels. Good weldability in all positions, recommended for welding hard to weld alloyed or non alloyed steels, carbon steels, super alloyed steels, tool steels, spring steels, rail steels, hard Mn steels.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.12	1.0	1.2	29	9

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)
740-840	>500	>22

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	350
Amperage(A)	55 - 85	80 - 120	110 - 150	160 - 210

Rebaking : Required at 350°C to 400°C for 2hrs.

AMA 1468 J

Standards: AWS/ASME SFA - 5.4 ~ E 312 -16
prEN 1600 E 29 9 R 12
Comparable No. of material 1.4337

Application / Properties: Electrode for joining of dissimilar steels and for surfacing purposes. The weld metal consists of ferritic-austenitic Cr-Ni-steel with a delta ferrite content of approximately 50% and non-scaling up to 1100C. It features high resistance to cracking and is therefore indicated for difficult to weld steels and depositing stress-relaxing buffer layers on crack sensitive base metals. It is suited for welding galvanized steels. fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.1	0.9	1.2	29	9

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)
750	450	20

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	300	350	350
Amperage(A)	55 - 85	80 - 120	110 - 150	140 - 210

Materials:

Dissimilar steels (unalloyed to austenitic steels), difficult to weld steels
(e.g. heat treatable and tool steels),
High manganese steels, wear resistant overlays and repair.

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1474 JB7

Standards: DIN 8556 E 23 12 L R 23
Comparable No. of material 1.4332
prEN 1600 E 23 12 L R 12
AWS/ASME SFA - 5.4 ~ E 309 L -17

Application / Properties: Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300 C; at higher temperature 1604 G electrode shall be used. fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	0.70	0.9	24	13

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	400	30	60

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	60 - 90	90 - 120	100 - 160	140 - 210

Materials:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Rebaking : required at 350°C to400°C for 2hrs

AMA 1474 Mo

Standards: DIN 8556 E 2312 2L R 23
Comparable No. of material 1.4332
prEN 1600 E 23 122L R 12
AWS/ASME SFA - 5.4 ~ E 309MoL -17

Application / Properties: Electrode for joining of dissimilar steels, (austenitic steels to ferritic steels) and for depositing claddings austenitic. Weld metal consists of with approximately 15% delta-ferrite. Claddings on alloyed or low-alloyed steel are already corrosion resistant in the first layer. Highest operating temperature for dissimilar steel joints is +300°C; at higher temperature 1604 G electrode shall be used. fine droplet metal transfer, good wash-in of joint sides, finely-rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values) :

C	Mn	Si	Cr	Ni	Mo
0.025	0.70	0.9	24	13	2.6

Mechanical Properties of all -weld metal:
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
640	420	30	50

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	60 -90	90 -120	100 -160	140 -210

Materials:

DIN EN standard 1.4401 X5CrNiMo17 12 2 ;1.4404 X2CrNiMo17 13 2 ; 1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4436 X5CrNiMo17 13 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4573 X10CrNiMoTi 18 12 ; 1.4580 X6CrNiMoNb 17 12 2 G-X10CrNiMoNb 18 10.

other Standard ASTM/ACI A240/A312/A351: (TP)316L ; CF-3M ; (TP)316L ; (TP)316LN ; (TP)316 ; 316Ti ; 316Ti ; 316Cb

Rebaking : required at 350°C to 400°C for 2hrs.

AMA 1507 JA

Standards: DIN 8556 E 25 20 R 26
AWS/ASME SFA-5.4 E 310 - 16

Application / Properties: Rutile electrode for welding of heat resistant chromium and chromium-nickel steels or cast steels. Non-scaling up to 1050C. Suitable for welding of annealing furnaces and boilers. If weld thickness is high, we recommend use AMA 1312J electrode.

Weld metal analysis in % (typical values):

C	Si	Mn	Cr	Ni
0.12	<0.9	1.20	26	20

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5, (%)	Impact energy (J) ISO - V +20 °C
540-650	>300	>30	>70

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	50 - 80	90 - 120	110 - 150	140 - 210

Materials:

DIN EN standard 1.4745 G-X40CrSi 23 ; 1.4823 G-X40CrNiSi 27 4 ;
1.4832 G-X25CrNiSi 20 14 ; 1.4833 X7CrNi 23 14 ;
1.4841 X15CrNiSi 25 20 ; 1.4845 X12CrNi 25 21;
1.4828 X15CrNiSi 20 12 ; 1.4840 G-X15CrNi 25 20 ;
1.4846 G-X40CrNi 25 21 ; 1.4826 G-X40CrNiSi 22 9 ;
1.4713 X10CrAl7; 1.4724 X10CrAl 13 ;
1.4742 X10CrAl 18 ; 1.4762 X10CrAl 25 ;
1.4710 G-X30CrSi 6 ; 1.4740 G-X40CrSi 17
other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1508 JC

Standards: DIN 8556 E 19 9 LR 23
Comparable No. of material 1.4316
prEN 1600 E 19 9 L R 12
AWS/ASME SFA - 5.4 ~ E 308 L -17

Application / Properties: Electrode for welding of austenitic stainless Cr-Ni-Steels having an extra low carbon content, as well as for temperatures up to +350 C; non-scaling up to +800°C. Fine-droplet metal transfer, good wash-in of joint sides, finely rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.025	0.8	0.9	19	10

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
580	400	35	65

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Rebaking : required at 350°C to 400°C for 2hrs.

AMA 1509 JC

Standards:

DIN 8556	E 19 12 3 L R 23
Comparable No. of material	1.4430
prEN 1600	E 19 12 3 L R 12
AWS/ASME SFA - 5.4	~ E 316 L -17

Application / Properties: Electrode for welding of austenitic stainless Cr-Ni-Mo-steels or cast steels having and extra low carbon content. Suitable for operating temperatures up to +400 C. fine droplet metal transfer,/good wash-in of joint sides, finely rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo
0.025	0.8	0.9	18.5	12	2.7

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
600	420	33	60

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard	1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12
other Standard	S31653 ; AISI 316L ; 316Ti ; 316Cb

Rebaking : required at 350°C to 400°C for 2hrs.

AMA 1510 JC6

Standards:

DIN 8556	E 19 9 Nb R 23
Comparable No. of material	1.4551
prEN 1600	E 19 9 Nb R 12
AWS/ASME SFA - 5.4	~ E 347 -17

Application / Properties: Electrode for welding of stabilized austenitic stainless Cr-Ni- steels and cast steels, as well as for stainless or heat resistant non-scaling up to +800C fine droplet metal transfer, good wash-in of joint sides, finely, rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Nb
0.025	0.8	0.9	19	10	0.4

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength 0.2% (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
620	420	33	60

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C

Rebaking : required at 350°C to 400°C for 2hrs

AMA 1511 JC6

Standards: DIN 8556 — E 19 12 3 Nb R 23
Comparable No. of material — 1.4576
prEN 1600 — E 19 12 3 Nb R 12
AWS/ASME SFA - 5.4 — ~ E 318 -17

Application / Properties: Electrode for welding of stabilized austenitic stainless Cr-Ni-Mo steels or cast steels. suitable for operating temperatures up to +400 C. Fine droplet metal transfer, good Wash-in of joint sides, finely- rippled beat surface, Easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Mo	Nb
0.025	0.8	0.9	18.5	12	2.7	0.4

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
630	450	30	60

= + ~ 0CV > 50V

Welding Parameters				
Diameter (mm)	2.5	3 .25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb17 12 2 ; 1.4583 X10CrNiMoNb 18 12

other Standard AISI 316L, 316Ti, 316Cb

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1560 JA

Standards:

DIN 8556	E 19 9 R26
AWS/ASMESFA5.4	E308 H-1 6
EN 1600	E 19 9 H R 42

Application / Properties: Electrode for welding of austenitic stainless Cr-Ni-Steels or cast steel having an high carbon content. Fine-droplet metal transfer, good wash-in of joint sides, finely rippled bead surface, easily removable slag. Easy arc striking and restriking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.06	0.8	0.9	19	10

Mechanical Properties of all -weld metal :
(Singlevalues are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
580	400	35	60

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300-350	350	350
Amperage(A)	45 - 80	70 - 120	100 - 150	140 - 210

Materials:

DIN EN standard 1.4948 X6CrNi18 11, 1.4878 X12CrNiTi 18 9

other Standard AISI 304, 304H, 321H, 347H

Rebaking: required at 350°C to 400°C for 2hrs.

AMA 1803 J

Standards:

	DIN 8556	E 18 8 Mn B 20+
	Comparable No. of material	1.4370
	prEN 1600	E 18 8 Mn B 42
	AWS/ASME SFA-5.4	~ E307-15 (mod.)

Application / Properties: Electrode for welding of dissimilar steels and for surfacing purposes. The weld metal consists of austenitic Cr-Ni-steel with possible small amounts of delta-ferrite; it is non-scaling up to 850C. It features high resistance to cracking and is therefore indicated for difficult-to-weld steels and depositing stress-relaxing buffer layers on crack sensitive base metal or beneath hardfacing deposits. Highest temperature of dissimilar steel joints is +300C, at higher temperatures 1604G electrode shall be used. Weld metal will work harden.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni
0.12	6	0.4	19	9

Mechanical Properties of all - weld metal:

(Single values are typical values)

Tensile Strength (N/mm²)	Yield Strength 0.2% (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
650	400	35	100	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	350
Amperage(A)	65 - 70	95 - 120	110 - 160	150 - 190

Materials:

Dissimilar steels (unalloyed to austenitic steels), difficult to weld steels (e.g. heat treatable and tool steels), high manganese steels.

Rebaking : required at 300°C for 2hrs.

Electrodes for Nickel Alloys

AMA

AMA 1604 G

Standards: DIN 1736 — EL - NiCr 15 FeMn
Material number — 2.4648
AWS/ASME SFA - 5.11 — ~ E NiCrFe - 3

Application / Properties: Basic-covered electrode with 65% Ni and 15% Cr for the welding of:
-Heat and corrosion resistant nickel alloys, e.g. NiCr 15Fe(2.4816), LC-NiCr15Fe(2.4817), NiCr20Ti(2.4951), NiCr23Fe(2.4851), creep resistant up to 800C
-Various nickel alloys and joining them to other steels
-Cryogenic nickel steels, e.g. 12Ni19(1.5680), X8Ni9(1.5662), good cryogenic properties down to -196°C.
-Ferritic steels to austenitic steels for operating temperatures above 300C e.g. creep resistant CrMo-steels to austenitic steel.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Ni	Nb	Fe	S	P
0.02	7.5	0.3	15	Base	2	7.5	<0.01	<0.015

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 196 °C
630	370	38	100	80

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	300	300	350	350
Amperage(A)	65-85	90-110	110-150	130-180

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1609 G

Standards: DIN 1736 — EL - NiCr 15 FeNb
Material number — 2.4805
AWS/ASME SFA - 5.11 — ~ E NiCrFe - 2

Application / Properties: Basic-covered electrode with 69% Ni and 16% Cr and 8%Fe for the welding of:
-Heat and corrosion resistant nickel alloys, e.g. NiCr 15Fe(2.4816),LC- NiCr15Fe(2.4817), or for joining these alloys to unalloyed, low alloy and high-alloy steels; good cryogenic properties down to -196C; heat resistant up to +800C, and austenitic steels to ferritic steels for operation temperatures above 300C.
-owing to high toughness properties and resistance to cracking, it is well suited for joining difficult-to-weld steels and for repair welding.

Weld metal analysis in % (typical values):

C	Si	Mn	Cr	Ni	Mo	Nb	Fe	S	P
0.04	0.3	2	16	Base	1.4	1.8	8.5	<0.015	<0.02

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 196 °C
640	360	40	85	75

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4.0
Length (mm)	300	350	350
Amperage(A)	60-85	80-110	100-140

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1611 G

Standards: DIN 1736 — EL - NiCr 20 Mo 9 Nb
Material number — 2.4621
AWS/ASME SFA - 5.11 — ~ E NiCrMo - 3

Application / Properties: Basic-covered electrode with 63% Ni and 22% Cr and 9%Mo or the welding of:
-Highly corrosion resistant nickel-chromium-molybdenum-alloys, e.g.:NiCr22Mo9Nb(2.4856), NiCr21Mo(2.4858),NiCr22Mo6Cu(2.4618).
-austenitic steels of highest corrosion resistance, e.g:1.4529(x1NiCrMoCuN25206),1.4547(X1CrNiMoCuN20-18-7)
-cryogenic nickel-alloyed steels,e.g.:X8Ni9(1.5662)

Weld metal analysis in % (typical values):

C	Si	Mn	Cr	Ni	Mo	Nb	Fe	S	P
0.03	0.4	0.6	22	Base	9	3.3	3	<0.01	<0.015

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 196 °C
780	520	35	80	50

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	300	350	350
Amperage(A)	50 - 70	70 - 95	90 - 120	120 - 160

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1615 G

Standards: AWS/ASME SFA - 5.11 ENiCrMo-6

Application / Properties: Basic electrode for welding of Ni-base alloys.
This electrode is specially used for welding of 5% Ni and 9% Ni steels for low temperature operation.
The electrode can be welded with AC current to avoid the arc below.
It is recommended to use arc length as short as possible.

Weld metal analysis in % (typical values):

C	Si	Mn	Cr	Ni	Mo	W	Nb	Fe
0.08	0.3	3.7	13	rest	5.5	1.3	1.5	8.5

Mechanical Properties of all -weld metal :
(single values are typical values)

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V +20 °C	Impact energy (J) ISO - V - 196 °C
AW	700	>420	40	90	70

AW :As welded

= + ~ 0CV > 70V

Welding Parameters				
Diameter (mm)	2.5	3.25	4	5
Length (mm)	250	300-350	350	350
Amperage(A)	70-95	100-150	140-180	180-230

Materials:

DIN EN standard X 8 Ni 9

other Standard ASTM A353 Gr. K81340; A522 Gr. I, II; A553 Gr.K81340

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1709 G

Standards: DIN 1736 EL-NiCu30Mn
AWS/ASME SFA - 5.11 ENiCu-7

Application / Properties Basic electrode for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Weld metal analysis in % (typical values):

C	Mn	Si	Ti	Fe	Cu	Ni
0.04	3.5	0.7	0.6	2.3	rest	65

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C
>480	>300	>30	100

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4	5
Length (mm)	250	300-350	350	350
Amperage(A)	60-80	90-120	110-150	140-200

Materials:

DIN EN standard NiCu30Fe (2.4360), NiCu30Al (2.4375)

other Standard Alloy 400, ASTM B 127, B 165

Rebacking : required at 300°C for 2hrs.

Electrodes for Creep Resistant Steels

AMA

AMA 1087 R3

Standards:

EN 1599	E CrMo 9B 42 H10
AWS/ASME SFA - 5.4	E 505-15-H8
AWS/ASME SFA - 5.5	E 8018-B8-H8
DIN 8575	E CrMo 9 B 20+

Application / Properties: Electrode for welding of boilers, pressure vessels subjected to operating temperatures up to 600°C. Typical applications are: petrochemical process plant, hydro crackers in chemical industries.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	S	P
0.07	0.85	0.3	9.5	1	<0.02	<0.02

Mechanical Properties of all -weld metal:
(single values are typical values)

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (J) ISO - V 20 °C
T	620-750	>500	20	80

T: Tempered 1 hrs at 760°C, Air cooling.

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	450
Amperage(A)	60 - 90	90 - 130	140 - 180	170 - 230

Materials:

DIN Standard X12CrMo 9 1 ; X7CrMo 9 1 ; G-X12CrMo 10 1

ASTM Standard A217 Gr. C12 ; A 234 Gr. WP9 ; A335 Gr. P9

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1181 NC

Standards: AWS/ASME SFA - 5.5 E 7016 - A1- H8
DIN 8575 EMO B 20+
EN 1599 E Mo B 4 2 H5

Application / Properties: Basic electrode suitable for boiler tanks subjected to operating temperature up to 500C.It`s weld metal contains Molybdenum has a good mechanical properties.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo	S	P
0.08	0.9Max	0.4	0.5	<0.02	<0.02

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A 5 , (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 20 °C
>510	>390	25	120	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350-450	350-450	450
Amperage(A)	60 - 90	90 - 140	140 - 190	190 - 250

Materials:

DIN Standard St 37-3 to St 52-3 ; St 37-2 to St 60-2 ; ST35.8 to ST45.8 ; StE 320.7 to StE415.7 ; StE 255 to StE 500 ;17Mn4 ; 19Mn5 ; 15Mo3 ; TStE 255 to TStE 500 .

EN Standard S355J2G3 ; E295 ; E335 ; P255G1TH ; L320 to L415NB ; L320MB to L415MBM ; S255N to S500N ; P295GH ; P310GH ;16Mo3 ; 15NiCuMoNb5, 20MnMoNi4-5 ; 17MnMoV6-4 ; S255NH to S500NH ; S255NL to S500NL.

ASTM Standard A204 Gr.A,B,C ; A217 Gr.WC1 ; A213 Gr.T2 ; A355 Gr.P1 ; A182M Gr. F1 ; A204M Gr. A, B, C; A250 Gr. T1
API Spec. 5 L: X 52, X 56, X 60.

Rebaking : required at 300°C to 350°C for 2hrs

AMA 1245 N

Standards: DIN 8575 E CrMo 2 B 20+
PrEN 1599 E CrMo 1 B 32 H10
AWS/ASME SFA - 5.5 E 9018 - B 3 - H8

Application / Properties: Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to+600C. Welds are of X-ray quality. Preheating, inter-pass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo
0.06	0.80	0.50	2.40	1

Mechanical Properties of all -weld metal:
(Single values are typical values)

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (J) ISO - V + 20 °C
T	570-670	>440	>22	100
N+T	500-600	>350	>24	140

T: tempered 0.5 h at 700C,air cooling

T+N : normalized + tempered 0.5 h at 920C, air cooling +0.5 h at 750C

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	50 85	85 130	90 180	150 240

Materials:

DIN Standard	10CrMo9 10 ; 10CrSiMoV7 ; 24CrMo 10 ; GS-12CrMo 9 10 ; GS-19CrMo 9 10
EN Standard	10CrMo9-10 , 10CrSiMoV7, G17CrMo9-10
ASTM Standard	A335 Gr. P22 ; A217 Gr. WC 9 .

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1261 N

Standards: DIN 8575 E Mo B 20+
PrEN 1599 E Mo B 42 H10
AWS/ASME SFA - 5.5 E 7018 - A 1 - H8

Application / Properties: Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to+550C. Welds are of X-ray quality. Preheating, inter-pass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):

C	Mn	Si	Mo
0.06	0.80	0.50	0.50

Mechanical Properties of all - weld metal:
(Single values are typical values)

Heat Treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5, (%)	Impact energy (J) ISO - V + 20°C
T	520-650	>470	>22	160

T : tempered 1 h at 620C,air cooling

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 90	90 - 130	140 - 180	190 - 230

Materials:

DIN Standard	St 37-3 to St 52-3 ; St 37-2 to St 60-2 ; ST35.8 to ST45.8 ; StE 320.7 to StE415.7 ; StE 255 to StE 500 ;17Mn4 ; 19Mn5 ; 15Mo3 ; TStE 255 to TStE 500 .
EN Standard	S355J2G3 ; E295 ; E335 ; P255G1TH ; L320 to L415NB ; L320MB to L415MBM ; S255N to S500N ; P295GH ; P310GH ;16Mo3 ; 15NiCuMoNb5, 20MnMoNi4-5 ; 17MnMoV6-4 ; S255NH to S500NH ; S255NL to S500NL.
ASTM Standard	A204 Gr.A,B,C ; A217 Gr.WC1 ; A213 Gr.T2 ; A355 Gr.P1 ; A182M Gr. F1 ; A204M Gr. A, B, C; A250 Gr. T1 API Spec. 5 L: X 52, X 56, X 60.

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1263 N

Standards: DIN 8575 — E CrMo 1 B 20+
PrEN 1599 — E CrMo 1 B 42 H10
AWS/ASME SFA - 5.5 — E 8018 - B2 - H8

Application / Properties: Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to+570C. Welds are of X-ray quality.
Preheating, interpass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo
0.06	0.80	0.40	1.00	0.50

Mechanical Properties of all -weld metal:
(Single values are typical values)

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation (5*d) (%)	Impact energy (J) ISO - V + 20°C
T	560-660	>490	>22	120
N+T	450-550	>300	>26	150

T: tempered 0.5 h at 700 °C,air cooling

T+ N: normalized + tempered 0.5 h at 920°C, air cooling +0.5 h at 700°C

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	60 - 85	100 - 130	140 - 180	190 - 230

Materials:

DIN Standard 13CrMo 44 ;15CrMo5 ;16CrMo44 ; 25CrMo4 ; 24CrMo5 ; GS -22CrMo 54 ;GS-17CrMo 55

EN Standard 13CrMo4-5 ;15CrMo5 ; 42CrMo4 ; 16CrMoV4 ; 25CrMo4 ;24CrMo5, ; G22CrMo5-4 ; G17CrMo5-5

ASTM Standard A193 Gr. B7 ; A335 Gr. P11 a. P12 ; A217 Gr. WC6

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1264 N

Standards: DIN 8575 — ECrMo 2 B 20+
PrEN 1599 — ECrMo 2 B 42 H10
AWS/ASME SFA - 5.5 — E8018-B3L

Application / Properties: Basic electrode with low carbon weld metal,suitable for creep resistant and Hydrogen resistant steels (boiler, Vessels and pipes) up to working temp of 600C. It`s weld metal is tough & resistant to work embitterment.

Weld metal analysis in % (typical values):

C	Mn	Si	S	P	Cr	Mo
<0.05	0.7	0.3	<0.02	<0.02	2.3	1

Mechanical Properties of all -weld metal:
(Single values are typical values)

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation (5*d) (%)	Impact energy (J) ISO - V + 20°C
T	>550	>460	>17	120

T :tempered 1 h at 790C, furnace cooling to 300C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	60-90	100-140	140 - 180	190 - 230

Materials:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo9 10; GS-12CrMo 9 10

ASTM Standard A181 Gr. F22; A217 Gr. WC 9; A335 Gr. P22; A336 Gr. F22

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1366 N2

Standards: DIN 8575 — E CrMo 5 B 20+
PrEN 1599 — E Z CrMo 5 B 42 H10
AWS/ASME SFA - 5.4 — E 502 - 15 - H8
AWS/ASMESFA 5.5 — E 8018-B6-H8

Application / Properties: Electrode for welding of boilers, pressure vessels subjected to operating temperature up to 600C. Weld metal matches the composition of steel grade 12 CrMo 195 featuring equal resistance to high-pressure hydrogen attack; creep resistance and creep rupture strength. Typical applications are: petrochemical process plants, Hydro crackers in chemical industries.

Weld metal analysis in %

C	Si	Mn	Cr	Mo
0.06	0.30	0.9	5	0.5

Mechanical Properties of all -weld metal:

Heat Treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (J) ISO - V + 20°C
T	600-700	>500	18	100
N+T	650-750	>580	17	120

T :tempered 1 h at 760C,air cooling

T+N normalized + tempered 0.5 h at 960C, air cooling +2 h at 710C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	250	350	350	450
Amperage(A)	60 - 90	85 - 130	140 - 180	180 - 230

Materials:

DIN Standard X12CrMo5 ; GX12CrMo5

ASTM Standard A182 Gr.F5 ; A199 Gr.T5 ; A213 Gr. T5; A217 Gr. C5; A335 Gr. P5 ; A336 C1.F5 ; A369 Gr.FP5 ; A387 Gr.5

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1379-4VN

Standards: AWS/ASME SFA 5.5 E 8018 - G - H8

Application / Properties: Basic electrode with low carbon weld metal, suitable for resistant and hydrogen resistant steels (boilers, vessels and pipes), up to working temp of 600C.It`s weld metal is tough and resistant to work embitterment.

Weld metal analysis in % (typical values):

C	Mn	Si	P	S	Cr	Mo	V
0.05-0.12	<0.9	<0.4	<0.02	<0.02	1-1.5	0.4-0.65	0.1-0.35

Mechanical Properties of all -weld metal:

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V + 20°C
>540	>440	>17	>100

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5
Length (mm)	350	450	450	450
Amperage(A)	60 - 85	100 - 135	140 - 185	180-220

Materials:

DIN Standard 13CrMo 4 5 ; 25CrMo 4 ; 14CrMo 4 5 ; 16MnCr 5 , ST37.3 - ST52.3 ; STE 290.7 - STE415.7

EN Standard S235J2G3 ; S355J2G3 ; L290NB - L415NB ; L290MB ; P235GH

ASTM Standard A182 Gr.F12-1 ; A213 Gr.T12 ; A250 Gr.T12 ; A335 Gr.P12 ; A387 Gr.11,12 ; A506 Gr.4130 ; A507 Gr.4130 ; A513 Gr.4130 ; A519 Gr.4130 ; A752 Gr.4130 ; A866 Gr.4130

Rebaking: required at 300 °C to 350 °C for 2hrs.

AMA 1410 N

Standards: AWS/ASME SFA-5.5 E 80 16 - B2 - H8
DIN 8575 E CrMo 1 B 20+
EN 1599 E CrMo 1 B 42 H10

Application / Properties: Electrode for welding of creep resistant and high-pressure hydrogen resistant steels used in the construction of pressure vessels, boilers and piping subjected to operating temperatures up to +570°C. Welds are of X-ray quality.
Preheating, inter pass temperature and post-weld heat treatment in accordance with base metal to be welded.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	S	P
0.08	0.85	0.3	1	0.5	<0.02	<0.02

Mechanical Properties of all -weld metal:

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V + 20°C
692	632	30	150

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	60 - 85	100 - 135	140 - 180	190 - 230

Materials:

DIN Standard 13CrMo 44 ;15CrMo5 ;16CrMo44 ; 25CrMo4 ; 24CrMo5 ; GS -22CrMo 54 ;GS-17CrMo 55

EN Standard 13CrMo4-5 ;15CrMo5 ; 42CrMo4 ; 16CrMoV4 ; 25CrMo4 ;24CrMo5, ; G22CrMo5-4 ; G17CrMo5-5

ASTM Standard A193 Gr. B7 ; A335 Gr. P11 a. P12 ; A217 Gr. WC6

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1419 N

Standards: AWS/ASME SFA - 5.5 E 8018 - B2L - H8
DIN 8575 ECrMo 1 B 20+
EN 1599 E CrMo 1 B 42 H10

Application / Properties: Basic electrode with low carbon weld metal, suitable for welding of creep resistant steels (pressure vessels, boilers and pipes) up to 570°C. Heat treatment will be based on the base metal.

Weld metal analysis in % :

C	Si	Mn	Cr	Mo
<0.05	0.45	0.80	1.1	0.45

Mechanical Properties of all -weld metal:

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V + 20°C	Heat Treatment
>550	>460	22	150	1 h at 690 C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	60 - 85	100 - 130	140 - 180	190 - 230

Materials:

DIN Standard	13CrMo 44 ;15CrMo5 ;16CrMo44 ; 25CrMo4 ; 24CrMo5 ; GS -22CrMo 54 ;GS-17CrMo 55
EN Standard	13CrMo4-5 ;15CrMo5 ; 42CrMo4 ; 16CrMoV4 ; 25CrMo4 ;24CrMo5, ; G22CrMo5-4 ; G17CrMo5-5
ASTM Standard	A193 Gr. B7 ; A335 Gr. P11 a. P12 ; A217 Gr. WC6

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1426 N

Standards: AWS/ASME SFA - 5.5 E 9018 - B3L - H8
DIN 8575 E CrMo 2 B 20+
EN 1599 E CrMo 2 B 42 H10

Application / Properties: Basic electrode with low carbon weld metal, suitable for creep resistant and Hydrogen resistant steels (boiler, Vessels and pipes) up to working temp of 600C. It's weld metal is tough & resistant to work embitterment.

Weld metal analysis in % :

C	Mn	Si	S	P	Cr	Mo
<0.05	0.7	0.3	<0.02	<0.02	2.3	1

Mechanical Properties of all -weld metal:

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V + 20°C	Heat Treatment
>620	>530	>17	150	1 h at 690 C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	60 - 90	85 - 130	140 - 180	190 - 230

Materials:

DIN Standard 10CrMo9 10 ; 10CrSiMoV7 ; 24CrMo 10 ; GS-12CrMo 9 10 ; GS-19CrMo 9 10

EN Standard 10CrMo9-10 , 10CrSiMoV7, G17CrMo9-10

ASTM Standard A335 Gr. P22 ; A217 Gr. WC 9 .

Rebaking: required at 300°C to 350°C for 2hrs.

Electrodes foe Fine Grain Structural Steels

AMA

AMA 1024 N

Standards: DIN; 8529 E - Y - 7955 Mn 2 Ni 1CrMo B H5
AWS/ASME SFA - 5.5 E 12018 - G - H4
EN 499 E89 4 Mn 2 Ni 1Cr Mo B 42 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in %(Typical values):

C	Mn	Si	Cr	Ni	Mo
0.06	1.60	0.50	0.70	2.40	0.50

Mechanical Properties of all -weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 40 °C
980-1080	>890	>14	70	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 135	140 - 185	180 - 240

Materials:

DIN Standard STE 690 ; STE 890

EN Standard S690 ; S890

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1188 N

Standards: AWS/ASME SFA - 5.5 E8018-G-H4

Application / Properties: Basic electrode for production of crack free and tough welded joints. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

Weld metal analysis in % (Typical values):

C	Mn	Si	Mo	S	P
0.08	1.50	0.45	0.15	<0.02	<0.02

Mechanical Properties of all -weld metal:

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 30 °C
550-650	>460	>22	>120	>50

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 90	90 - 130	140 - 180	190 - 230

Materials:

DIN Standard	St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4;HI; HII;17mn4 ; STE 255 to StE 355 ; 17MnMoV6 4, 15NiCuMoNb5S
EN Standard	S235JR-E335; S235J2G3 to S355J2G3; P235T1 to P355T1; P235T2; P355T2; P235GH; P265GH; P295GH ; S255N to S355N .
ASTM Standard	A302 Gr. A,B ; A517 Gr.A,B,C,E,F,H,J,K,M,P

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1282 N

Standards: EN 499 — E 506 Mn1 Ni B 42 H5
DIN 8529 — E Y 5076 Mn 1 Ni B H5
AWS/ASME SFA - 5.5 — E 8018 - G - H4

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni
0.06	1.6	0.50	0.5

Mechanical Properties of all -weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
590-690	>510	>23	200	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 135	140 - 180	190 - 240

Materials:

DIN Standard StE420 to StE500 ; St 37-3 to St 52-3 ;WStE 420 to WStE 500 ; TStE 255 to TStE500 ; StE 240.7 TM to StE 445.7 TM ; StE 210.7 to StE 445.7 ; EStE 255 to EStE 460.

EN Standard S255N to S355N ; S235J2G3 to S355J2G3 ; P255NH to P500NH; S255NL to S500NL ; L245MB to L450MB ; L210 - L450NB ; E295 to E335; P355 NL1 to P460NL1 ; S380N to S460N ; P355NH to P460NH ; S380NL to S460NL ; S255NL1 to S420NL1.

ASTM Standard A516 Gr. 65, A572 Gr. 55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3.A678 Gr.A-D

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1284 N

Standards: EN 499 E 50 6Mn1 Ni B 42 H5
DIN 8529 E Y 5076 Mn 1 Ni B H5
AWS/ASME SFA - 5.5 E 8018 - G - H4

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical pure having a very low hydrogen content. the electrode has a stable and concentrated arc, thus being well suited or positional welding. Welds are of X- ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni
0.07	1.6	0.4	0.9

Mechanical Properties of all-weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	- 60 °C
590-690	>510	>24	200	80

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 135	140 - 180	190 - 240

Materials:

DIN Standard StE420 to StE500 ; St 37-3 to St 52-3 ;WStE 420 to WStE 500 ; TStE 255 to TStE500 ; StE 240.7 TM to StE 445.7 TM ; StE 210.7 to StE 445.7 ; EStE 255 to EStE 460.

EN Standard S255N to S355N ; S235J2G3 to S355J2G3 ; P255NH to P500NH; S255NL to S500NL ; L245MB to L450MB ; L210 - L450NB ; E295 to E335; P355 NL1 to P460NL1 ; S380N to S460N ; P355NH to P460NH ; S380NL to S460NL ; S255NL1 to S420NL1.

ASTM Standard A516 Gr. 65, A572 Gr. 55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3.A678 Gr.A-D.

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1285 N

Standards: AWS/ASME SFA - 5.5 E9018-D1-H4
E9018-G-H4
DIN 8529 E Y 5554 MnMo B H5
EN 499 E 55 3 MnMo B 4 2 H5

Application / Properties: Basic Electrode for producing crack-free and tough welded joints in low temperatures. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

Weld metal analysis in % (Typical values):

C	Mn	Si	Mo	S	P
0.07	1.7	0.45	0.4	<0.02	<0.02

Mechanical Properties of all -weld metal (Single values are typical values):

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 40 °C
-	620-780	>540	>20	>120	>40
T	620-760	>540	>20	>120	>40

T: tempered1 h at 620°C, air cooling

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 90	90 - 130	140 - 180	190 - 230

Materials:

DIN Standard	St 50-2 to St 70-2 ; 15Mo3 ; 19Mn5 ; StE380 to StE500 ; WStE 420 to WStE 500 ;
EN Standard	E295 to E360 ; 16Mo3 ; P310GH ;17MnMoV6-4, 15NiCuMoNb5S, S380N to S500N ; P380NH to S460NH .
ASTM Standard	A225 Gr. C ; A302 Gr. A-D ; A514 ; A517 Gr. A, B, C, E, F, H, J, K, M, P

Rebaking: required at 300°C to 350°C for 2hrs.
Preheating, inter pass temperature and post weld heat treatment in accordance with base metal to be welded.

AMA 1286 N

Standards: AWS/ASME SFA - 5.5 E9018-D1-H4

Application / Properties: Basic Electrode for producing crack-free and tough welded joints in low temperatures. Weld metal is of high metallurgical purity with very low hydrogen content. Easy releasable slag and good bead profile.

Weld metal analysis in % (Typical values):

C	Mn	Si	Mo	Ni	S	P
0.07	1.7	0.45	0.35	0.5	<0.02	<0.02

Mechanical Properties of all weld metal (Single values are typical values):

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V		
				+ 20	-40	-51C
-	630-780	>550	>22	>130	>50	>40
T	630-760	>550	>22	>130	>50	>40

T: tempered1 h at 620 °C, air cooling

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 90	90 - 130	140 - 180	190 - 230

Materials:

DIN Standard	STE355 to STE500 ; TStE 355 to TStE 500 ; 17MnMoV 6 4 ; 17MnNi4
EN Standard	S380N ; S500N ; P380NL to S500NL.
ASTM Standard	A517 Gr. A, B, C, E, F, H, J, K, M, P ; A225 Gr. C ; A633 Gr. E ; A572 Gr. 65

Rebaking: required at 300°C to 350°C for 2hrs.

Preheating, inter pass temperature and post weld heat treatment in accordance with base metal to be welded.

AMA 1292 N

Standards: DIN 8529 — E Y 69 75 Mn 2 NiCrMo B H5
AWS/ASME SFA - 5.5 — E 10018 - G - H4
EN 499 — E 69 6 Mn2 NiCrMo B 4 2 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality. If normalizing is required after welding 1292N shall be used.

Weld metal analysis in % (Typical values):

C	Mn	Si	Cr	Ni	Mo
0.06	1.50	0.50	0.40	2.10	0.40

Mechanical Properties of all weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
780-940	>700	>17	120	55

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 240

Materials:

DIN Standard ESTE 620 ; ESTE 690

EN Standard S500N, S500NH, S460NL

ASTM Standard A225 Gr. C; A 514 and A517 Gr. A, B, C, E, F, H, J, K, M, P; A656; A678 Gr. C

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1301 N

Standards: EN 499 — E 38 5 Z B 42
DIN 8529 — E Y 38 65 1 NiCu B
AWS/ASME SFA - 5.5 — E 7018 - G

Application / Properties: Electrode depositing a weld metal resistant to atmospheric corrosion for welding similar "weathering" steels. The weld metal features good toughness properties, thus being suitable for welding thicker section. Welds are of X-ray quality.

Weld metal analysis in %(Typical values):

C	Mn	Si	Cu	Ni
0.06	1.00	0.4	0.45	1.00

Mechanical Properties of all -weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 40 °C
500-600	>380	>25	200	80

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 240

Materials:

DIN Standard St 37-2 to St 60-2 ; St 52-3 Cu 3 ; WTSt 37-2 ;

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr. B, C

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1385 NC

Standards: DIN 8529 — E SY 55 76 Mn 1 NiMo B H5
AWS/ASME SFA - 5.5 — E 9018 - G - H4
EN 499 — E 55 6 Mn 1 NiMo B 4 2 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni	Mo
0.05	1.50	0.30	1.2	0.35

Mechanical Properties of all -weld metal (Single values are typical values):

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	- 60 °C
AW	630-720	>560	>20	160	70
SR	620-720	>550	>20	150	55

AW: as welded
SR: stress - relieved 15hrs./580C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 240

Materials:

DIN Standard STE420 to STE500 ; WSTE 355 to WSTE 500 ; TSTE 420 to TSTE500 ; 17MnMoV64 ; 15NiCuMoNb5 ; 20MnMoNi 4 5 ;

EN Standard S420N to S500N ; S355NL to S500NL ; P355NL1 to P460NL1 ; P355NH to P500NH

ASTM Standard ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Rebaking: required at 300°C to 350°C for 2hrs

AMA 1398 N

Standards: EN 499 — E 46 61 Ni B 42 H5
DIN 8529 — E SY 42 761 Ni B H5
AWS/ASME SFA - 5.5 — E 7018 - G - H4

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. The electrode has a stable and concentrated arc, thus being well suited or positional welding. Welds are of X-ray quality. CTOD-tested for offshore application.

Weld metal analysis in %(Typical values):

C	Mn	Si	Ni	S	P
0.06	1.20	0.30	0.95	<0.015	<0.015

Mechanical Properties of all -weld metal (Single values are typical values):

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
AW	530-680	>460	>22	190	70
SR	500-640	>420	>25	190	60

AW: as welded

SR: stress- relieved 15hrs. /580C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 250

Materials:

DIN Standard	St33 to St52.3 ; St50.2 to St70.2 ; H? ; H?? ; 17Mo4 ; 19Mn5 ; StE 210.7 to StE 415.7 ; StE 285 to StE460 ; WStE 255 to WStE 460 ; EStE 255 to EStE 460 ; GS-38 to GS-52 .
EN Standard	S235J2G3 to S355J2G3 ; L210 to L415 ; E295 to E360 ; P235GH ; P265GH ; P295GH ; P355GH.
ASTM Standard	A131 Gr.A,B,C ; AH32 to EH40 ;A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Rebaking : required at 300°C to350°C for2hrs

AMA 1414 N

Standards: AWS/ASME SFA 5.5 E 7018 - C2L - H4
DIN 8529 E Y 4297 3 Ni B H5

Application / Properties: Electrode for producing crack-free and tough welded joints in bellow temperature. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni	S	P
0.05	0.7	0.4	3.2	<0.02	<0.02

Mechanical Properties of all weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V		
			+20 °C	- 60 °C	- 101 °C
531	447	29	>180	>100	>27

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350-450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 250

Materials:

DIN Standard STE 285 to STE420 ; 10Ni14 ; TSTE 225 to TSTE380 ; 11 MnNi 5 3 ; 13 MnNi 6 3 ;15 NiMn 6

EN Standard 12Ni14 ; S275to S420 ; P275-P420 ; S275Nto S420N ; S275NLto S420NL S355, S420 ; L360, L415, L445

ASTM Standard A633 Gr.E ; A572 Gr.65 ; A203 Gr.D ; A333 Gr.3 ; A334 Gr.3

Rebaking : required at 300°C to 350°C for 2 hrs.

AMA 1415 N

Standards: AWS/ASME SFA 5.5 — E 9016 - G - H4
DIN 8529 — ESY 55 76 Mn 1 NiMo B H5
EN 499 — E 55 6 Mn1NiMo B T 4 2 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in %(Typical values):

C	Mn	Si	Ni	Mo	S	P
0.09	1.6	0.35	0.9	0.6	<0.02	<0.02

Mechanical Properties of all-weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A (%)	Impact energy (J) ISO - V	
			- 40 °C	- 50 °C
630-720	>560	>20	60	40

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 250

Materials:

DIN Standard StE 355 to StE500 ; WStE 355 to WStE 500 ; EStE355 to EStE 500 ; StE 480.7 TM to StE 550.7 TM ; TStE 420 to TStE 550 ; 17MnMoV 6 4 ; 15NiCuMoNb 5 ; 20MnMoNi 4 5 ; 13MnNiMo 5 4

EN Standard L485MB , L555MB ; S355N to S500N ; P355N to P500N; S355NL to S500NL ; P355NL1 to P460NL1 ; P355NH to P500NH

ASTM Standard A508 Cl.2 ; A533 Cl.1 ; A678 Gr, A , B ; A516 Gr.55 ; A662 Gr.A ,B,C

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1416 N

Standards: AWS/ASME SFA - 5.5 E 8018 - W

Application / Properties: Basic electrode with a weld metal resistant to atmospheric corrosion and having good mechanical properties, easy releasable slag & good bead profile.

Weld metal analysis in %(Typical values):

C	Mn	Si	S	P	Cu	Cr	Ni
0.06	0.9	0.4	<0.02	<0.02	0.5	0.47	0.47

Mechanical Properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V - 18 °C
550	460	19	80

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 240

Materials:

DIN Standard St 37-2 to St 60-2 ; St 52-3 Cu 3 ; WTSt 37-2

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr. B, C

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1417 N

Standards: AWS/ASME SFA 5.5 E 8018 - G

Application / Properties: Basic electrode with a weld metal resistant to atmospheric corrosion and having good mechanical properties, easy releasable slag & good bead profile.

Weld metal analysis in %(Typical values):

C	Mn	Si	Ni	Cu	S	P
0.08	1.3	0.35	0.8	0.4	<0.02	<0.02

Mechanical Properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4(%)	Impact energy (J) ISO - V		
			- 20 °C	- 40 °C	- 50 °C
560-640	>460	>28	125	90	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 135	140 - 185	180 - 240

Materials:

DIN Standard St 37-2 to St 60-2 ; St 52-3 Cu 3 ; WTSt 37-2

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr. B, C

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1418 N

Standards: AWS/ASME SFA 5.5 E 8018 - C2 -H4
DIN 8529 E Y 4687 3Ni B H5

Application / Properties: Basic electrode for producing crack-Free and tough welded joints in bellow temperature. Weld metal is extremely metallurgical purity having very low hydrogen content.

Weld metal analysis in %(Typical values):

C	Mn	Si	Ni	S	P
0.06	1	0.3	3	<0.02	<0.02

Mechanical Properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4, (%)	Impact energy (J) ISO - V - 73 °C
560-640	>460	24	50

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350-450	450	450
Amperage(A)	65 - 95	90 - 140	140 - 185	180 - 250

Materials:

DIN Standard	STE 285 to STE420 ; 10Ni14 ; TSTE 225 to TSTE380 ; 11MnNi 5 3 ; 13MnNi 6 3 ;15 NiMn 6
EN Standard	12Ni14 ; P275 to P460 ; S275N to S460N ; S275NL to S460NL ; S355, S420 ; L360, L415, L445
ASTM Standard	A633 Gr.E ; A572 Gr.65 ; A203 Gr.D ; A333 Gr.3 ; A334 Gr.3

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1420 N

Standards: EN 499 — E 46 62 Ni B 42 H5
DIN 8529 — E SY 42 87 2 Ni B H5
AWS/ASME SFA - 5 5 — E 8018 - C 1 - H4

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	P	S	Ni
0.05	1.1	0.3	<0.02	<0.02	2.4

Mechanical Properties of all-weld metal (Single values are typical values):

	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
AW	550-700	>480	>22	170	100
SR	520-640	>420	>20	170	80

AW: as welded
SR: stress - relieved 15hrs./580C

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350-450	350-450	450
Amperage(A)	65 - 95	90 - 130	140 - 185	180 - 245

Materials:

DIN Standard TStE 355 to TStE 460 ; EStE 355 to EStE 460 ; EStE 255 to StE 460 ; TStE 355 to TStE 460 ; WSTE 355 to WSTE 460

EN Standard 12Ni14 ; 14Ni6 ; 10Ni14 ; 13MnNi 6 3 ; P355NL1 to P460NL1 ; S255N to S460N ; S355NH to S460NH ; S255NL to S460NL ; S255NL1 to S380NL1

ASTM Standard A633 Gr. E ; A572 Gr. 65; A203 Gr. D ; A333 and A334 Gr. 3 ; A 350 Gr. LF3

Rebaking : required at 300°C to 350°C for 2hrs.
Approval: LRS , GL

AMA 1422 N

Standards: AWS/ASME SFA - 5.5 E 8018 - C 3 - H4
DIN 8529 E SY 46 76 1Ni B H5
EN 499 E 46 5 1Ni B 42 H5

Application / Properties: Low hydrogen basic electrode with crack resist & high toughness, suitable for fine grain & high strength steels. It has slow arc and low spatter & it's slag is easy removable.

Weld metal analys is in %(Typical values):

C	Mn	Si	Ni	S	P
0.09	1.2	0.4	1	<0.02	<0.02

Mechanical Properties of all weld metal (Singlevalue are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 40 °C
550-700	>470	22	>140	70

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350-450	350-450	450
Amperage(A)	65 - 95	90 - 130	140 - 180	180 - 240

Materials:

DIN Standard StE420 to StE500 ; St 37-3 to St 52-3 ;WStE 420 to WStE 500 ; TStE 255 to TStE500 ; StE 240.7 TM to StE 445.7 TM ; StE 210.7 to StE 445.7 ; EStE 255 to EStE 460.

EN Standard S255N to S355N ; S235J2G3 to S355J2G3 ; P255NH to P500NH; S255NL to S500NL ; L245MB to L450MB ; L210 - L450NB ; E295 to E335 ; P355 NL1 to P460NL1 ; S380N to S460N ; P355NH to P460NH ; S380NL to S460NL ; S255NL1 to S420NL1.

ASTM Standard A516 Gr. 65, A572 Gr. 55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3.A678 Gr.A-D.

Rebaking: required at 300°C to 350°C for 2hrs.
Approval: LRS, GL

AMA 1424 N

Standards: AWS/ASME SFA-5.5 — E 7018 - C3L - H4
DIN 8529 — E Y 42 76 1Ni B H5
EN 499 — E 46 5 1Ni B 42 H5

Application / Properties: Low hydrogen basic electrode with crack resist & high toughness, suitable for fine grain structural steels. It has slow arc and low spatter & its slag is easy removable.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni	S	P
0.06	1	0.3	1	<0.02	<0.02

Mechanical Properties of all weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (J) ISO - V - 51 °C
520	460	26	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 95	90 - 130	130 - 180	180 - 240

Materials:

DIN Standard StE255 to StE460 ; St 37-3 to St 52-3 ;WStE 420 to WStE 460 ; TStE 255 to TStE460 ; StE 240.7 TM to StE 445.7 TM ; StE 210.7 to StE 445.7 ; EStE 255 to EStE 460.

EN Standard S235J2G3 to S355J2G3 ; P255NH to P460NH; S255NL to S460NL ; L245MB to L450MB ; L210 - L450NB ; E295 to E335 ; P355 NL1 to P460NL1 ; S380N to S460N ; P355NH to P460NH ; S380NL to S460NL ; S255NL1 to S420NL1.

ASTM Standard A516 Gr. 65, A572 Gr. 55, 60, 65, A633 Gr. E, A612, A618 Gr. I, A537 Gr. 1-3.A678 Gr.A-D.

Rebaking : required at 300°C to 350°C for 2hrs.

AMA 1428 NC

Standards: AWS/ASME SFA 5.5 E 9018 M - H4

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in % (Typical values):

C	Mn	Si	Ni	Cr	Mo	P	S
0.05	1.1	0.4	1.6	0.1	0.3	0.02	0.02

Mechanical Properties of all-weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation (A4) (%)	Impact energy (J) ISO - V - 51 °C
650	550	29	84

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 92	90 - 135	140 - 185	180 - 240

Materials:

DIN Standard	STE420 to STE500 ; WSTE 355 to WSTE 500 ; TSTE 420 to TSTE500 ; 17MnMoV64 ; 15NiCuMoNb5 ; 20MnMoNi 4 5 ;
EN Standard	S420N to S500N ; S355NL to S500NL ; P355NL1 to P460NL1 ; P355NH to P500NH ; P420N to P500N
ASTM Standard	ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Rebaking: required at 300°C to 350°C for 2hrs

AMA 1432 N

Standards: DIN 8529 — E Y 69 75 Mn 2 NiCrMo B H5
AWS/ASME SFA - 5.5 — E 11018 - M - H4
EN 499 — E 69 5 Mn2NiCrMo B 4 2 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld meta l analysis in %(Typical values):

C	Mn	Si	Cr	Ni	Mo
0.06	1.80	0.50	0.35	2.20	0.40

Mechanical Properties of all -weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V + 20 °C	Impact energy (J) ISO - V - 60 °C
800-960	>700	>16	120	60

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	450	450	450
Amperage(A)	65 - 92	90 - 135	140 - 185	180 - 240

Materials:

DIN Standard TStE 620 V , TStE 690 V ; EStE 620 V , EStE 690 V

EN Standard S620 QL-S690QL ; S620QL1, S690QL1

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1433 NA

Standards: AWS/ASME SFA 5.5 — E 12018 M - H4
DIN 8529 — E Y 6955 Mn2Ni1CrMo B H5
EN 499 — E 69 5 Mn2NiCrMo B 4 2 H5

Application / Properties: Electrode for producing crack-free and tough welded joints. Weld metal is extremely metallurgical purity having very low hydrogen content. Welds are of X-ray quality.

Weld metal analysis in %(Typical values):

C	Mn	Si	Ni	Cr	Mo	P	S
0.063	1.5	0.35	2.3	0.45	0.47	<0.02	<0.02

Mechanical Properties of all-weld metal (Single values are typical values):

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation (A4) (%)	Impact energy (J) ISO - V - 51 °C
877	770	22	50

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	65 - 92	90 - 135	140 - 185	180 - 240	210 - 320

Materials:

DIN Standard	28NiCrMo5 5 ; 24CrMoV 5 5 ; 21CrMov 51 1 ; TStE 620 V ,TStE 690 V ; EStE 620 V , EStE 690 V
EN Standard	S620 QL-S690QL ; S620QL1, S690QL1

Rebaking: required at 300°C to 350°C for 2hrs

AMA 1437 B

Standards: AWS/SFA/5.5 E 7016 - G - H8
DIN 8529 E SY 42 76 1Ni B
EN 499 E 46 6 1Ni B 42 H5

Application / Properties: Basic electrode with tough weld metal, suitable for carbon steels up to 0.4%, due to low hydrogen content with is crack resistant. Low spatter & undercut & good X-ray are some characteristics of this electrode.

Weld metal analysis in %:

C	Mn	Si	S	P	Ni
0.07	1.4	0.4	<0.02	<0.02	0.85

Mechanical Properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (J) ISO - V - 30 °C	Heat Treatment
540-620	>460	>22	>100	-
530-600	>450	>25	>100	570 C/1 h

= +

Welding Parameters				
Diameter (mm)	2.5	3.25	4.0	5.0
Length (mm)	350	350	350	450
Amperage(A)	60 - 90	90 - 140	135 - 190	190 - 260

Materials:

DIN Standard St33 to St52.3 ; St50.2 to St70.2 ; HI ; HII ; 17Mo4 ; 19Mn5 ; StE 210.7 to StE 415.7 ; StE 285 to StE460 ; WStE 255 to WStE 460 ; EStE 255 to EStE 460 ; GS-38 - GS-52 .

EN Standard S235J2G3 to S355J2G3 ; L210 to L415 ; E295 to E360 ; P235GH ; P265GH ; P295GH ; P355GH.

ASTM Standard A131 Gr.A,B,C ; AH32 - EH40 ;A517 Gr. A, B, C, E, F, H, J, K, M, P; A225 Gr. C; A633 Gr. E; A572 Gr. 65

Rebaking: required at 300°C to 350°C for 2hrs.

Electrodes for Cast Iron

AMA

AMA 1012 G

Standards: AWS/ASME SFA - 5.15 EST

Application / Properties: Half-basic type electrode with mild steel core for welding cast iron. Weld deposit is non-machinable, applicable as a whole for cast iron parts, repair of casting defects, joining of cast iron to steel arc.
Suitable for : Cast iron parts, repair of casting defects, joining of cast iron to steels.
Mechanical Properties of all-weld metal: (typical values)
Tensile strength of the weld deposit is in equal to base material but almost higher

Welding Parameters		
Diameter (mm)	3.25	4.0
Length (mm)	350	350
Amperage(A)	90 - 120	110 - 140

Caution: The electrode must be welded with short arc as much as possible. But notice that it does not
contact with the work piece, for it will stick. The following points must be observed when welding with this electrode:

1.The work piece must be clean from oil or there impurities

2.Only beads of 25 to 35 mm length should be welded

3.Just after welding, welding deposit should be pinned in order to balance the internal stress

4.The work piece should never be than hand burning temperature

AMA 1094 Ni

Standards: DIN 8573 E Ni BG - 22
AWS/ASME SFA - 5.15 E Ni - CI

Application / Properties: Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300 C max). For repairing cracked or worn casting or joining cast iron parts to components made of steel, copper and nickel materials. Easy arc striking, stable arc, finely-rippled bead surface. Weld metal is machinable. Weld short beads (approx. 30 to 50 mm long).
For reducing weld residual stresses hammer peen welds before cooling.

Weld metal analysis in % (typical values):

C	Ni	Fe
0.5	Base	2

Mech anical Properties of all -weld metal:
(single values are typical values)

Tensile Strength (N/mm^2)	0.2% Yield Strength (N/mm^2)	Elongation A5 (%)	Brinell hardness HB 10/3000
400	200	5	140

= + ~

Welding Parameters			
Diameter (mm)	2.25	3.25	4.0
Length (mm)	250	350	350
Amperage(A)	50 - 80	80 - 110	110 - 150

Materials:

Cast iron with lamellar graphite, white and black heart malleable cast iron, nodular cast iron.

AMA 1094 MO

Standards: DIN 8573 E NiCu BG 22
AWS/ASME SFA - 5.15 E NiCu - B

Application / Properties: Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300 C max). If possible, iron admixture should be kept low, thus using it preferably for filler and cover passes or for filling metal closely matches color or base metal.
Easy arc striking, stable arc, finely-rippled bead surface. Weld metal is machinable.
Weld short beads

Weld metal analysis in % (typical values):

C	Ni	Cu	Fe
0.5	Base	30	4

Mechanical Properties of all -weld metal:
(single values are typical values) (Graphite)

Tensile Strength (N/mm^2)	0.2% Yield Strength (N/mm^2)	Elongation A5 (%)	Brinell hardness HB 10/3000
400	220	15	150

= + ~

Welding Parameters			
Diameter (mm)	2.25	3.25	4.0
Length (mm)	250	350	350
Amperage(A)	50 - 80	80 - 110	110 - 150

Materials:

Cast iron with lamellar graphite, white and black heart malleable cast iron, nodular cast iron

AMA 1094 NiFe

Standards: DIN 8573 E NiFe - 1 BG - 22
AWS/ASME SFA - 5.15 E NiFe - CI

Application / Properties: Electrode having a pure nickel core wire, designed for the welding of cast iron without or with low preheats (up to 300 C max). The weld metal has a low coefficient thermal expansion and therefore little shrinkage. It feature higher strength properties than pure nickel weld metal and therefore preferred for joining nodular cast iron, white and black heart malleable cast iron and austenitic nodular cast iron or for joining these materials to components made of steel, copper and nickel materials. Easy arc striking, stable arc, finely ripped bead surface, weld metal is Machinable. Weld short beads.

Weld metal analysis in % (typical values):

C	Ni	Fe
0.5	53	Remainder

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	0.2% Yield Strength (N/mm^2)	Elongation A5 (%)	Brinell hardness HB 10/3000
450	300	10	170

= + ~

Welding Parameters			
Diameter (mm)	2.25	3.25	4.0
Length (mm)	250	300	350
Amperage(A)	60 - 90	90 - 110	130 - 170

Materials:

Nodular cast iron, white and black heart malleable cast iron, austenitic nodular cast iron, joining of cast iron to steel.

Electrodes for Hardfacing Applications

AMA

AMA 1105 V

Standards: DIN 8555 E 4 - UM - 60 - 65 - S
AWS/ASME SFA - 5.13 E Fe 6

Application / Properties: Rutile type electrode with coating for manufacturing and repairing high speed cutting tools.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	V	W
0.9	0.50	0.50	4.20	8.50	0.90	1.10

Mechanical Properties of all -weld metal:
(single values are typical values)

HRC Hardness		
as - welded	after prescribed heat treatment(a)	after annealing (b)
50-64	62-66	25-30

Heat Treatment			
Hardening: Quenching temperature	Quenching agent Oil, dry air, hot bath	Tempering: Twice one hour (air cooling)	Annealing (oven cooling)
1180-1240 C	450-500C	Up to 510-540 C	2-4hr at 820-850C

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4.0
Length (mm)	350	350	350
Amperage(A)	70 - 100	100 - 150	130 - 180

Materials:

Manufacturing and repairing of cutting tools, e.g. for turning, planning, milling, reaming, drills, etc.

Caution: In order obtain optimum results, deposit three layers one on top of the other. Before welding,preheat the work piece up to 600-700C and maintain this temperature during welding. Weld at the lowest possible
Do not weld the AMA1105 V electrode if the coating is damaged

AMA 1600 V

Standards: DIN 8555 E 6 - UM - 60

Application / Properties: Thick basic-covered electrode for depositing tough and wear resistant overlays on components subject to severe wear The weld metal is crack-free and without porosity and resistant to impact and shocks. It can be machined only by grinding.
A tough buffer layer (with 1803 J electrodes) is only required with very crack sensitive steels. It is possible to deposit a large number of layers without the need of intermediate buffer layers to prevent cracking.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	V
0.50	0.3	0.40	7.0	0.50	0.50

Mechanical Properties of all -weld metal:
(single values are typical values)

Hardness as -welding(HV30)
670-770 (57-62 HRC)

= +

Welding Parameters					
Diameter (mm)	2.5	3.25	4.0	5.0	6.0
Length (mm)	350	450	450	450	450
Amperage(A)	70 - 90	100 - 135	140 - 180	190 - 240	250 - 300

Suitable for: Excavator parts, bucket edges, bucket teethes, drilling 1 bits, coal planes, conveyor screws, polygon edges, crusher jaws and cones.

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1602 V

Standards: DIN 8555 E 10 - UM - 60 R

Application / Properties: Thick Rutile-covered high-alloy electrode depositing a weld metal of hypereutectic chromium hard metal composition. It is suitable for highly wear resistant overlays subject to abrasion by mineral particles. The typical transverse cracks make such a hard weld metal not detrimental to abrasion resistance. However, the weld metal is not suitable for application where impact and shock conditions prevail. It is machinable only by grinding. On difficult-to-weld steels a buffer layer with 1803J is necessary.
1602V produces extremely smooth weld beads with flat penetration. Metal recovery is approximately 160%.

Weld metal analysis in % (typical values):

C	Cr
4.3	35

Mechanical Properties of all -weld metal:
(Single values are typical values)

Hardness as-welding(HV)
680-770 (58-62 HRC)

= +

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	120 - 140	170 - 190	220 - 250

Materials:

Wearing parts subject to mineral abrasion such as conveyor screws, mixer blades, concrete pumps, stirring and agitator parts, milling parts, excavator bucket edges, cool planes, centrifugal shovels, parts in petrochemistry industries also, wearing parts subject to corrosion at elevated temperatures.

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1621 V3

Standards: DIN 8555 E 10 - UM - 60 R

Application / Properties: Thick Rutile-covered high-alloy electrode depositing a weld metal of chromium hard metal composition. It is suitable for highly wear resistant overlays subject to abrasion. However, the weld metal is not suitable for application where impact and shock conditions prevail.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo
3.3	1.5	1.7	28	0.4

Mechanical Properties of all -weld metal:
(Single values are typical values)

Hardness as-welding
58-62 HRC

= +

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	120 - 140	170 - 190	220 - 250

Materials:

Wearing parts subject to mineral abrasion such as suger rolls.

Rebacking :
Rebaking required at 300°C to 350°C for 2hrs.
The typical transverse cracks occurring such a hard weld metal are not detrimental to abrasion resistance.

AMA 1622 V

Standards: DIN 8555 E 1 - UM - 400

Application / Properties: Thick basic-covered electrode for depositing highly wear resistant overlays. The weld metal can only be machined using sintered hard metal tipped tools. It is particularly resistant to impact and shock.
A tough buffer layer (with 1803J electrodes) is only required with crack sensitive steels. It is possible to deposit even a large number of layers without the need of intermediate buffer layers. 1622V can be easily welded in all positions expect vertical-sown.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr
0.20	0.40	0.50	2.8

Mechanical Properties of all -weld metal :
(single values are typical values)

Hardness as -welding
37-42 HRC

= +

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	105 - 135	120 - 180	170 - 240

Materials:

Rebuilding of rails, rails crossing and switch pointer, wear parts such as dredger parts, polygon edges, bearing surface, striking tools, dies, tires , wheel flanges, slide surface subjected to heavy wear, reconditioning of lower dies and punishes, etc.

Rebaking : required at 300 ℃ to 350 ℃ for 2hrs.

AMA 1623 V

Standards: DIN 8555 E 6 - UM - 60

Application / Properties: Basic electrode for repairing of molds especially 1.2080 cutting mold . This electrode can be used with or without buffer layer for 1.2080 steel .
Before welding , 1.2080 steel shall be preheat at 350 -400 C .

Weld metal analysis in % (typical values):

C	Mn	Si	Cr	Mo	W	V
0.5	0.4	0.9	6.5	0.45	1.3	0.6

Mechanical Properties of all -weld metal:
(Single values are typical values)

Hardness as -welding
57-62 HRC

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4
Length (mm)	350	350-450	350-450
Amperage(A)	70-100	100-140	140-180

Materials:

For repair of cutting molds

Rebaking: required at 300°C to 350°C for 2hrs.

AMA 1639 V

Standards: DIN 8555 E 6 - UM - 55 - GP

Application / Properties: Rutile-covered electrode for depositing hardfacing overlays on components subject by metal to metal. The weld metal is resistant to impact and high compressive stresses. Weldable by AC (OCV 70V) and DC+ in the flat and vertical up position.

Weld metal analysis in % (typical values):

C	Mn	Si	Cr
0.50	0.60	1.90	9.50

Mechanical Properties of all -weld metal :
(single values are typical values)

Hardness as-welding
54 HRC

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4.0
Length (mm)	350	450	450
Amperage(A)	65 - 95	90 - 140	125 - 190

Materials:

Crusher hammers, gear wheels, bucket wheels, bucket teeth and lips, mixers, dredge part, moulds repairing.

Rebaking: required at300°C 2hrs.

AMA 1760 V

Standards: DIN 8555 E 7 - UM - 200 KP

Application / Properties: Basic-covered austenitic manganese steels electrode for wear resistant hard facing application. Since the weld metal will adopt high hardness by cold working, it is particularly suited to be used on components subjected to wear by heavy impact and shock. The work piece is sown if necessary. In the case of large work pieces must not become too hot and during welding and should be allowed to cool manganese steel, Such as jaw plate for crushers, it is advisable to weld them in a water bath. High current densities and wide weave beads must be avoided. When building up various layers, it is good practice to deposit an intermediate buffer layer with 1803J weld metal.
In joint welding of austenitic manganese steel It is preferable to use 1803J electrode.

Weld metal analysis in % (typical values):

C	Mn	Si
1.20	13.0	0.70

Mechanical Properties of all -weld metal:
(Single values are typical values)

Hardness as-welding : approx	Hardness after work hardening: approx
~ 200 HB	~ 400-500 HB

= +

Welding Parameters			
Diameter (mm)	3.25	4.0	5.0
Length (mm)	450	450	450
Amperage(A)	110 - 135	140 - 175	1 80 - 230

Materials:

Hardfacing an repair welding of wear resisting parts made of austenitic manganese steels, Such as: jaws
plates for crushers, crusher cones, pulverizing hammers, beating arm, etc.

Rebaking: required at 300°C to 350°C for 2hrs.

Electrodes for Non Ferrous Metals

AMA

AMA 1075 SP

Standards: DIN 1732 EL - AlSi 5
No. of Material 3.2245
AWS/ASME SFA - 5.3 E - 4043

Application / Properties: Electrode with special covering for the welding of aluminum silicon alloys and for joining dissimilar aluminum alloys. The electrode should be held perpendicularly to the workpiece and a short arc length maintained. Plates thicker than 10 mm and larger workpieces require preheating in the range of 150 to 250 C. Since slag residues arc corrosive, the must be completely removed from the welded bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, the electrode must be stored in an absolutely dry location, or redried if required.

Weld metal analysis in % (typical values):

Al	Si	Fe
Base	5	0.3

Mechanical Properties of all -weld metal:
(Single values are typical values)

Tensile Strength (N/mm²)	0.2% Yield Strength (N/mm²)	Elongation A5 (%)
160	90	15

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4.0
Length (mm)	300	350	350
Amperage(A)	60 - 90	80 - 110	110 - 150

Materials

AlMgSi and AlMg -alloys up to 2.5% Mg, AlMnCu, AlSi cast cast alloys.

Redrying: at 110°C to 120°C for 2hrs.

AMA 1075 A

Standards: DIN 1732 EL - Al 99.5
No. of Material 3.0259
AWS/ASME SFA - 5.3 E 1100

Application / Properties: Electrode with special covering for the welding of aluminum silicon alloys and for joining dissimilar aluminum alloys. The electrode should be held perpendicularly to the workpiece and a short arc length maintained. Plates thicker than 10 mm and larger workpieces require preheating in the range of 150 to 250 C. Since slag residues arc corrosive, the must be completely removed from the welded bead. Electrode serves well as consumable in oxyacetylene welding. The covering being hygroscopic, the electrode must be stored in an absolutely dry location, or redried if required.

Weld metal analysis in % (typical values):

Al	Other
min 99.5	max 0.5

Mechanical Properties of all -weld metal :
(single values are typical values)

Tensile Strength (N/mm^2)	0.2% Yield Strength (N/mm^2)	Elongation A5 (%)
80	30	30

= +

Welding Parameters			
Diameter (mm)	2.5	3.25	4.0
Length (mm)	300	350	350
Amperage(A)	60 - 90	80 - 110	110 - 150

Materials

Commercially pure aluminum e.g. Al99.5 to Al 99, DIN 1721 Aluminum alloys, such as AL 99.9Mg
0.5 AlRMg 0.5, AlRMg 0.5, DIN 1725.

Redrying : 2hrs at 110°C to 120°C

AMA 1328 G

Standards: DIN 1733 EL - Cu Sn 7
AWS/ASME SFA - 5.6 E Cu Sn - C

Application / Properties: Thin-bronze electrode for joining, welding and hard facing on copper and copper alloys. Also suitable, for hard facing of copper on steels, cast steel and grey cast iron. Particularly suitable for surfacing welds on bronze bearings. Smooth running and good weld ability.

Weld metal analysis in % (typical values):

Cu	Sn	Mn	P
91	7.5	0.4	0.3

Mechanical Properties of all -weld:

(single values are typical values)

Tensile Strength (N/mm^2)	Vickers hardness HV 30
~ 300-350	~ 70-100

= +

Welding Parameters				
Diameter (mm)	2.0	2.5	3.25	4.0
Length (mm)	250	350	350	450
Amperage(A)	40 - 70	70 - 120	130 - 180	160 - 200

Materials

Caution: The lowest possible current must be set when applying the root pass during hard surfacing of ferrous materials, so as to reduce the possibility of impurities in the bronze weld metal through the melting of the base material to a minimum. The current setting should be slightly increased for the subsequent passes. The arc has to be applied in circular fashion in order to ensure slow cooling process of the weld pool, i,e, the arc must repeatedly recover the weld pool. Preheating the work piece can be of advantage. Joint welding is carried put with high currents. The included angle should be 90C if possible. When butt welding ensures adequate air gap Due to the good heat conductivity of copper and its alloys The weld zone must be preheated to 100-300C depending on the degree of heat dissipation.

Thin -bronze materials, red brass and copper. Hard facing of copper on steel, cast steel and grey cast iron.

Rebaking: required at 300℃ for 2 hrs

Electrodes for Gouging & Cutting

AMA

AMA 1006 Y

Application / Properties: Electrode with special coating for cutting, gouging and piercing of steel and grey cast iron. Very useful in repair and demolition.

= + | = −

Welding Parameters			
Diameter (mm)	3.25 mm	4.0 mm	5.0 mm
Length (mm)	450	450	450
Amperage(A)	160 - 200	200 - 280	280 - 350

Suitable for : All steels(particularly for stainless and manganese steels which cannot be cut by the Oxyacetylene process), also for cast iron, copper and its alloys etc.

Fluxes for Submerged Arc Welding of General Structural Steels and Fine Grain Steels

AMA

AMA OP 155

Standards: EN 760 SA MS 1 89AC
DIN 32 522 B MS 1 89 AC 8 SKM

AWS/ASME: F7A0-EL12
F7A0-EM12

Type /Characteristics: Agglomerated Manganese-Silicate type flux for high-speed welding. It is preferably used for welding thin plates at speeds higher than 2.5 meter/min. Welding properties arc outstanding on either AC or DC up to 800A.

AMA OP 155 is Suitable for Welding tube-web-tube joints on finned tubes, exhibiting slag removal.

It is likewise suited for tandem and multi-wire weldin g.

AMA OP 155 produce high Manganese pick-up which decreases with increasing Manganese content of the wire electrode.

Damp flux shall be retried by baking at 300-350C

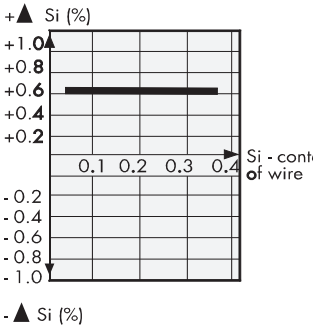
Grain size according to DIN 32 522:2-20.

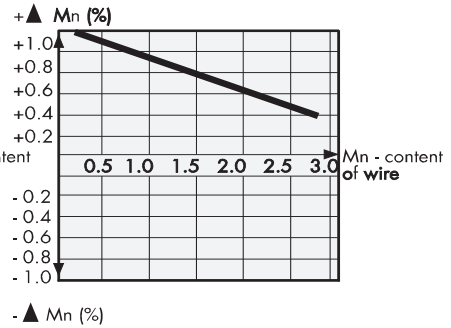
Main constituents:

SiO2 + TiO2	CaO + MgO	Al203 + MnO
45%	10%	40%

Basicity according to boniszewskii: ~0.8

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1





All -Weld metal analysis(typical values):

With Wire electrode		Weight-%				
	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.03 - 0.07	0.4 - 0.8	1.4 - 1.8	-	--
50-12	S2	0.03 - 0.07	0.4 - 0.8	1.8 - 2.3	-	--
50-14	S2Mo	0.03 - 0.07	0.4 - 0.8	1.8 - 2.3	0.5	--
50-22	S2crMo1	0.03 - 0.07	0.4 - 0.8	1.8 - 2.3	0.5	1

AMA OP 155

Mechanical properties of all - weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C	±0°C	- 20°C
50-11	As -Welded	500 - 600	> 400	> 22	> 90	> 60	> 35

Mechanical properties of Welded joints(typical values):

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Impact energy (j) (Joule) ISO - V +20°C	±0°
50-12**	As -Welded	> 510	> 360	> 50	> 30
50-14**	As -Welded	> 510	> 360	> 50	> 30
50-22 ***	As -Welded	> 440	> 300	> 40	–
50-14**	stress relived	> 510	> 360	> 50	> 30
50-22 ***	stress relived	> 440	> 300	> 50	–

Stress relived at 15hrs/700C
* Transverse flat tensile specimen
** StE 36 12 mm, welded from both sides in one pass
*** 13 Cr Mo 44, 15 mm, mm, Welded from both sides in one pass

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11	50-11, 50-12
St 44-2,St 44-3,St 52-3	50-11	50-11, 50-12
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7,StE 290.7	50-11	50-11, 50-12
StE 320.7, StE 360.7	50-12	50-11, 50-12
St 35.0, St 37.4, St 35.8	50-11	50-11, 50-12
St 44, St 44.4,St 45.8	50-11	50-11, 50-12
St 52,St 52.4	50-11	50-11, 50-12
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-11, 50-12
17 Mn 4, 19 Mn 5	50-11	50-11, 50-12
15 Mo 3	–	50-14
13 Cr Mo 44	–	50-22

AMA OP 176

Standards: DIN EN 760 SA MS 188 AC H5

AWS/ASME: F7A2-EM12 F7A2-EM12K
F7P0-EM12K

Type /Characteristics: Agglomerated Manganese-Silicate type flux for high-speed welding of butt and fillet welds. The high silicon and manganese transfer from the flux to weld metal alloys to use the AMA OP 176 flux with low or medium manganese wire electrode like 50-11 , 50-12, 50-14.
Owing to its good weldability AMA OP 176 can be used in welding from both sides in one pass, e.g. in longitudinal welding of large diameter pipes and in thin walled spiral pipes. AMA OP 176 can be used on either DC (positive) or AC current.

Damp flux shall be redried by baking at 300-350C
Grain size according to DIN 32 522:3-20.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
40%	25%	20%	10%

Basicity as to boniszewski: ~0.8

All -Weld metal analysis (typical values):

With Wire electrode		Weight %			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.03	0.6	1.2	–
50-12	S2	0.06	0.7	1.5	–

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C	0°C	-20°C	-30°C
50-12	As -Welded	530	410	28	125	100	58	48

AMA OP 129

Standards: EN 760 S A CS 1 77 AC
DIN 32 522 B CS 1 77 AC 10 M

AWS/ASME: F6A0-EL12 F7P2-EM12
F7A2-EM12

Application / Properties: Agglomerated Calcium-Silicate type flux for welding general structural steels, pressure vessel steels, pipe steels as well as fine grain structural steels. It produces a mean silicon pick-up and when used with wire electrodes, 50-14,50-15,50-11,50-12 also a manganese pick-up. The neutral point for manganese is at approximately 2%. AMA OP 129 can therefore be combined with wire electrodes having a low manganese content.
It is particularly for twin-wire, tandem and multi-wire at high speeds. AMA OP 129 is likewise suited for welding from both sides in one pass,. For increased weld metal toughness, wire electrode containing molybdenum 50-14 should be preferably used. AMA OP 129 can be used on either DC or AC up to 1000A (in single wire welding),

Slag removal is easy. The resulting slag is short, i.e., girth seams on work pieces having a small diameter can be welded without the danger of the slag running off.

Damp flux shall be retried by baking at 300-350C
Grain size according to DIN 32 522:2-20.

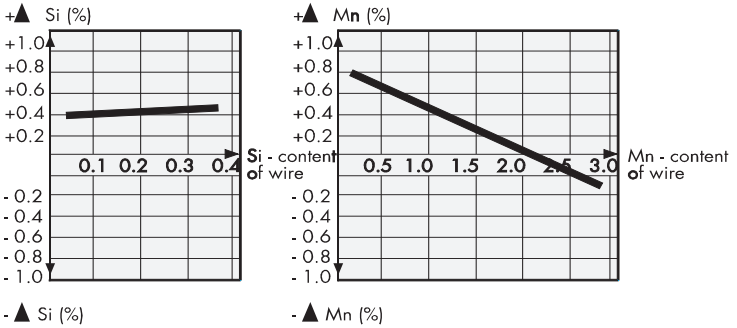
Main constituents:

SiO2 + TiO2	CaO + MgO	Al203 + MnO	CaF2
40%	20 %	25%	10%

Basicity to boniszewskii: ~1.0

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1

(DVS Merkblatt 0907, part 1)



All -Weld metal analysis (typical values):

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.04 - 0.08	0.3 - 0.7	0.8 - 1.3	--
50-12	S2	0.04 - 0.08	0.3 - 0.7	1.1 - 1.7	--
50-15	S3	0.04 - 0.08	0.3 - 0.7	1.3 - 1.9	--
50-14	S2Mo	0.04 - 0.08	0.3 - 0.7	1.1 - 1.7	0.5

AMA OP 129

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20	±0	- 20	- 40°C
50-11	As - Welded	420 - 500	> 360	> 24	>100	>60	>30	–
50-12	As - Welded	520 - 620	> 400	> 24	>100	>80	>50	–
50-15	As - Welded	550 - 650	> 460	> 24	>130	>100	>70	>50
50-14	As - Welded	600 - 700	> 480	> 20	>90	>50	>35	–

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37.2, USt37.2, RSt37.2	50-11	50-12,50-14
St37.3, St44.2, St44.3, St52.3	50-12	50-12,50-14
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240, StE290.7	50-11	50-12,50-14
StE320.7, StE360.7	50-12	50-12,50-14
St35, St35.4, St35.8	50-11	50-12,50-14
St45, St45.4, St45.8	50-12	50-12,50-14
St52, St52.4	50-12	50-12,50-14
X42	50-11	50-12,50-14
X46, X52, X56	50-12	50-12,50-14
X60, X65, X70	50-14	50-12,50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12,50-14
17Mn4, 19Mn5	50-12	50-12,50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE255, WStE255, TStE255***	50-12*	50-12,50-14
StE285, WStE285, TStE285***	50-12*	50-12,50-14
StE315, WStE315, TStE315***	50-12*	50-12,50-14
StE355, WStE355, TStE355***	50-12*,50-15**	50-12,50-14
StE420, WStE420, TStE420***	50-15**	50-12
StE460, WStE460, TStE460***	50-15**	50-12

For welding from both side in one pass, especially in multi-wire welding **50-14** wire electrode should be used Because of the fine-grain formation caused by molybdenum.

* At service temperatures down to -20°C

** At service temperatures down to -40°C

AMA OP 119

Standards: EN 760 — SA CS 1 98 AC
DIN 32 522 — B CS 1 98 AC 12 M

AWS/ASME: F6A0-EL12 — F7P2-EM12
F7A2-EM12

Application / Properties: Agglomerated Calcium -Silicate type flux for welding general structural steels, pressure vessel steels, pipe steels as well as fine grain structural steels.
It causes a relatively high silicon pick-up and when using wire electrodes 50-11,50-12,50-15, also a manganese pick-up. The neutral point for manganese is suited at approximately 2.5%, thus the flux being able to be used with low manganese electrode wires. AMA OP 119 is particularly suited for twin-wire, tandem and multi-wire welding at relatively high speed. It is likewise suited for welding from both sides in one pass. For increased weld metal toughness, wire electrodes containing molybdenum 50-14 should be preferably used. AMA OP 119 can be used on either DC or AC up to approximately 1200A (in single wire welding).
Slag removal is easy. The resulting slag is short, i.e., girth seams on work pieces having a small diameter can be welded without the danger of the slag running off.

Damp flux shall be redried by baking at 300-350C
Grain size in accordance with DIN 32 522:2-20.

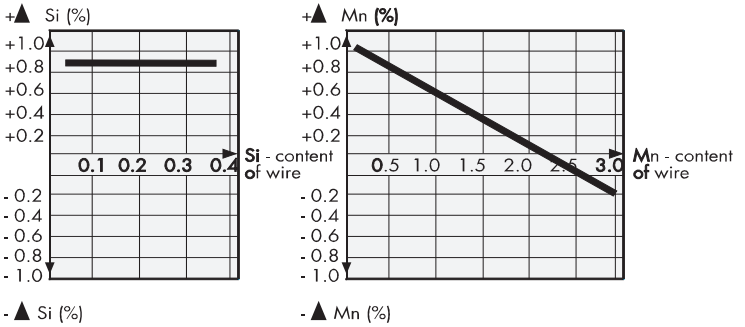
Main constituents:

SiO2 + TiO2	CaO + MgO	Al2O3 + MnO	CaF2
40%	25%	25%	10%

Basicity to boniszewskii: ~1.0

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content

of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values) :

With Wire electrode				Weight-%	
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.04 - 0.08	0.7 - 1.1	1.1 - 1.4	–
50-12	S2	0.04 - 0.08	0.7 - 1.1	1.5 - 1.8	–
50-14	S2Mo	0.04 - 0.08	0.7 - 1.1	1.5 - 1.8	0.5

AMA OP 119

Mechanical properties of all -weld meta l (typical values)

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20	±0	- 20°C
50-11	As - Welded	460 - 560	> 360	> 24	> 90	> 50	> 30
50-12	As - Welded	530 - 630	> 400	> 24	> 90	> 50	> 35
50-14	As - Welded	600 - 700	> 480	> 20	> 65	> 50	> 35

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11	50-11,50-14
St 37-3,St 44-2,St 44-3,St 52-3	50-12	50-11,50-14
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7, StE 290.7	50-11	50-12 ,50-14
StE 320.7, StE 360.7	50-12	50-12 ,50-14
St 37.0, St 37.4, St 45.8	50-11	50-12 ,50-14
St 44, St 44.4,St 37.8	50-12	50-12,50-14
St 52,St 52.4	50-12	50-12,50-14
X42	50-11	50-12,50-14
X 46, X 52, X 56	50-12	50-12,50-14
X 60, X 65, X 70	50-14	50-12,50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12,50-14
17 Mn 4, 19 Mn 5	50-12	50-12,50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, WStE 255	50-12	50-12,50-14
StE 285, WStE 285	50-12	50-12,50-14
StE 315, WStE 315	50-12	50-12,50-14
StE 355, WStE 355	50-12	50-12,50-14

For welding from both side in one pass, especially in multi-wire welding **50-14** wire electrode should be used

Because of the fine-grain formation caused by molybdenum.

Aproval: LRS,GL

AMA OP 181

Standards:	EN 760 DIN 32 522	SA AR 1 88 AC B AR 1 88 AC 10 SKM
AWS/ASME:	F7AZ-EL12 F7AZ-EM12	F7PZ-EM12 F7AZ-EM12K

Application / Properties: Agglomerated aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having o yield strength of up to 355 N/mm2. AMA OP 181 produces a high silicon and manganese pick up and can therefore be used with 50-11, 50-12, electrode wires.
It is particularly suited for high-speed welding applying the twin-wire process as well as in tandem and multi-wire welding. Owing to its metallurgical behavior AMA OP 181 can be preferably used for welding from both sides in one pass, e.g. in longitudinal welding of large-diameter pipes and thin-walled spiral pipes.
A further field of application is the welding of tube-web-tube points or finned tubes.
On account of easy slag removal, AMA OP 181 preferably used in filled welding.
It can be used on either DC or AC up to 1000A.

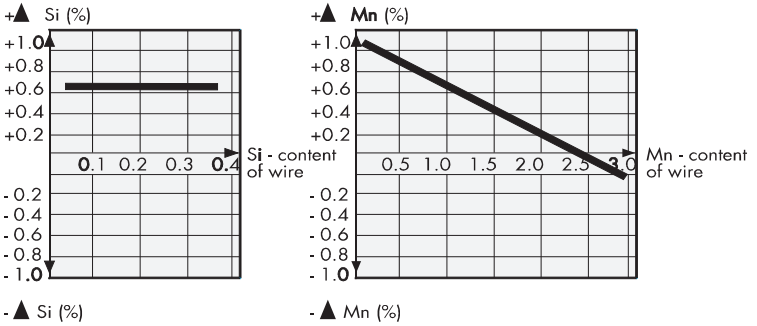
Damp flux shall be redried by baking at 300-350C
Grain size in accordance with DIN 32 522:2-16.

Main constituents:

SiO2 + TiO2	Al203 + MnO	CaF2
30%	50%	10%

Basicity to boniszewskii: ~0.4

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values)

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.03 - 0.08	0.6 - 0.9	1.1 - 1.5	-
50-12	S2	0.04 - 0.08	0.6 - 0.9	1.3 - 1.7	-
50-14	S2Mo	0.04 - 0.08	0.6 - 0.9	1.3 - 1.7	0.5

AMA OP 181

Mechanical properties of all -weld metal（typical values）:

With Wire electrode	Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C
50-11	As - Welded	520 - 620	≥ 420	≥ 22	≥ 50
50-12	As - Welded	560 - 660	≥ 450	≥ 22	≥ 50
50-14	As - Welded	610 - 710	≥ 490	≥ 18	≥ 50

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11,50-12	50-12
St 44-2,St 44-3	50-11,50-12	50-12
St 52-3**	50-12	50-12
Pipe steels	With wire electrode	With wire electrode
StE210.7,StE240.7,StE 290.7	50-11	50-12
StE 320.7, StE 360.7	50-12	50-12
St 37, St 37.4, St 35.8	50-11	50-12
St 44, St 44.4,St 45.8	50-11	50-12
St 52,St 52.4	50-12	50-12
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11,50-12	50-11,50-12
17 Mn 4, 19 Mn 5	50-12	50-11,50-12
15 Mo3	50-14	50-14
13 Cr Mo44*	50-22	50-22
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, StE 355**	50-11,50-12	50-12

* Only for fillet welds or tube-web-tube welding on finned tubes.

** At service temperatures down to + 0°C

AMA OP 185

Standards: EN 760 SAAR 1 88 AC
DIN 32 522 BAR 1 88 AC 10 SKM

AWS/ASME: F7AZ-EL12 F7PZ-EM12
F7AZ-EM12 F7AZ-EM12K

Application / Properties: Agglomerated aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having a yield strength of up to 355N/mm2. AMA OP185 produces a high, silicon and manganese pick-up and can therefore be used with 50-11, 50-12 wire electrodes.
It is particularly suited for high-speed welding applying the twin-wire process, as well as for tandem and multi-wire welding Owing to its metallurgical behavior; AMA OP185 can be advantageously used for welding from both sides in one pass.
It is outstanding for welding tube-web-tube joints or finned tubes.
On account of easy slag removal, AMA OP 185 is preferably used in fillet welding.
The weld metal produced with this flux is not susceptible to porosity when welding on surfaces contaminated by rust, scale etc. The flux has a low bulk density with correspondingly low consumption.
AMA OP 185 can be used on either DC or AC up to 1000A.

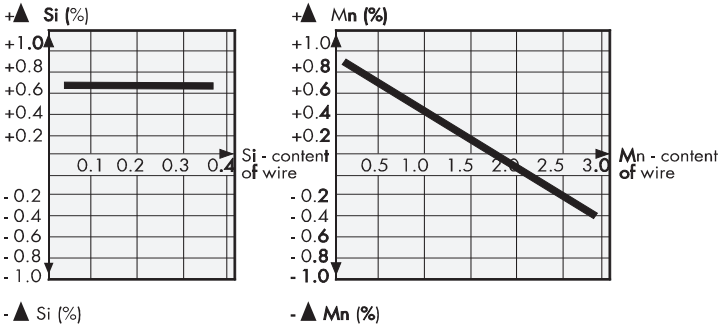
Damp flux shall be redried by baking at 300-350C
Grain size in accordance with DIN 32 522:2-20.

Main constituents:

SiO2 + TiO2	Al2O3 + MnO	CaF2
30%	55%	5%

Basicity to boniszewskii: ~0.5

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%				
	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.04 - 0.08	0.5 - 0.8	1.2 - 1.6	–	–
50-12	S2	0.04 - 0.08	0.5 - 0.8	1.4 - 1.8	–	–
50-14	S2Mo	0.04 - 0.08	0.5 - 0.8	1.4 - 1.8	0.5	–
50-22	S2crMo1	0.05 - 0.10	0.5 - 0.8	1.4 - 1.8	0.5	1

AMA OP 185

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C
50-11	As - Welded	500 - 600	> 400	> 24	> 50
50-12	As - Welded	530 - 630	> 420	> 22	> 50
50-14	As - Welded	580 - 680	> 440	> 20	> 50

Mechanical properties of Welded joints (typical values) :

13 Cr Mo 44, 10 mm Welded From both sides in one pass.

With Wire electrode	Heat treatment	* Tensile Strength (N/mm^2)	* Yield Strength (N/mm^2)	Impact energy (j) (Joule) ISO - V +20°C
50-22	As - Welded	> 440	> 300	> 70
50-22	Stress relived	> 440	> 300	> 80

Stress relived 15 hrs / 700C

* Transverse flat tensile specimen

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11 , 50-12	50-12
St 44-2,St 44-3	50-11 , 50-12	50-12
St 52-3**	50-12	50-12
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7,StE 290.7	50-11	50-12
StE 320.7, StE 360.7	50-12	50-12
St 37, St 37.4, St 35.8	50-11	50-12
St 44, St 44.4, St 45.8	50-11	50-12
St 52,St 52.4	50-12	
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11 , 50-12	50-11 ,50-12
17 Mn 4, 19 Mn 5	50-12	50-11 ,50-12
15 Mo 3	50-14	50-14
13 Cr Mo 44 *	-	50-22
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, StE 355 **	50-11 , 50-12	50-12

* Only for fillet welds or tube-web-tube welding on finned tubes.

** At service temperatures down to + 0°C

AMA UNIVERSAL

Standards: EN 760 SA AR 1 97 AC
DIN 32 522 B AR 1 97 AC 10 SKM

AWS/ASME: F6AZ-EL12 F7PZ-EM12
F7AZ-EM12 F7AZ-EM12K

Application / Properties: Agglomerated aluminate-rutile type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels having a yield strength of up to 355N/mm2. AMA UNIVERSAL produces a relatively high silicon pick-up. When using 50-11,50-12 wire electrodes, also a manganese is suited at approximately 1.3%. The flux can therefore be used with low manganese wire electrodes. AMA UNIVERSAL is particularly suited for twin-wire, tandem and multi-wire welding at higher speeds and advantageous in welding from both sides in one pass, e.g. thin-walled spiral pipes. For increased weld metal toughness, molybdenum alloyed wire electrodes (50-14) should be used with AMA-UNIVERSAL flux. It is especially suited for welding tube-web-tube joints or finned tubes.
Owing easy slag removal, It is also well suited for filled welding. The weld metal produced is relatively insensitive to porosity when welding on plates contaminated by rust, scale etc. AMA UNIVERSAL can be used on either DC (positive) or AC up to approximately 900 A (in single wire welding).

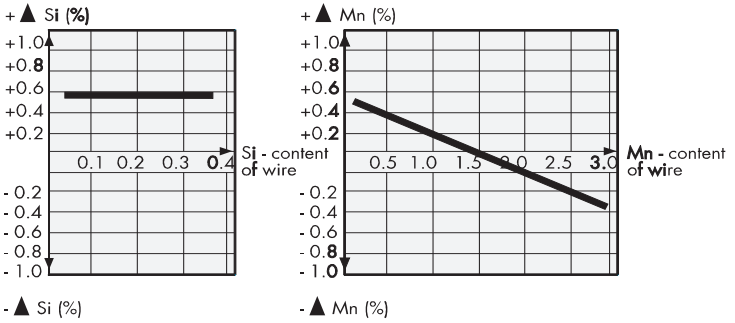
Damp flux shall be redried by baking at 300-350C
Grain size in according with DIN 32 522:2-16*.
Grain size in according with DIN 32 522:2

Main constituents:

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaF_2
30 %	55%	5%

Basicity to boniszewskii: ~0.4

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%				
	DIN/EN	C	Si	Mn	Mo	Cr
50-11	S1	0.04 - 0.08	0.5 - 0.8	0.9 - 1.3	–	–
50-12	S2	0.04 - 0.08	0.5 - 0.8	1.2 - 1.6	–	–
50-14	S2Mo	0.04 - 0.08	0.5 - 0.8	1.2 - 1.6	0.5	–
50-22	S2crMo1	0.04 - 0.08	0.5 - 0.8	1.2 - 1.6	0.5	1

AMA UNIVERSAL

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C
50-11	As - Welded	450 - 550	> 360	> 22	> 60
50-12	As - Welded	500 - 600	> 400	> 22	> 50
50-14	As - Welded	580 - 680	> 450	> 18	> 50

Mechanical properties of Welded joints (typical values) :

13 Cr Mo 44, 10 mm Welded From both sides in one pass.

With Wire electrode	Heat treatment	Tensile * Strength (N/mm^2)	* Yield Strength (N/mm^2)	Impact energy (j) (Joule) ISO - V +20°C
50-22	As - Welded	> 440	> 300	> 40
50-22	** Stress relived	> 440	> 300	> 50

* Transverse flat tensile specimen

** Stress relived 15 hrs/700C

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11	50-11 , 50-12
St 44-2,St 44-3, St 52-3**	50-11	50-11 , 50-12
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7,StE 290.7**	50-11	50-11 , 50-12
StE 320.7, StE 360.7**	50-12	50-11 , 50-12
St 37, St 37.4, St 35.8	50-11	50-11 , 50-12
St 44, St 44.4, St 45.8	50-11	50-11 , 50-12
St 52,St 52.4*	50-11 , 50-12	50-11 , 50-12
Boiler plates	With wire electrode	With wire electrode
H I, H II*	50-11	50-11 , 50-12
17 Mn 4, 19 Mn 5**	50-12	50-11 , 50-12
15 Mo 3**	50-14	50-14
13 Cr Mo 44 *	-	50-22

* Only for fillet welds or tube-web-tube welding on finned tubes.

** At service temperatures down to + 20 °C

AMA OP 123

Standards: EN 760 SAAB 1 67AC
DIN 32 522 BAB 1 67 AC 10 M

AWS/ASME: F7A0-EL12 F7A0-EM12K
F7A0-EM12 F7P0-EM12K

Application / Properties: Agglomerated aluminate-basic type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels. AMA OP123 produces a slight silicon and mean manganese pick-up. Owing to its metallurgical behavior, It can be used with 50-11, 50-12, 50-14 wire electrodes. It is suited to be used in twin-wire and multi-wire welding, as well as in welding from both sides in one pass, e.g. In the production of large diameter pipes. With this process variant, the use of molybdenum alloyed wire electrodes for increased toughness values is advisable. An outstanding feature of AMA OP 123 flux is its high current carrying capacity. Unless there are limitation imposed by base metal quality, this feature of the flux can be of benefit when slag can be easily removed in all cases, the slag being short, i.e. girth seams of small diameter work pieces can be welded without the danger of the slag running off. On account of its low bulk density, flux consumption is low.
AMA OP 123 can be used on either DC (positive) or AC up to 1000A.

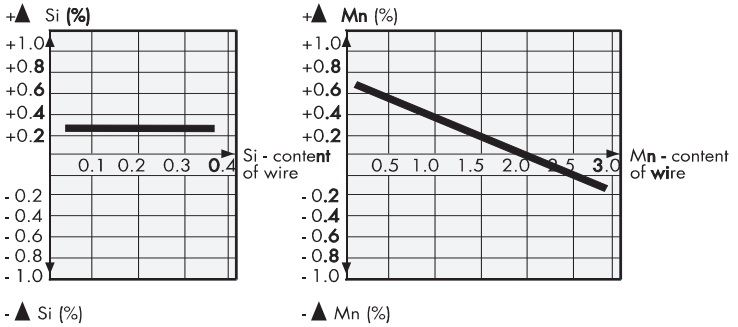
Damp flux shall be redried by baking at 300-350C
Grain size in according with DIN 32 522:2-20*.

Main constituents:

SiO2 + TiO2	CaO + MgO	Al2O3 + MnO	CaF2
20%	20%	45%	10%

Basicity to boniszewski: ~1.0

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.05 - 0.08	0.2 - 0.4	0.7 - 1.1	–
50-12	S2	0.05 - 0.08	0.2 - 0.4	1.2 - 1.6	–
50-14	S2Mo	0.05 - 0.08	0.2 - 0.4	1.2 - 1.6	0.5

AMA OP 123

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20	±0	-20°C
50-11	As - Welded	420 - 520	> 360	> 24	> 90	> 50	> 35
50-12	As - Welded	500 - 600	> 400	> 22	> 90	> 50	> 35
50-14	As - Welded	600 - 700	> 450	> 18	> 65	> 50	> 35

Application:

Materials	Multi pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-2	50-11	50-12 , 50-14
St37.2,St 44-2,St 44-3, St 52-3	50-12	50-12 , 50-14
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7	50-11	50-12 , 50-14
StE 290.7, StE 320.7, StE 360.7	50-12	50-12 , 50-14
St 37, St 37.4, St 35.8	50-11	50-12 , 50-14
St 44, St 44.4, St 45.8	50-12	50-12 , 50-14
St 52,St 52.4	50-12	50-12 , 50-14
X 42	50-11	50-12 , 50-14
X 46, X52, X56	50-12	50-12 , 50-14
X60, X65, X70	50-14	50-12 , 50-14
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-11	50-12 , 50-14
17 Mn 4, 19 Mn 5	50-12	50-12 , 50-14
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, WStE 255	50-11	50-12 , 50-14
StE 285, WStE 285	50-12	50-12 , 50-14
StE 315, WStE 315	50-12	50-12 , 50-14
StE 355, WStE 355	50-12	50-12 , 50-14
StE 380, WStE 380	50-12	50-12 , 50-14
StE 420, WStE 420	50-11 , 50-14	50-12 , 50-14

For welding from both side in one pass, especially in multi-wire welding **50-14** wire electrode should be used because of the fine-grain formation caused by molybdenum.

AMA OP 132

Standards: DIN EN 760 SA AB 167 AC H5
DIN 32 522 B AB 167 AC 12 MHP5

AWS/ASME: F7A4-EM12, F7A4-EM12K, F7P5-EM12K, F7A5-EM13K, F7P5-EM13K, F8A5-EH12K, F7P6-EH12K, F8A4-EA2, F8P4-EA2

Application / Properties: Agglomerated aluminate-basic type flux for welding of pipe steels according to DIN 17172 and API 5L steels up to X70. Weld metal hardness is less than 240HV and resistant to sour gas environment. AMA OP 132 produces a slight silicon and manganese pick-up. Weld metal toughness in low temperature is very good. When using this flux with S2MoTiB or S3MoTiB wire, The toughness of weld metal will be increased. It is suitable for longitudinal welding of sour gas and oil pipes and spiral pipes at high speed welding with single and multi-wire (up to 5 wires) welding system. The weld bead is of uniform profile, good wetting without undercut. The slag detachment is excellent. AMA OP 132 can be used on either DC (positive) or AC up to 1200A on a single wire.

Damp flux shall be redried by baking at 300-350C
Grain size in according with DIN 32 522:3-18.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
20%	25%	35%	15%

Basicity to boniszewski: ~1.5

All -Weld metal analysis(typical values) :

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.06	0.15	0.8	-
50-12	S2	0.06	0.20	1.3	-
50-14	S2Mo	0.05	0.20	1.3	0.47
50-18	S4	0.06	0.30	1.8	-

Mechanical properties of all -weld metal(typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d (%)	Impact energy (j) ISO - V ±0°C	-20°C	-40°C	-60°C
50-11	As - Welded	470	360	26.5	200	80	–	–
50-12	As - Welded	520	420	28	–	160	120	-
50-14	As - Welded	580	495	23	–	110	60	-
50-18	As - Welded	580	480	26	–	105	65	50

Mechanical properties of Welded joints (typical values) :

X70 plates - Weld From both sides in one pass.

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d (%)	Impact energy (j) ISO - V ±0°C	-20°C	-30°C	-40°C
50-12	As - Welded	> 460	> 350	–	90	80	65	50
50-14	As - Welded	> 610	> 520	–	> 100	>70	>50	–

AMA OP 139

Standards: DIN EN 760 SA AB 167 AC H5
DIN32522 BAB167 Ac12 MHP5

AWS/ASME: F7A4-EM12 F7A5-EM13K F8A5-EH12K
F7A4-EM12K F7P5-EM13K F7P6-EH12K
F7P5-EM12K F8A4-EA2
F8P5-EA2

Type/ Characteristics: Agglomerated aluminate-basic type flux for welding of medium tensile steels and pipe steel up X70 Grade. AMA OP 139 produces a slight silicon and manganese pick-up. Owning to its metallurgical behavior, it can be used with AMA 50-14 and AMA 50-18 wire electrodes. It is suitable to be used in high speeds welding with single or multi wire and tandem welding systems. The flux has a high current
carrying capacity and as such is suitable for fillet and butt welding applications especially for welds in heavy section steel work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds. The slag detachment is good and in most cases is self-lifting AMA OP 139 is used with a range of low alloy wires including AMA 50-14, AMA 50-57 for the seam welding of pipes were low temperature impact toughness properties are required.
AMA OP 139 can be used on either DC (positive) or AC up to approximately 1200 A.

Damp flux shall be redried by baking at 300-350 C.
Grain size according to DIN 32 522:3-18.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
20%	25%	35%	15%

Basicity to boniszewski ~1.5

All -Weld metal analysis (typical values):

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.06	0.20	1.3	–
50-14	S2Mo	0.06	0.3	1.3	0.45
50-18	S4	0.06	0.30	1.8	–

Mechanical properties of all- weld metal (typical values):

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (j) ISO - V		
					-20°C	-40°C	-60°C
50-12	As - Welded	495	390	31	120	60	–
50-14	As - Welded	585	500	25	100	50	-
50-18	As - Welded	580	480	26	105	60	40

AMA OP 120 TT

Standards: EN 760 SA FB 1 66 AC H5
DIN 32 522 B FB 1 66 AC 10 M HP5

AWS/ASME: F7A5-EM12, F7A5-EM12K, F7P5-EM12K, F8A4-EA2, F8P5-EA2, F8A8-EH12K, F8P8-EH12K, F8A8-EH14, F8P8-EH14, F9A8-EF1, F8P8-EF1, F8A2-EB2, F8P2-EB2, F7A5-EM13K, F7P5-EM13K, F8A8-EA4, F8P8-EA4

Type/ Characteristics: Agglomerated fluoride-basic type flux for welding general structural steels pressure vessels, pipe steels, as well as fine grain structural steels. Owing to the manganese pick-up caused by AMA OP120TT, low manganese wire electrodes will find an extended field of application. AMA OP120TT is outstanding for tandem, multi-wire and twin-wire welding. It delivers a weld metal featuring excellent toughness properties and crack resistance.
AMA OP120TTcan be used on either DC(positive) or AC up to approximately1000A.

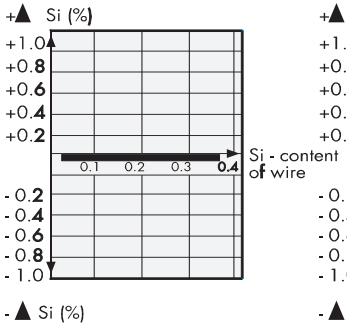
Damp flux shall be redried by baking at 300-350°C.
Grain size according to DIN 32 522:2-20.

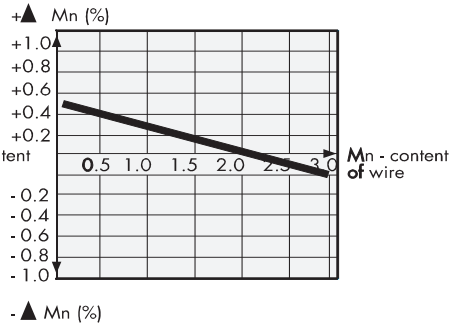
Main constituents:

SiO2 + TiO2	CaO + MgO	Al2O3 + MnO	CaF2
15%	35%	20%	30%

Basicity as to boniszewski: ~3.1

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1





All -Weld metal analysis(typical values) :

With	Wire electrode			Weight-%			
	DIN/EN	C	Si	Mn	Mo	Cr	Ni
50-11	S1	0.04- 0.08	0.10 - 0.25	0.7 - 1.0	-	-	-
50-12	S2	0.04- 0.08	0.20 - 0.40	1.0 - 1.4	-	-	-
50-15	S3	0.04- 0.08	0.20 - 0.40	1.4 - 1.7	-	-	-
50-14	S2Mo	0.04- 0.08	0.20 - 0.40	1.0 - 1.4	0.5	-	-
50-22	S2crMo1	0.04- 0.08	0.20 - 0.40	1.0 - 1.4	0.5	1.0	-
50-24	S2Ni1	0.04- 0.08	0.25 - 0.50	1.3 - 1.6	-	-	1.0

AMA OP 120 TT

Mechanical properties of all -weld metal (typical values):

With Wire electrode	Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d %
50-11	As - Welded	440 - 540	> 360	> 25
50-12	As - Welded	500 - 600	> 420	> 24
50-15	As - Welded	550 - 650	> 450	> 24
50-14	As - Welded	600 - 700	> 500	> 22
50-22	norm+Temp(2)	570 - 670	> 500	> 22
50-22	Tempered(1)	430 - 530	> 310	> 28
50-24	As - Welded	540 - 640	> 470	> 25

	Heat treatment	(Joule) ISO - V Impact energy (j)				
		+20	± 0	- 20	- 40	- 60 °C
50-11	As - Welded	> 150	> 120	> 90	–	–
50-12	As - Welded	> 160	> 130	> 100	> 70	–
50-15	As - Welded	> 160	> 130	> 100	> 70	–
50-14	As - Welded	> 130	> 90	70	> 40	–
50-22	Tempered(1)	200	> 150	–	–	–
50-22	norm+Temp(2)		> 200	–	–	–
50-24	As - Welded		> 140	> 100	> 70	> 50

1) tempered : 700-720°C
2) norm + temp : 920°C/air+700-720°C

Application:

Materials	Multipass joint welding
Fine Grain structural steels	With wire electrode
StE 255, WStE 255	50-11
StE 285, WStE 285	50-11
StE 315, WStE 315	50-11
StE 355, WStE 355	50-11 , 50-12
StE 420, WStE 420	50-15 , 50-24
StE 460, WStE 460	50-15 , 50-24
StE 500, WStE 500	50-15 (1), 50-24 (1)
TStE 255, EStE 255	50-12
TStE 285, EStE 285	50-12
TStE 315, EStE 315	50-12
TStE 355, EStE 355	50-12
TStE 380, EStE 380	50-15 , 50-24
TStE 420, EStE 420	50-15 , 50-24

AMA OP 120 TT

Materials	Multipass joint welding
Fine Grain structural steels	With wire electrode
St 37-2,Ust 37-2	50-11
Rst 37-2	50-11
St 44-2 , St44-3	50-11
St 52-3	50-11,50-12
Pipe steels	With wire electrode
StE 210 .7,StE 240.7	50-11
StE 290.7	50-11
StE 360.7	50-11,50-12
St 37.0,St 37.4,St 35.8	50-11
St 44.0,St 44.4,St 45.8	50-11
St 52.0,St 52.4	50-11,50-12
Boiler plates steels	With wire electrode
HI,HII,17M4	50-11
19MN5	50-11,50-12
Creep resistant steels	With wire electrode
15 Mo3	50-14
13CrMO 44	50-22

1) Adjust for fine plate

Approval: LRS

AMA OP 121 TT

Standards: EN 760 SA FB 1 55 AC H5
DIN 32 522 B FB 1 55 AC 10 MHP5

AWS/ASME: F7A5-EM12, F7A5-EM12K, F8A4-EA2, F7P5-EA2, F8A8-EH12K, F7P8-EH12K, F8A8-EH14, F9A8-EF1, F8A8-EF1, F8A2-EB2, F8P2-EB2, F7A6-EM13K, F7P6-EM13K, F8A8-EA4, F8P8-EA4

Type/ Characteristics: Agglomerated fluoride-basic type flux, preferably used for high strength fine grain structural steels, as well as cryogenic steels and steels resistant to ageing. Owning its neutral behavior as regards pick-up and burn-out of silicon and manganese, wire electrodes having higher percentages of Si and Mn (e.g. 50-27, 50-57) should be used.
AMA OP 121 TT is particularly suited for tandem and multi-wire welding. On the strength of COD tests made with, 50-57 wire electrodes, this flux is suitable to be employed for welding offshore components. The weld metal produced in combination with corresponding wire electrodes, meets high toughness requirements at cryogenic temperatures.
AMA OP 121 TT Produces a short slag, i.e. girth seams of components having a small diameter can be welded without the danger of the slag running off. It produces uniform welds without undercut. AMA OP 121 TT can be used on either DC (positive) or AC up to approximately 1000A.

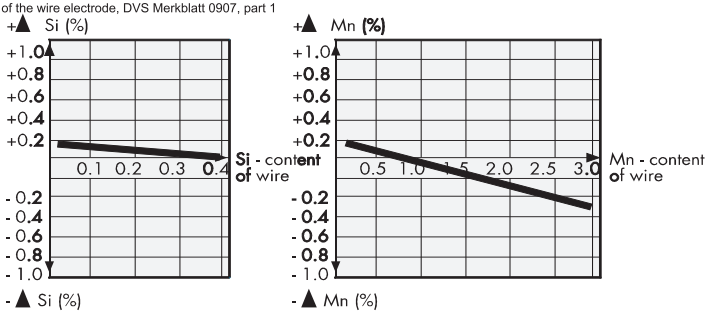
Damp flux shall be redried by baking at 300-350 C.
Grain size according to DIN 32 522:2-20.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
15 %	40%	20%	25%

Basicity to boniszewski : ~3.1

Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis (typical values) :

With Wire electrode					Weight-%		
	DIN/EN	C	Si	Mn	Mo	Cr	Ni
50-12	S2	0.05 - 0.08	0.15 - 0.25	0.7 - 1.0	-	-	-
50-15	S3	0.05 - 0.08	0.15 - 0.25	1.0 - 1.4	-	-	-
50-57	EH12K	0.05 - 0.08	0.20 - 0.40	1.4 - 1.9	-	-	-
50-14	S2Mo	0.05 - 0.08	0.15 - 0.25	0.7 - 1.0	0.5	-	-
50-17	S3Mo	0.05 - 0.08	0.15 - 0.25	1.0 - 1.4	0.5	-	-
50-22	S2crMo1	0.05 - 0.08	0.20 - 0.30	0.7 - 1.0	0.5	1.0	-
50-23	S1crMo2	0.05 - 0.08	0.20 - 0.30	0.5 - 0.8	1.0	2.2	-
50-24	S2Ni1	0.05 - 0.08	0.25 - 0.40	1.0 - 1.3	-	-	1.0
50-25	S2Ni2	0.05 - 0.08	0.20 - 0.30	0.7 - 1.0	-	-	2.0
50-21	S3Ni1Mo	0.05 - 0.08	0.20 - 0.40	1.3 - 1.6	0.5	-	1.0

AMA OP 121 TT

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %
50-12	As - Welded	450 - 550	> 360	> 28
50-15	As - Welded	530 - 630	> 430	> 25
50-57	As - Welded	540 - 640	> 450	> 24
50-14	As - Welded	580 - 680	> 500	> 20
50-17	Tempered(1)	600 - 700	> 530	> 18
50-22	Tempered(1)	530 - 630	> 380	> 24
50-22	norm+Temp(2)	430 - 530	> 310	> 30
50-23	Tempered (3)	550 - 650	> 450	> 22
50-23	norm+Temp(4)	520 - 620	> 400	> 22
50-24	As - Welded	500 - 600	> 420	> 24
50-24	stress relived	480 - 580	> 380	> 26
50-25	As - Welded	550 - 650	> 450	> 24
50-25	stress relived	500 - 600	> 430	> 26
50-21	As - Welded	650 - 750	> 540	> 20
50-21	stress relived	630 - 730	> 540	> 22

	Heat treatment	(Joule) ISO - V Impact energy (j)					
		+20	± 0 °C	- 20	- 40	- 60	- 80 °C
50-12	As - Welded	> 180	> 160	> 100	-	-	-
50-15	As - Welded	> 180	> 160	> 100	> 35	-	-
50-57	As - Welded	> 200	> 180	> 140	> 100	> 70	-
50-14	As - Welded	> 140	> 120	> 100	> 70	> 50	-
50-17	As - Welded	> 140	> 120	> 100	> 70	> 50	-
50-22	Tempered(1)	> 200	> 150	-	-	-	-
50-22	norm+Temp(2)	> 200	> 200	-	-	-	-
50-23	Tempered (3)	> 140	> 100	-	-	-	-
50-23	norm+Temp(4)	> 140	> 90	-	-	-	-
50-24	As - Welded	> 150	> 130	> 100	> 70	> 50	-
50-24	stress relived	> 170	> 140	> 110	> 90	> 70	-
50-25	As - Welded	> 160	> 140	> 120	> 100	> 70	> 50
50-25	stress relived	> 180	> 160	> 140	> 120	> 90	> 70
50-21	As - Welded	> 150	> 120	> 90	> 70	> 50	-
50-21	stress relived	> 160	> 140	> 120	> 90	> 70	-

1) tempered : 700-720°C
2) norm + temp : 920°C/air+700-720°C
3) tempered : 730-750°C
4) norm + temp : 940°C/air+730-750°C

AMA OP 121 TT

Application:

Materials	Multipass joint welding
Fine Grain structural steels	With wire electrode
StE 255, WStE 255	50-12 , 50-15
StE 285, WStE 285	50-12 , 50-15
StE 315, WStE 315	50-12 , 50-15
StE 355, WStE 355	50-12 , 50-15
StE 380, WStE 380	50-15 , 50-57
StE 420, WStE 420	50-15 , 50-57
StE 460, WStE 460	50-57
StE 500, WStE 500	50-24 (1) , 50-21(2)
TStE 255, EStE 255	50-24 , 50-15 , 50-57 (3)
TStE 285, EStE 285	50-24 , 50-15 , 50-57 (3)
TStE 315, EStE 315	50-24 , 50-15 , 50-57 (3)
TStE 355, EStE 355	50-24 , 50-15 , 50-57 (3)
TStE 380, EStE 380	50-24 , 50-15 , 50-57 (3)
TStE 420, EStE 420	50-24 , 50-15 , 50-57 (3)
TStE 460, TStE 460	50-57
TStE 500, EStE 500	50-57(1) , 50-21 (2)
Creep resistant steels	With wire electrode
15 Mo3	50-14 , 50-17
13 Cr Mo44	50-22
10 Cr Mo9 10	50-23
Cryogenic steels	With wire electrode
10 Ni 14 (4)	50-25
TTSt 35 N, TTSt 35 V	50-25
TTSt 41 N, TTSt 41 V	50-25
Non-ageing steels	
ASt 35, ASt 41	50-15
ASt 45, ASt 52	50-15

1) only thinner plates
2) Also for stress-relived condition
3) Observe minimum temperature of -40°C
4) Lowest service temperature -80°C
Approval : LRS

AMA OP 122

Standards: EN 760 — SA FB 1 65 AC HP 5
DIN 32 522 — B FB 1 65 AC 12 MHP 5
AWS/ASME: F6A2-EM12, F6A2-EM12K, F7A2-EM13K, F7A5-EH12K, F7P5-EH12K, F7A2-EA2, F7P2-EA2

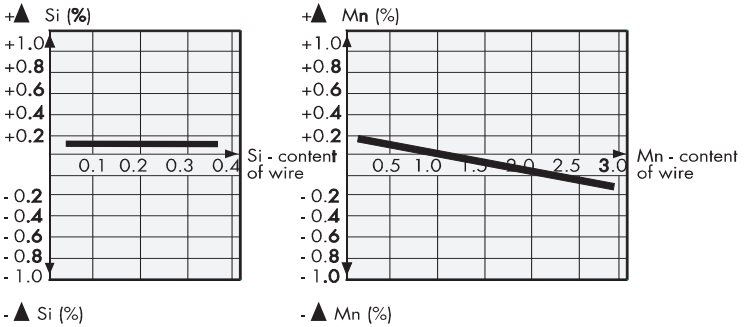
Type/ Characteristics: Agglomerated fluoride-basic type flux for welding general structural steels, pressure vessel and pipe steels, as well as fine grain structural steels.
As regards silicon, AMA OP 122 will produce a slight pick-up, whereas it is relatively neutral as to manganese, which requires the use of wire electrodes having higher manganese content, as for instance 50-12, 50-15. AMA OP 122 is also suitable to be used for twin wire, tandem and multi wire welding, as well as for welding from both sides in one pass, as is the case in fabrication large diameter pipes. For improved toughness values, it is advisable to use molybdenum alloyed wire electrodes. AMA OP 122 exhibits high current carrying capacity and is therefore suitable for depositing large fillet weld sections. Slag removal is excellent. Owning to its low bulk density, consumption is also low. On account of its special production mode, moisture pick-up of the flux and hydrogen content of the weld metal are low.
AMA OP 122 can be used on either DC (positive) or AC up to 1200 A.

Damp flux shall be redried by baking at 300-350 C.
Grain size according to DIN 32 522:2-20.

Main constituents:

SiO2 + TiO2	CaO + MgO	Al2O3 + MnO	CaF2
20%	30%	25%	20%

Basicity to boniszewski : ~1.7
Metallurgical behavior: Pick-up and burn-off the alloying elements Si and Mn as a function of the alloy content of the wire electrode, DVS Merkblatt 0907, part 1



All -Weld metal analysis(typical values) :

With Wire electrode				Weight-%	
	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.04 - 0.08	0.1 - 0.2	0.8 - 1.2	–
50-14	S2Mo	0.04 - 0.08	0.1 - 0.2	0.8 - 1.2	0.5
50-15	S3	0.04 - 0.08	0.15 - 0.25	1.3 - 1.6	–

AMA OP 122

Mechanical properties of all - weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20	±0	- 20	- 40	- 60°C
50-12	As - Welded	450 - 550	> 360	> 24	>150	>110	>90	>50	–
50-14	As - Welded	510 - 620	> 430	> 20	> 90	>70	> 40	–	–
50-15	As - Welded	500 - 600	> 400	> 24	> 160	>130	>100	>70	>30

Application:

Materials	Multi-pass joint welding	Welding from both sides in one pass
General structural steels	With wire electrode	With wire electrode
St37-2,Ust37-2, RSt37-3	50-12	**50-12 , 50-14**
St37.3,St 44-2,St 44-3	50-12	**50-12 , 50-14**
St 52-3	50-12 , 50-15	**50-12 , 50-14**
Pipe steels	With wire electrode	With wire electrode
StE210.7, StE240.7, StE 290.7	50-12	**50-12 , 50-14**
StE 320.7, StE 360.7, StE 385	50-15	**50-12 , 50-14**
StE 415.7, StE 445.7, StE 480	50-14	**50-14**
St 37, St 37.4, St 35.8	50-12	**50-12 , 50-14**
St 44, St 44.4, St 45.8	50-12	**50-12 , 50-14**
St 52, St 52.4	50-12	**50-12 , 50-14**
X 42	50-14	**50-14**
X 46, X52, X56	50-14	**50-14**
X60, X65, X70	50-14	**50-14**
Boiler plates	With wire electrode	With wire electrode
H I, H II	50-12	**50-12 , 50-14**
17 Mn 4	50-12	**50-12 , 50-14**
19 Mn 5	50-12	**50-12 , 50-14**
15 Mo3	50-14	**50-14**
Fine grain structural steels	With wire electrode	With wire electrode
StE 255, WStE 255	50-12	**50-12 , 50-14**
StE 285, WStE 285	50-12	**50-12 , 50-14**
StE 315, WStE 315	50-12	**50-12 , 50-14**
StE 355, WStE 355	50-12	**50-12 , 50-14**
StE 380, WStE 380	50-15	**50-12 , 50-14**
StE 420, WStE 420	50-14	**50-14**
TStE 255, TStE 285	50-15	
TStE 315, TStE 355	50-15	
TStE 380	50-15	

Welding from both sides in one pass, especially in multi wire welding, 50 -14 Mo wire electrode should be used because of the fine grain formation caused by molybdenum.

Approval : LRS, GL

AMA AP 380

Standards: EN 760 SA AB 167 AC H5
DIN 32 522 B AB 167 AC 12 MHP5

AWS/ASME: F7A4-EM12 F7P5-EM12K F7P5-EM13K F7P6-EH12K
F7A4-EM12K F7A5-EM13K F8A5-EH12K F8A4-EA2
F8P5-EA2

Application / Properties: Agglomerated aluminate-basic type flux for welding of medium tensile steels and pipe steels up to X70 Grade. AP380 produces a slight silicon and manganese pick-up.
Owing to its metallurgical behavior, it can be used with S2Mo and S3Mo wire electrodes. The flux is suitable for longitudinal and spiral welding of pipes.
It has a high current carrying capacity and as such is suitable for fillet and butt welding applications especially for weld in heavy section steels work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds.
The slag detachment is good and in most cases is self-lifting.
AP380 can be used on either. DC (positive) or AC up to 1200 A on a single wire.

Damp flux shall be retried by baking at 300-350°C
Grain size in according with DIN 32 522:2-18

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
20%	25%	35%	15%

Basicity as to boniszewski: ~1.5

All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-11	S1	0.06	0.15	0.8	-
50-12	S2	0.06	0.2	1.3	-
50-14	S2Mo	0.05	0.2	1.2	0.5
50-18	S4	0.09	0.3	1.8	-

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5, (%)	Impact energy (j) ISO - V -20°C	-40°C	-60°C
50-11	470	360	26	120	60	–
50-12	510	420	28	140	90	50
50-14	580	490	25	90	45	–
50-18	580	480	26	105	65	50

Mechanical properties of welded joint (typical values) :
X70 plates-weld from both sides in one pass

With Wire electrode	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d (%)	Impact energy (j) ISO - V -20°C	-30°C	-40°C
50-12	>460	>350	-	80	70	50
50-14	>610	>520	-	70	50	-

Approval : BV, GL,DNV, LR

AMA AP 380-3

Standards: EN 760 — SA AB 167 AC H5
DIN 32 522 — B AB 167 AC 12 MHP5

AWS/ASME: F7A2-EM12 — F7A2-EA2
F7A2-EM12K — F7P2-EA2
F8A4-EH12K

Application / Properties: Agglomerated aluminate-basic type flux for welding of mild and medium steels and for pipe steels up to X70 Grade. AP380-3 produces a slight silicon and manganese pick-up.
Owing to its metallurgical behavior, it can be used with S2Mo and S3Mo wire electrodes.
It is suitable for longitudinal and spiral welding system. The flux has a high current carrying capacity and as such is suitable for fillet and butt welding applications especially for weld in heavy section steels work. **The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds.**
The slag detachment is good and in most cases is self-lifting.
AP380-3 can be used on either. DC (positive) or AC up to 1200 A on a single wire.

Damp flux shall be retried by baking at 300-350°C
Grain size in according with DIN 32 522:2-18.

Main constituents:

SiO2 + TiO2	CaO + MgO	Al2O3 + MnO	CaF2
25%	25 %	35%	13%

Basicity as to boniszewski ~1.3

All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%			
	DIN/EN	C	Si	Mn	Mo
50-14	S2Mo	0.06	0.25	1.3	0.5

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V -20 °C	-30 °C
50-14	As- Welded	580	490	23	70	50

Mechanical properties of welded joint (typical values) :

X70 plates -weld from both sides in one pass

With Wire electrode		Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation Lo = 5d (%)	Impact energy (j) ISO - V -10 °C
50-14	Four wire	>620	> 520	–	100

AMA AP 440

Standards: EN 760 SA AB 167 AC H5
DIN 32522 B AB 167 AC12 MH P5

AWS/ASME: F7A4-EM12 F7A4-EM12K F7P6-EH12K F7A5-EM13K
F8A4-EA2 F7P5-EM12K F8A5-EH12K F7P5-EM13K
F8P5-EA2

Type/ Characteristics: Agglomerated aluminate-basic type flux for welding of medium tensile steels and pipe steel up X70 Grade. AMA AP 440 produces a slight silicon and manganese pick-up. It is suitable to be used in high speeds welding with single or multi wire and tandem welding systems. The flux has a high current carrying capacity and as such is suitable for fillet and butt welding applications especially for welds in heavy section steel work. The weld bead is of uniform profile with smooth weld bead profile and good blending at the weld toes even at high welding speeds. The slag detachment is good and in most cases is self-lifting AMA AP 440 is used with a range of low alloy wires including AMA 50-14, AMA 50-57 for the seam welding of pipes were low temperature impact toughness properties are required.
This flux can be used for welding of suer gas pipe with S2MoTiB or S3MoTiB wires.
AMA AP 440 can be used on either DC (positive) or AC up to approximately 1200 A.

Damp flux shall be redried by baking at 300-350 C.
Grain size according to DIN 32 522:3-18.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
20%	25%	35%	15%

Basicity as to boniszewski: ~1.5

Mechanical properties of all -weld metal (typical values) :

With Wire electrode				Weight-%	
	DIN/EN	C	Si	Mn	Mo
50-12	S2	0.06	0.2	1.3	-
50-14	S2Mo	0.06	0.2	1.35	0.5

All -Weld metal analysis(typical values) :

With Wire electrode	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 , (%)	Impact energy (j) (Joule) ISO - V -20 °C	-40 °C
50-12	515	420	28	130	80
50-14	580	490	27	110	60

Mechanical properties of welded joint (typical values) :

X70 plates -weld from both sides in one pass

With Wire electrode	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 5d (%)	Impact energy (j) ISO - V -20 °C	-30 °C
50-14	590	495	-	90	70

Fluxes for Submerged Arc Welding of Austenitic Stainless Steels

AMA

AMA OP 71 Cr

Standards: EN 760 SA FB 2 63 DC
DIN 32 522 B FB 5 63745 DC 8 K

Type/ Characteristics: Special agglomerated fluoride-basic type flux of extra low carbon quantity for welding austenitic stainless and heat resistant steels in combination with wire electrode according to DIN 8556.
Owning to its metallurgical behavior In terms of carbon, AMA OP 71 Cr is Suited for welding extra low carbon steels. It contains chromium - bearing substances counteracting chromium burn-off.

AMA OP 71 Cr is characterized by causing a mean silicon pick-up and a slight manganese burn-off. It produces smooth and finely rippled weld beads merging into the base metal without undercut.
Owning to excellent slag removal, AMA OP 71 Cr is well suited for fillet welding.
AMA OP 71 Cr can be used on DC (positive) up to 800 C.

Damp flux shall be redried by backing at 300 350 C.
Grain size according to DIN 32 522:2-20.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
30%	30%	10%	25%

Basicity to boniszewski ~1.6

All -Weld metal analysis(typical values) :

With Wire electrode		Weight-%				
	AWS	C	Cr	Ni	Mo	Nb
30-51	ER308L	< 0.03	> 18	> 9	-	-
30-52	ER347	< 0.07	> 18	> 9	-	> 8 × C
30-53	ER316L	< 0.03	> 18	> 10	2.5	-
30-54	ER318	< 0.07	> 18	> 10	2.5	> 8 × C

Mechanical properties of all -weld metal (typical values) :

With Wire electrode	Tensile Strength (N/mm^2)	Proof stress (N/mm^2) 1%	Proof stress (N/mm^2) 0.2%	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C
30-51	> 550	> 350	> 320	> 35	> 75
30-52	> 575	> 370	> 350	> 30	> 65
30-53	> 550	> 350	> 320	> 30	> 75
30-54	> 600	> 370	> 350	> 30	> 65

AMA OP 71 Cr

Application : joint welding of austenitic stainless Cr Ni steel, preferably for thinner plates

Materials	Material-No	With wire electrode	Material-No
X 2 Cr Ni 1911	1.4306	30-51	1.4316
X 5 Cr Ni 1810	1.4301	30-51	1.4316
X 6 Cr Ni Ti 1810	1.4541	30-52	1.4551
X 5 Cr Ni Nb 189	1.4543	30-52	1.4551
X 6 Cr Ni Nb 1810	1.4550	30-52	1.4551
X 12 Cr Ni Ti 189	1.4878	30-52	1.4551
X 2 Cr Ni Mo 17132	1.4404	30-53	1.4430
X 2 Cr Ni Mo 18143	1.4435	30-53	1.4430
X 5 Cr Ni Mo 17122	1.4401	30-53	1.4430
X 6 Cr Ni Mo Ti 17122	1.4571	30-54	1.4576
X 10 Cr Ni Mo Ti 1812	1.4573	30-54	1.4576
X 6 Cr Ni Mo Nb 17122	1.4580	30-54	1.4576
C 10 Cr Ni Mo Nb 1812	1.4583	30-54	1.4576

AMA AP 720

Standards: EN 760 SA FB 2 55AC
DIN 32 522 B FB 6 55455 AC 8 MHP 5

Type/ Characteristics: Special agglomerated fluoride-basic type flux for welding austenitic stainless steels in combination with wire electrode according to DIN 8556. As to carbon content of the weld metal, AMA AP 720 is strictly neutral, so that, using suitable wire electrodes steels having extra low carbon content can be safely welded. It has no chromium compensation which is of importance if certain ferrite content in the weld deposit must be observed. Its metallurgical behavior as regards silicon and Manganese burn off will take place when using wire electrodes having a high Manganese content. AMA AP 720 is designed for welding thick sections.

It is a hydrogen controlled flux deposition low hydrogen weld metal.
AMA AP 720 is particularly suited to be used in tandem and multi-wire welding.
It produces smooth and finely rippled weld beads merging into the base metal without undercut.
AMA AP 720 can be used on DC (positive) or AC up to 800 C.

Damp flux shall be redried by backing at 300 350 C.
Grain size according to DIN 32 522:2-20.

Main constituents:

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
15%	40%	20%	25%

Basicity as to boniszewski ~2.7

All -Weld metal analysis (typical values):

With Wire electrode		Weight-%					
	AWS	C	Cr	Ni	Mo	Nb	N
30-51	ER308L	< 0.03	> 18	> 9	-	-	-
30-52	ER347	< 0.07	> 18	> 9	-	> 8×C	-
30-53	ER316L	< 0.03	> 18	> 10	2.5	-	-
30-54	ER318	< 0.07	> 18	> 10	2.5	> 8×C	-
30-56		< 0.03	20	16	3.0	-	0.15
30-55		< 0.03	23	9	3.0	-	0.15
30-57		< 0.15	22	12	-	-	-
30-58		< 0.03	21	> 60	9.0	3.5	-

Mechanical properties of all -weld metal (typical values)

With Wire electrode	Proof stress (N/mm^2) 0.2%	Proof stress (N/mm^2) 1%	Tensile Strength (N/mm^2)	Elongation Lo = 5d %	Impact energy (j) (Joule) ISO - V +20°C
30-51	> 320	> 350	> 550	> 35	> 75
30-52	> 350	> 370	> 575	> 30	> 65
30-53	> 320	> 350	> 550	> 30	> 75
30-54	> 350	> 370	> 600	> 30	> 65
30-56	> 380	> 410	> 600	> 30	> 120
30-55	> 450	> 500	> 650	> 25	> 100
30-57	> 320	> 350	> 650	> 30	> 75
30-58	> 400	> 420	> 680	> 30	> 75

AMA AP 720

Application: welding of austenitic stainless Cr Ni steel, particularly thick sections.

Materials	Material-No	With wire electrode	Material-No
X 2 Cr Ni 1911	1.4306	30-51	1.4316
X 5 Cr Ni 1810	1.4301	30-51	1.4316
X 6 Cr Ni Ti 1810	1.4541	30-52	1.4551
X 5 Cr Ni Nb 189	1.4543	30-52	1.4551
X 6 Cr Ni Nb 1810	1.4550	30-52	1.4551
X 12 Cr Ni Ti 189	1.4878	30-52	1.4551
X 2 Cr Ni Mo 17132	1.4404	30-53	1.4430
X 2 Cr Ni Mo 18142	1.4435	30-53	1.4430
X 5 Cr Ni Mo 17122	1.4401	30-53	1.4430
X 6 Cr Ni Mo Ti 17122	1.4571	30-54	1.4576
X 10 Cr Ni Mo Ti 1812	1.4573	30-54	1.4576
X 6 Cr Ni Mo Nb 17122	1.4580	30-54	1.4576
X 10 Cr Ni Mo Nb 18 12	1.4583	30-54	1.4576
X 2 Cr Ni Mo N 22 5	1.4462	30-55	~1.4462
X 15 Cr Ni Si 20 12	1.4828	30-57	1.4829
X 12 Cr Ni Ti 18 9	1.4878	30-57	1.4828
X 2 Cr Ni 18 9	1.4306	30-56*	1.4455
X 5 Cr Ni 18 10	1.4301	30-56*	1.4455
X 6 Cr Ni Ti 18 10	1.4541	30-56*	1.4455
X 5 Cr Ni Nb 18 9	1.4543	30-56*	1.4455
X 6 Cr Ni Nb 18 19	1.4550	30-56*	1.4455
X 12 Cr Ni Ti 18 9	1.4878	30-56*	1.4455
X 2 Cr Ni Mo 17 13 2	1.4404	30-56*	1.4455
X 2 Cr Ni Mo 18 14 2	1.4435	30-56*	1.4455
X 5 Cr Ni Mo 17 12 2	1.4401	30-56*	1.4455
X 6 Cr Ni Mo Ti 17 12 2	1.4571	30-56*	1.4455
X 10 Cr Ni Ti Mo 18 12	1.4573	30-56*	1.4455
X 6 Cr Ni Mo Nb 17 12 2	1.4580	30-56*	1.4455
X 10 Cr Ni Mo Nb 18 12	1.4583	30-56*	1.4455

*) If weld metal is required to be fully austenitic

Materials	Material-No	With wire electrode	Material-No
X 8 Ni 9	1.5662	30-56	1.4455
10 Ni 14	1.5637	30-56	1.4455
12 Ni 19	1.5680	30-56	1.4455

AMA AP 720+ 30-56 is out standing for joining unalloyed and low alloy steels to high alloy steels.

Fluxes for Wear Resistant and Hardsurfacing Applications

AMA

AMA OP 250 A

Standards: EN 760 SA CS 3 97 AC
DIN 32 522 B CS 3 97 CCrMo AC 8

Type/ Characteristics: Agglomerated alloy-bearing type flux for hard surfacing purposes, to be used in combination with 50-11 wire electrode. The alloying effect of the flux depends to a large degree on the welding parameters chosen.
Optimum parameters for a 4 mm dia. wire electrode are 600A / 32V / 50 cm/min.
AMA OP 250 A is suitable to be used on either DC or AC.

Damp flux shall be redried by baking at 300 C.

All -Weld metal analysis (typical values) :

With Wire electrode					Weight-%	
	DIN/EN	C	Si	Mn	Cr	Mo
50-11	S1	0.15	0.5	1.5	1.5	0.2

Mechanical properties of all -weld metal (typical values) :

Wire electrode	Hardness HB 30*
50-11	250 - 350

* as to DIN 8555, sheet2, fig.2

Application: Hard surfacing of machine parts, driving gears, rails, support, rolls of caterpillars, etc.

AMA OP 350 A

Standards: EN 760 SA CS 3 97 AC
DIN 32 522 B CS 3 97 CCrMo AC 8

Type/ Characteristics: Agglomerated alloy-bearing type flux for hard surfacing purposes, to be used in combination with 50-11, 50-22 wire electrodes. The alloying effect of the flux depends to a large degree on the welding parameters chosen. Optimum parameters for a 4 mm dia. wire electrode are 600A / 32V / 50 cm/min. welding speed. AMA OP 350 A is suitable to be used on either DC or AC.

Damp flux shall be redried by baking at 300 C

All -Weld metal analysis (typical values) :

With Wire electrode		Weight-%				
	DIN/EN	C	Si	Mn	Cr	Mo
50-11	S1	0.25	0.5	1.7	3	0.4
50-22	S2CrMo1	0.25	0.8	1.8	3.5	0.7

Mechanical properties of all -weld metal (typical values) :

Wire electrode	Hardness HB 30*
50-11	350 - 450
50-22	460 - 540

* as to DIN 8555, sheet2, fig.2

Application: Hard surfacing of machine parts, driving gears, rails, support, rolls of caterpillars, etc.

SAW Backing Flux

AMA

AMA OP 10 U

Standards: DIN EN 760 ~ ACS1

Type/ Characteristics: AMA OP 10 U is an agglomerated flux for use as the backing medium in the single-sided submerged arc welding process.
For single-sided welding the backing flux is spread as a thin layer of a few millimeters in thickness in a copper backing bar which is pressed against the underside of the weld joint. After welding the slag detaches easily and the root of the weld exhibits a uniform profile. AMA OP 10 U is suitable for use with single, tandem and multi-wire submerged arc welding processes. The optimized fine grain size in combination with the flux chemistry of AMA OP 10 U ensures that the weld profile is straight, with clean weld toes and a smooth cosmetically acceptable surface.

Damp flux should be redried by baking at 300-350°C

Main constituents

$SiO_2 + TiO_2$	$CaO + MgO$	$Al_2O_3 + MnO$	CaF_2
32%	53%	5%	7%

Packing: Polyethylene plastic sacks of 25 kg weight.

Submerged Arc Welding Wires

AMA

AMA Trade Name	DIN EN 756	AWS/ASME SFA5.17	C	Si	Mn	
50-11	S1		0.1	<0.15	0.5	
50-12	S2		0.1	<0.15	1	
50-13	S2Si		0.1	0.2	1	
50-15	S3		0.1	0.15	1.5	
50-16	S3Si		0.1	0.25	1.35	
50-18	S4		0.13	<0.15	>1.8	
50-51		EL 12	0.1	<0.1	0.5	
50-52		EM12	0.1	<0.1	1	
50-53		EM12 K	0.11	0.18	1	
50-56		~EM13K	0.12	0.27	1.3	
50-57		EH12K	0.12	0.35	1.75	
50-61		EH14	0.12	<0.1	1.85	

AMA Trade Name	DINEN 756	AWS/ASME SFA 5.23	C	Si	Mn	Mo	Cr	Ni
50-14	S2Mo		0.1	0.15	1	0.5		
50-17	S3Mo		0.1	0.15	1.5	0.5		
50-19	S4Mo		0.1	0.12	2	0.5		
50-21	S3Ni1Mo		0.12	0.15	1.7	0.6	–	1
50-22	S2CrMo1		0.12	0.2	1	0.5	1.2	–
50-23*	S1CrMo2		0.12	0.2	0.5	1	2.5	–
50-24*	S2Ni1		0.1	0.25	1.3	–	–	1
50-25*	S2Ni2		0.1	0.15		–	–	2.2
50-54		EA 1	0.1	0.15	0.95	0.5		
50-55		EA 2	0.12	0.15	1.1	0.5		
50-58		EA 3	0.11	0.15	1.75	0.5		
50-59		EA 4	0.1	0.15	1.5	0.5		
50-62		EB 2	0.12	0.2	1	0.5	1	–
50-63		EB 3	0.12	0.2	0.7	1	2.4	
50-64		EF 1	0.1	0.2	1.6	0.5	–	1
50-65		EF 3	0.12	0.2	1.8	0.5	–	1
50-66		E G	0.1	0.3	0.95	Cu:0.35	0.26	0.78

* These wires produces after order.

AMA Trade Name	DIN 8556	AWS/ASME SFA5.9	C	Si	Mn	Mo	Cr	Ni	Nb
30-51	**UPX2CrNi 19 9**	ER308L	<0.025	0.4	1	–	19	9	–
30-52	**UPX5CrNiNb 19 9**	ER347	<0.05	0.4	1.3	–	19	9	>12 **xc**
30-53	**UPX2CrNiMo 19 12**	ER316L	<0.025	0.4	1.3	2.7	19	12	–
30-54	**UPX5CrNiMoNb19 12**	ER318	<0.05	0.4	1.3	2.7	19	12	>12 **xc**

MIG/MAG Wires for C-Mn Steels Welding

AMA

AMA 40-13 M

Standards: AWS/ASME SFA - 5.18 ER70S-3

Application/ Properties: Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO2 - or mixed shielding gas, e.g. Ar with 5-25% CO2.

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.06-0.15	0.45-0.75	0.9-1.4	<0.025	<0.025

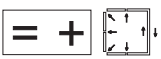
Mechanical properties of all - weld metal using CO2 shielding gas
(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V -18 °C
500-640	>420	>22	>50

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Copper coating & wound wire - reel on:
weight :15kg.
diameter : 0.8 -2 mm



AMA 40-14 M

Standards: AWS/ASME SFA - 5.18 ER70S-4

Application/ Properties: Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO2- or mixed shielding gas, e.g. Ar with 5-25% CO2.

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.07-0.15	0.65-0.85	1-1.5	<0.025	<0/025

Mechanical properties of all- weld metal using CO2 shielding gas

(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V -29 °C
500-640	420	>22	>40

Material :

DIN Standard St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH

ASTM & API Standard ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Copper coating & wound wire - reel on:

weight :15kg.
diameter : 0.8 -2 mm

AMA 40-16 M

Standards: AWS/ASME SFA - 5.18 ER70S-6

Application/ Properties: Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO2 - or mixed shielding gas, e.g. Ar with 5-25% CO2.

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.06 -0.15	0.8-1.15	1.4-1.85	<0.025	<0.025

Mechanical properties of all - weld metal using CO2 shielding gas

(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V -29 °C
500-640	>420	>22	>50

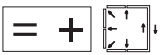
Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Copper coating & wound wire - reel on:

weight :15kg.

diameter : 0.8 -2 mm



AMA 40-18 M

Standards: DIN 8559 SG 2
Material-No. 1.5125
EN 440 G3 Si1

Application/ Properties: Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO2 - or mixed shielding gas, e.g. Ar with 5-25% CO2.

Analysis of Wire electrode% (Typical va lue) **:**

C	Si	Mn	P	S
0.06-0.12	0.7-1	>1.3-1.6	<0.025	<0.025

Mechanical properties of all - weld metal using CO2 shielding gas
(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V -30 °C
500-640	>420	>22	>50

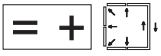
Material:

DIN Standard St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH

ASTM & API Standard ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70;
A516 Gr. 55; A570 Gr. 30, 33, 36,
40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45;
A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841;
A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Copper coating & wound wire - reel on:
weight :15kg.
diameter : 0.8 -2 mm



AMA 40-19 M

Standards: DIN 8559 SG 3
Material-No. 1.5130
EN 440 G4 Si1

Application/ Properties: Low alloy wire electrode for MAG- Welding of general structural steels and pipe steels using CO2- or mixed shielding gas, e.g. Ar with 5-25% CO2.

Analysis of Wire electrode% (Typical va lue) **:**

C	Si	Mn	P	S
0.06-0.13	0.8-1.2	>1.6-1.9	<0.025	<0.025

Mechanical properties of all -weld metal using CO2 shielding gas
(single value are typical values) :

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (j) ISO - V -30 °C
530-680	>460	>22	>60

Material:

DIN Standard St 37-2 to St 60-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 355 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235J2G3 to S355J2G3; E360; P235T1 to P355T1; P235G1TH; P255G1TH; P235GH; P310GH; P265GH; P295GH; S355G1S to S355G3S; S255N to S420N; P255NH to P420NH ; S235JRS1 to S235J4S

ASTM & API Standard ASTM A27 a. A36 Gr. all; A106 Gr. A, B A214; A 242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A556 Gr. B2A; A570 Gr. 30, 33, 36, 40, 45; A572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Copper coating & wound wire - reel on:
weight :15kg.
diameter : 0.8 -2 mm

Low Alloy MIG/MAG Welding Wires

AMA

AMA 80-11 M

Standards: AWS/ASME SFA-5.28 ER 80S-B2

Application/ Properties: Medium-alloyed wire for MAG welding of Cr Mo-alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 550 C.
This wire shall be welded using mixed shielding gas. Observe direction as to pre-weld heat treatment of materials.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Mn	Cr	Mo
0.1	0.4	0.6	1.3	0.5

Shielding gas: DIN EN 439-M2 1 (15-25% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (Joule) ISO - V 25 °C
T	600-700	>500	>21	>80
N+T	480-560	>350	>25	>80

T= Heat treatment 30 min at 720C,furnace cooling to 300C

N+T= norm + treatment 30 min at 930 C, air cooling + 30 min at 720 C, furnace cooling to
300C.

Material:

DIN Standard	13CrMo 44 ;15CrMo5 ;16CrMo44 ; 25CrMo4 ; 24CrMo5 ; GS -22CrMo 54 ;GS-17CrMo 55
EN Standard	13CrMo4-5 ;15CrMo5 ; 42CrMo4 ; 16CrMoV4 ; 25CrMo4 ;24CrMo5, ; G22CrMo5-4 ; G17CrMo5-5
ASTM Standard	A193 Gr. B7 ; A335 Gr. P11 a. P12 ; A217 Gr. WC6

Delivery: Only Copper coating,wound wire - reel on:
weight :15kg.
diameter : 1 - 2 mm
Note: other weight & sizes are produced upon customers request.

AMA 80-12 M

Standards: AWS/ASME SFA-5.28 ER 80S-G (ER 80S-Ni1)
ER80S-Ni1

Application/ Properties: Medium-alloyed wire for MAG welding of atmospheric corrosion resistant steels and structural steels. Weld metal have good toughness and mechanical properties.
This wire can be use with Co2 or Ar-Co2 mixed gases.

Analysis of Wire electrode% (Typi cal value) :

C	Mn	Si	Ni	Cr	Cu
0.07	1.1	0.7	0.8	0.15	0.3

Shielding gas: DIN EN 439-M2 1 (15-25% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V	
			-40°C	-46°C
620	530	24	60	50

Material:

DIN Standard St 37-2 to St 60-2 ; St 52-3 Cu 3 ; WTSt 37-2 ;

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr. B, C

Delivery: Only Copper coating wound wire- reel on:
weight :15kg.
diameter : 1 -2 mm
Note: other weight & sizes are produced upon customers request.

AMA 80-14 M

Standards: AWS / ASME SFA 5.28 ER 70S-A1(ER 80S-G)
DIN 8575 SGMo

Application/ Properties: This wire suitable for welding of boilers, Pipes and steels having 0.5 percent Mo subjected to operating temperature up to 550°C.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	P	S	Mo
0.1	0.6	1.1	0.016	0.01	0.5

Shielding gas: DIN EN 439-M2 1 (15-25% CO2, Balance Ar)

Mechanical properties of all -weld metal:

Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V 25 °C
520-620	>430	>22	>80

Material:

DIN Standard St 37-3 to St 52-3 ; St 37-2 to St 60-2 ; ST35.8 to ST45.8 ; StE 320.7 to StE415.7 ; StE 255 to StE 500 ;17Mn4 ; 19Mn5 ; 15Mo3 ; TStE 255 to TStE 500 .

EN Standard S355J2G3 ; E295 ; E335 ; P255G1TH ; L320 to L415NB ; L320MB to L415MBM ; S255N to S500N ; P295GH ; P310GH ;16Mo3 ; 15NiCuMoNb5, 20MnMoNi4-5 ; 17MnMoV6-4 ; S255NH to S500NH ; S255NL to S500NL.

ASTM Standard A204 Gr.A,B,C ; A217 Gr.WC1 ; A213 Gr.T2 ; A355 Gr.P1 ; A182M Gr. F1 ; A204M Gr. A, B, C; A250 Gr. T1

Delivery: Only Copper coating wound wire- reel on:
Weight :15kg.
diameter: 1 -2 mm
Note: other weight & sizes are produced upon customer's request.

AMA 80-15 M

Standards: AWS / ASME SFA 5.28 E R 100 S-G

Application / Properties: Medium-alloyed wire electrode for MAG welding of high strength fine grain structural steels. The wire is suited for joint welding in boiler, pressure vessel, pipeline, and crane construction. wire features good ductility and crack resistance in spite of its high strength.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Ni	Cr	V	Mo
0.1	0.6	1.6	1.4	0.3	0.05	0.25

Shielding gas: DIN EN 439 - M21 (15-25% CO_2 , balance Ar)
DIN EN 439 - C1 (100 % CO_2)

Mechanical properties of all -weld metal: shielding gas : M21

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C	-40 °C
AW	750-880	>650	>16	>80	>47

AW :as - welded

Material:

DIN Standard	STE 550 to STE 690 ; ESTE 620 ; ESTE 690 ; 20MnMoNi5 5
EN Standard	S380N to S500N ; S380NL to S500NL ; S500NC to S550NC ;
ASTM Standard	ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P ; A225 Gr. C ; A633 Gr. E ; A572 Gr. 65

Delivery: Only Copper coating wound wire - reel on:
Weight: 15kg.
Diameter: 0.8-1.6 mm
Note: other weight & sizes are produced upon customers request.

AMA 80-16 M

Standards: AWS / ASME SFA 5.28 E R 80S-B6

Application / Properties: GMAW solid wire for welding of plate and tube alloyed steels which to contain 5 % Cr and 0.5 % Mo, particularly for application in oil refineries and petrochemical industries. Weld metal ability of service in hot hydrogen conditions.
Preferably used for the base metal X12CrMo5 Approved in long-term condition up to +650 °C service temperature.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Cr	Mo
0.06	0.25	0.45	5.1	0.5

Shielding gas: DIN EN 439 - M21 (15-25 % CO2 + Balance Ar)

Mechanical properties of all -weld metal: shielding gas : M21

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)
T	550-700	>460	>22

T : Heat treatment 1 h at 745C,furnace cooling to 300C

Material:

DIN Standard X12CrMo5; GX12CrMo5

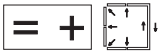
ASTM Standard A182 Gr.F5 ; A199 Gr.T5 ; A213 Gr. T5; A217 Gr. C5; A335 Gr. P5 ; A336 C1.F5 ; A369 Gr.FP5 ; A387 Gr.5

Delivery: Only Copper coating, wound wire - reel on:

Weight: 15kg.

Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.



AMA 80-17 M

Standards: AWS / ASME SFA 5.28 E R 90S-B3
DIN 8575 SG CrMo 2

Application / Properties: GMAW solid wire for Cr-Mo low alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for the base metal 10CrMo910 Approved in long-term condition up to +600 °C service temperature. Also for similar alloyed quenched and tempered steels and case hardening steels. The deposit is noted for its good mechanical properties and cracking resistance.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Cr	Mo
0.1	0.5	0.7	2.4	1

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all -weld metal: shielding gas : M21

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C
T	570-700	>440	>20	130

T :Heat treatment 1 h at 745C,furnace cooling to 300C

Material:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo 910.

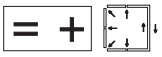
ASTM Standard ASTM A335 Gr. P22; A217 Gr. WC 9.

Delivery: Only Copper coating, wound wire - reel on:

Weight: 15kg.

Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.



AMA 80-18 M

Standards: AWS / ASME SFA 5.28 E R 80S-Ni2
DIN EN 440 G2 Ni2

Application / Properties: GMAW wire for high quality welds in the construction of storage tanks and piping systems for cryogenic applications. The weld deposit is noted for its particularly good low temperature properties.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Ni	S	P
0.08	0.5	1.2	2.3	<0.02	<0.02

Shielding gas: DIN EN 439 - M21 (15-25% CO_2 , balance Ar)
DIN EN 439 - C1 (100 % CO_2)

Mechanical properties of all -weld metal: (shielding gas : M21)

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V -60 °C
T	550-700	>460	>22	>47

T :Heat treatment 1 h at 620C,furnace cooling to 300C

Material:

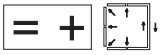
DIN Standard TStE 355 to TStE 460 ; EStE 355 to EstE 460 ; STE 255 to STE 460 ; WStE 355 to WStE 460 ;
EN Standard 12Ni14 ; 14Ni6 ; 10Ni14 ; 13MnNi 6 3 ; P355NL1 to P460NL1; P355NL2 to P460NL2 ; S255N to S460N ; S355NH to S460NH ; S255NL to S460NL ; S255NL1 to S380NL1.
ASTM Standard A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 and A334 Gr. 3; A 350 Gr. LF3

Delivery: Only Copper coating, wound wire - reel on:

Weight: 15kg.

Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.



Stainless Steel MIG/MAG Welding Wires

AMA

AMA 30-11 M

Standards: AWS/ASME SFA-5.9 ER 308 L

Application/ Properties: Austenitic stainless wire electrode in extra low carbon quantity for MIG/ MAG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
<0.03	0.3-0.65	19.5-22	1-2.5	9-11

Shielding gas: DIN EN 439 -M13 (0 -3% O2, Balance Ar)

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>320	>35	>80

Material:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Delivery: Only wound wire - reel on:
weight :15kg.
diameter : 0.8 -1.6 mm
Note: other weight & sizes are produced upon customers request.

AMA 30-12 M

Standards: AWS/ASME SFA-5.9 ER 308 LSi

Application/ Properties: Austenitic stainless wire electrode in extra low carbon quantity for MIG/ MAG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
<0.03	0.65-1	19.5-22	1-2.5	9-11

Shielding gas: DIN EN 439-M13 (0 -3% O2, Balance Ar)

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

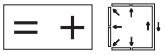
Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>320	>35	>80

Material:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Delivery: Only wound wire - reel on:
weight :15kg.
diameter : 0.8 -1.6 mm
Note: other weight & sizes are produced upon customers request.



AMA 30-13 M

Standards: AWS/ASM E SFA-5.9 ER 316 L

Application/ Properties: Austenitic stainless wire electrode in extra low carbon quantity for MIG/ MAG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni	Mo
<0.03	0.3-0.65	18-20	1-2.5	11-14	2-3

Shielding gas: DIN EN 439 -M13 (0 -3% O2, Balance Ar)

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>320	>30	>80

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Delivery: Only wound wire - reel on:
weight :15kg.
diameter : 0.8 -1.6 mm
Note: other weight & sizes are produced upon customers request.

AMA 30-14 M

Standards: AWS/ASM E SFA-5.9 ER 316 L Si

Application/ Properties: Austenitic stainless wire electrode in extra low carbon quantity for MIG/ MAG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode % (Typical value):

C	Si	Cr	Mn	Ni	Mo
<0.03	0.65-1	18-20	1-2.5	11-14	2-3

Shielding gas: DIN EN 439 -M13 (0 -3% O2, Balance Ar)

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>320	>30	>80

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request

AMA 30-15 M

Standards: AWS/ASME SFA-5.9 ER 347

Application/ Properties: stabilized austenitic stainless steels wire electrode for MIG/ MAG welding of unstabilized and stabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Ni	Nb
<0.08	0.3-0.65	19-21.5	9-11	>10xC

Shielding gas: **DIN EN 439 -M13 (0 -3% O2, Balance Ar)**

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>350	>30	>65

Material:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C .

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request.

AMA 30-16 M

Standards: AWS/ASME SFA-5.9 ER 347 Si

Application/ Properties: stabilized austenitic stainless steels wire electrode for MIG/ MAG welding of unstabilized and stabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) :

C	Si	Cr	Ni	Nb
<0.08	0.65-1	19-21.5	9-11	>10xC

Shielding gas: DIN EN 439 -M13 (0-3% O2, Balance Ar)

DIN EN 4 39 -M12 (0-5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>350	>30	>65

Material:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C .

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request.

= +

AMA 30-17 M

Standards: AWS/ASME SFA-5.9 ER 309 L

Application/ Properties: Austenitic - ferritic wire electrode foe MIG/ MAG welding of high alloy steels to unalloyed or low alloy steels. Highest operating temperature is 300 C.

Wire Analysis:

C	Si	Cr	Mn	Ni
<0.03	0.3-0.65	23-25	1-2.5	12-14

Shielding gas: DIN EN 439 -M13 (0-3% O2, Balance Ar)

DIN EN 439 -M12 (0 -5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>400	>30	>47

Material:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request.

AMA 30-18 M

Standards: AWS/ASME SFA-5.9 ER 309 LSi

Application/ Properties: Austenitic - ferritic wire electrode foe MIG/ MAG welding of high alloy steels to unalloyed or low alloy steels. Highest operating temperature is 300 C.

Wire Analysis:

C	Si	Cr	Mn	Ni
<0.03	0.65-1	23-25	1-2.5	12-14

Shielding gas: DIN EN 439 -M13 (0-3% O2, Balance Ar)

DIN EN 439 -M12 (0-5% C O2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>520	>400	>30	>47

Material:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request.

AMA 30-19 M

Standards: AWS/ASME SFA-5.9 ER 310

Application/ Properties: Fully austenitic stainless wire electrode for MIG/MAG welding of heat resistant steels, containing 25% Cr and 20% Ni. Likewise suited for welding heat and scaling resistant ferritic chromium steels unless corrosion attack by reducing sulphur-bearing combustion gases is to be expected. Non-scaling up to 1200 C. Weld metal exhibits good toughness down to -196C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
0.08-0.15	0.3-0.65	25-28	1-2.5	20-22.5

Shielding gas: DIN EN 439 -M13 (0-3% O2, Balance Ar)

DIN EN 439 -M12 (0-5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>550	>300	>30	>70

Material:

DIN EN standard 1.4745 G-X40CrSi 23 ; 1.4823 G-X40CrNiSi 27 4 ; 1.4832 G-X25CrNiSi 20 14 ; 1.4833 X7CrNi 23 14 ; 1.4841 X15CrNiSi 25 20 ; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12 ; 1.4840 G-X15CrNi 25 20 ; 1.4846 G-X40CrNi 25 21 ; 1.4826 G-X40CrNiSi 22 9 ; 1.4713 X10CrAl7; 1.4724 X10CrAl 13 ; 1.4742 X10CrAl 18 ; 1.4762 X10CrAl 25 ; 1.4710 G-X30CrSi 6 ; 1.4740 G-X40CrSi 17

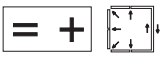
other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.



AMA 30-21 M

Standards: AWS/ASME SFA-5.9 ER 318

Application/ Properties: Stabilized austenitic stainless wire electrode for MIG/MAG welding of stabilized or unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode% (Typical value) **:**

C	Cr	Si	Ni	Mo	Nb
<0.08	18-20	0.3-0.65	11-14	2-3	>8xC

Shielding gas: DIN EN 439 -M 13 (0-3% O2, Balance Ar)

DIN EN 439 -M12 (0-5% CO2, Balance Ar)

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) ISO - V 25 °C
>550	>350	>25	>65

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb17 12 2 ; 1.4583 X10CrNiMoNb 18 12

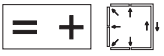
other Standard AISI 316L, 316Ti, 316Cb

Delivery: Only wound wire - reel on:

weight :15kg.

diameter : 0.8 -1.6 mm

Note: other weight & sizes are produced upon customers request



Nickle base MIG/MAG Welding wires

AMA

AMA 90-11 M

Standards: AWS/ASME SFA-5.14 ERNiCr-3

Application / Properties: GMAW solid wire for welding of nickel-base alloys,high-temperature and creep resisting steels, heat resisting and cryogenic materials, low-alloyed problem steels and dissimilar joints. Ferritic austenitic joints for service temperatures above +300 °C or for applications where a post weld heat treatment is required. Suitable for pressure vessel fabrication for the service temperature range -196 °C to +550 °C, otherwise resistant to scaling up to +1200 °C . Not susceptible to embrittlement . Resistant to thermal shocks, corrosion resistant, fully austenitic. Low coefficient of thermal expansion (between C-steels and austenitic CrNi (Mo) steel).

Weld metal analysis in % (typical values):

C	Mn	Ni	Cr	Nb+Ta
<0.05	3	rest	20.5	3.5

Shielding gas: DIN EN 439 - I1 (100% Ar)
DIN EN 439 - I3 (Ar + He)

Mechanical Properties of all-weld metal : shielding gas : I 1

Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (j) ISO - V +20°C	-196 °C
AW	>640	>400	>35	160	80

AW :As welded

Material:

DIN Standard: 2.4816 Ni Cr 15 Fe ; 2.4817 LC-NiCr 15 Fe ; X8Ni9

Other standard: Alloy 600, Alloy 600 L

Delivery: Only wound wire - reel on:
Weight: 15kg.
Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.

AMA 90-12 M

Standards: AWS/ASME SFA-5.14 ERNiCrMo-3

Application / Properties: GMAW solid wire for high-quality joint welding of nickel- base alloys like Inconel 625 and Incoloy 825 as well as of CrNiMo stainless steels with high Mo-content. Additionally it is recommended for high temperature or creep resisting, heat resisting and cryogenic materials, joining of dissimilar steels.
Can be used for pressure vessel fabrication for service temperatures in the -196 °C to +550 °C range, otherwiseup to scaling resistance limit of +1200°C . Due to the weld metal embrittlement between +600 - 850 °C, this temperature range should be avoided. Highly resistant to hot cracking. Extremely resistant to stress corrosion cracking and pitting. Resistant to thermal shocks, fully austenitic. Low coefficient of thermal expansion (between C-steels and austenitic CrNi (Mo) steel)

Weld metal analysis in % (typical values):

C	Ni	Mo	S	P	Fe	Cr	Nb+Ta
<0.03	rest	9	<0.1	<0.1	1	22	3.2

Shielding gas: DIN EN 439 - I1 (100 % Argon)
DIN EN 439 - I3 (Ar + He)

Mechanical Properties of all-weld metal : (single values are typical values)

Heat treatment	Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (j) ISO - V +20°C	-196 °C
AW	>740	>500	>35	100	80

AW :As welded

Material:

DIN Standard: 2.4856 NiCr 22 Mo 9 Nb ; 2.4858 NiCr 21 Mo ; 2.4816 NiCr 15 Fe ; 1.4583 X10CrNiMoNb18 12 ; 1.4876 X 10 NiCrAlTi 32 20 H ; 1.4876 X 10 NiCrAlTi 32 20 ; 1.4529 X1NiCrMoCuN25 20 7 ; X 2 CrNiMoCuN 20 18 6 ; 2.4641 NiCr 21 Mo 6 Cu ; 1.5662 X8Ni9 ; 1.4529 (X 1 NiCrMoCuN 25 20 6), 1.4547(X 1 CrNiMoCu N20 18 7)

Other standard: ASTM A 553 Gr.1, Alloy 600, Alloy 625, Alloy 800, 9 % Ni-steels

Delivery: Only wound wire - reel on:
Weight: 15kg.
Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.

AMA 90-13 M

Standards: AWS/ASME SFA-5.14 ERNiCu-7
DIN 1736 SG-NiCu30Mn

Application / Properties: GMAW solid wire for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials , such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Weld metal analysis in % (typical values):

C	Mn	Si	Ti	Ni	Cu	Fe
0.05	3.7	0.1	2.3	rest	28	0.9

Shielding gas: DIN EN 439 - I1 (100 % Argon)
DIN EN 439 - M11 (0-5% Co2, balance Ar)

Mechanical Properties of all-weld metal :(single values are typical values)

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20°C
>500	>300	>35	150

Material:

DIN Standard: NiCu30Fe (2.4360), NiCu30Al (2.4375)

Other standard: Alloy 400, ASTM B 127, B 165

Delivery: Only wound wire - reel on:
Weight: 15kg.
Diameter: 0.8-1.6 mm

Note: other weight & sizes are produced upon customers request.

TIG Wires for C-Mn Steels Welding

AMA

AMA 40-13 T

Standards: AWS/ASME SFA - 5.18 ER70S-3

Application/ Properties: Low alloy wire electrode for TIG- Welding of general structural steels and pipe steels using Ar shielding gas..

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.06-0.15	0.45-0.75	0.9-1.4	<0.025	<0.025

Mechanical properties of all - weld metal using Ar shielding gas
(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V -18 °C
500-640	>420	>22	>100

Material:

DIN Standard St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

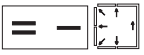
EN Standard S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH

ASTM & API Standard ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70;
A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45;
A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60;
A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Welding rods, Copper coated:

weight :5 or 10 kg.

diameter : 1 -4 mm length : 1000 mm



AMA 40-14 T

Standards: AWS/ASME SFA - 5.18 ER70S-4

Application/ Properties: Low alloy wire electrode for TIG- Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.07-0.15	0.65-0.85	1-1.5	<0.025	<0.025

Mechanical properties of all -weld metal using Ar shielding gas
(single value are typical values) :

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A4 (%)	Impact energy (j) ISO - V -29 °C
500-640	>420	>22	>100

Material:

DIN Standard	St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.
EN Standard	S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; - S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH
ASTM & API Standard	ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70; A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45; A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2; A935 Gr. 45; A936 Gr. 50 API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Welding rods, Copper coated:

weight :5 or 10 kg.

diameter : 1 -4 mm length : 1000 mm

AMA 40-16 T

Standards: AWS/ASME SFA - 5.18 ER70S-6

Application/ Properties: Low alloy wire electrode for TIG- Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of Wire electrode% (Typical value) :

C	Si	Mn	P	S
0.06-0.15	>0.8-1.15	1.4-1.85	<0.025	<0.025

Mechanical properties of all - weld metal using Ar shielding gas
(single value are typical values) :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A4 (%)	Impact energy (j) ISO - V -29°C
500-640	>420	>22	>120

Material:

DIN Standard St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH

ASTM & API Standard ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70;
A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45;
A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60;
A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2;
A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Welding rods, Copper coated:

weight :5 or 10 kg.

diameter : 1 -4 mm length : 1000 mm

AMA 40-18 T

Standards: DIN 8559 WSG 2
Material-No. 1.5125
DIN En 1668 W 3 Si 1

Application/ Properties: Low alloy wire electrode for TIG- Welding of general structural steels and pipe steels using Ar shielding gas.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Mn	P	S
0.06-0.12	>0.7-1	>1.3-1.6	<0.025	<0.025

Mechanical properties of all - weld metal using Ar shielding gas
(single value are typical values) :

Tensile Strength (N/mm²)	Yield Strength (N/mm²)	Elongation A5 (%)	Impact energy (j) ISO - V -30 °C
500-640	>420	>22	>100

Material:

DIN Standard St 37-2 to St 70-2; St 37-3 to St 52-3 ; St 37.0 to St 52.0; St 37.4 to St 52.4; StE 210.7 to StE 360.7; StE 210.7 TM to StE 290.7 TM; St 35.8 to St 45.8; H?; H??;17mn4; 19Mn5; GL-A to GL-E ; GL-A 36 to GL-E 36; STE 255 to StE 355 ; WStE 255 to WStE 380 ; TStE 255 to TStE 355 ; TT ST 35 N ; GS-38 ; GS-52.

EN Standard S235J2G3 to S355J2G3; E360, P235T1 to P355T1 ; P235G1TH ; L210 ; L290MB ; P255G1TH ; P235GH ; P265GH ; P295GH ; P310GH ; P255NH ; S235JRS1 to S235J4S ; S355G1S to S355G3S ; S255N to S355N ; P255NH to P380NH

ASTM & API Standard ASTM A27 a. A36 Gr. all ; A214; A242 Gr. 1-5; A266 Gr. 1, 2, 4; A283 Gr. A, B, C, D; A285 Gr. A, B, C; A299 Gr. A, B; A328; A366; A515 Gr. 60, 65, 70;
A516 Gr. 55; A570 Gr. 30, 33, 36, 40, 45;
A 572 Gr. 42, 50; A606 Gr. all; A607 Gr. 45; A656 Gr. 50, 60; A668 Gr. A, B; A907 Gr. 30, 33, 36, 40; A841; A851 Gr. 1, 2;
A935 Gr. 45; A936 Gr. 50
API 5 L Gr. B, X 42, X 46, X 52, X 56, X 60

Delivery: Welding rods, Copper coated:

weight :5 or 10 kg.

diameter : 1 -4 mm length : 1000 mm

Low Alloy TIG Welding Wires

AMA

AMA 80-11 T

Standards: AWS/ASME SFA-5.28 ER 80S-B2

Application/ Properties: Medium-alloyed welding rod for TIG-Welding of Cr Mo-alloyed creep resistant boiler and pipe steels subjected to operating temperatures up to 550C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Mn	Cr	Mo
0.1	0.4	0.6	1.3	0.5

Shielding gas: 100% Argon

Mechanical properties of all -weld metal :

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (Joule) ISO - V 25 °C
T	600-700	>500	>21	>95
N+T	480-560	>350	>25	>110

T= treatment 30 min at 720C,furnace cooling to 300C

N+T= norm + treatment 30 min at 930 C, air cooling + 30 min at 720 C
, furnace cooling to
300C.

Material:

DIN Standard	13CrMo 44 ;15CrMo5 ;16CrMo44 ; 25CrMo4 ; 24CrMo5 ; GS -22CrMo 54 ;GS-17CrMo 55
EN Standard	13CrMo4-5 ;15CrMo5 ; 42CrMo4 ; 16CrMoV4 ; 25CrMo4 ;24CrMo5, ; G22CrMo5-4 ; G17CrMo5-5
ASTM Standard	A193 Gr. B7 ; A335 Gr. P11 a. P12 ; A217 Gr. WC6

Delivery:

Copper coating , welding rods

weight :5 kg. diameter : 1 - 4 mm. Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 80-12 T

Standards: AWS/ASME SFA-5.28 ER 80S-G (ER 80S-Ni1)
ER80S-Ni1

Application/ Properties: Medium-alloyed wire for TIG welding of atmospheric corrosion resistant steels and structural steels. Weld metal have good toughness and mechanical properties.

Analysis of Wire electrode% (Typical value) **:**

C	Mn	Si	Ni	Cr	Cu
0.07	1.1	0.7	0.8	0.15	0.3

Shielding gas: 100% Argon

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V -40°C	-51°C
>560	>470	25	70	50

Material:

DIN Standard St 37-2 to St 60-2 ; St 52-3 Cu 3 ; WTSt 37-2 ;

EN Standard S235JR, S235JRW, S355JRW, S355J2G3 Cu

ASTM Standard ASTM A36, A283 Gr. B, C

Delivery: Copper Coated, welding rods

weight :5 kg.

diameter : 1 -4 mm

Length: 1000 mm

Note: other weight & sizes are produced upon customers request.

AMA 80-14 T

Standards: AWS / ASME SFA 5.28 ER 70S-A1(ER 80S-G)
DIN 8575 SGMo

Application/ Properties: This wire suitable for welding of boilers, Pipes and steels having 0.5 percent Mo subjected to operating temperature up to 550°C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Mn	P	S	Mo
0.1	0.6	1.1	0.016	0.01	0.5

Shielding gas: 100% Argon

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V 25 °C
570-670	>470	>22	>80

Material:

DIN Standard	St 37-3 to St 52-3 ; St 37-2 to St 60-2 ; ST35.8 to ST45.8 ; StE 320.7 to StE415.7 ; StE 255 to StE 500 ;17Mn4 ; 19Mn5 ; 15Mo3 ; TStE 255 to TStE 500 .
EN Standard	S355J2G3 ; E295 ; E335 ; P255G1TH ; L320 to L415NB ; L320MB to L415MBM ; S255N to S500N ; P295GH ; P310GH ;16Mo3 ; 15NiCuMoNb5, 20MnMoNi4-5 ; 17MnMoV6-4 ; S255NH to S500NH ; S255NL to S500NL.
ASTM Standard	A204 Gr.A,B,C ; A217 Gr.WC1 ; A213 Gr.T2 ; A355 Gr.P1 ; A182M Gr. F1 ; A204M Gr. A, B, C; A250 Gr. T1

Delivery: Copper Coated, welding rods

weight :5 kg.

diameter : 1 -4 mm

Length: 1000 mm

Note: other weight & sizes are produced upon customers request.

AMA 80-15 T

Standards: AWS / ASME SFA 5.28 ER 100S-G

Application / Properties: Medium-alloyed rod electrode for TIG welding of high strength fine grain structural steels. The wire is suited for joint welding in boiler, pressure vessel, pipeline, and crane construction. wire features good ductility and crack resistance in spite of its high strength.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Ni	Cr	V	Mo
<0.1	0.6	1.6	1.4	0.3	0.05	0.25

Shielding gas: DIN EN 439 - I1 (100 % Ar)

Mechanical properties of all -weld metal: shielding gas : I 1

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C	-50 °C
AW	780-900	>670	>17	>80	>47

AW :as - welded

Material:

DIN Standard	STE 550 to STE 690 ; ESTE 620 ; ESTE 690 ; 20MnMoNi5 5
EN Standard	S380N to S500N ; S380NL to S500NL ; S500NC to S550NC ;
ASTM Standard	ASTM A517 Gr. A, B, C, E, F, H, J, K, M, P ; A225 Gr. C ; A633 Gr. E ; A572 Gr. 65

Delivery: Copper coated , welding rods

Weight: 5 kg.

Diameter: 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 80-16 T

Standards: AWS / ASME SFA 5.28 ER 80S-B6

Application / Properties: GTAW rod for welding of plate and tube alloyed steels which to contain 5 % Cr and 0.5 % Mo, particularly for application in oil refineries and petrochemical industries. Weld metal ability of service in hot hydrogen conditions.
Preferably used for the base metal X12CrMo5 Approved in long-term condition up to +650 °C service temperature.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Cr	Mo
0.06	0.25	0.45	5.1	0.5

Shielding gas: DIN EN 439 - I1 (100 % Ar)

Mechanical properties of all -weld metal:

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)
T	550-700	>460	>22

T :Heat treatment 1 h at 745C,furnace cooling to 300C

Material:

DIN Standard X12CrMo5; GX12CrMo5

ASTM Standard A182 Gr.F5 ; A199 Gr.T5 ; A213 Gr. T5; A217 Gr. C5; A335 Gr. P5 ; A336 C1.F5 ; A369 Gr.FP5 ; A387 Gr.5

Delivery: Copper coated, welding rods Only wound wire - reel on:

Weight: 5kg.

Diameter: 1-4 mm

Note: other weight & sizes are produced upon customers request.

AMA 80-17 T

Standards: AWS / ASME SFA 5.28 E R 90S-B3
DIN 8575 SG CrMo 2

Application / Properties: GTAW rod for or Cr-Mo low alloyed boiler, plate and tube steels as well as in oil refineries. Preferably used for the base metal 10CrMo910 Approved in long-term condition up to +600 °C service temperature. Also for similar alloyed quenched and tempered steels and case hardening steels. The deposit is noted for its good mechanical properties and cracking resistance.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Cr	Mo
0.1	0.5	0.7	2.4	1

Shielding gas: DIN EN 439 - I1 (100% Ar)

Mechanical properties of all -weld metal:

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C
T	580-700	>450	>20	150

T :Heat treatment 1 h at 745C,furnace cooling to 300C

Material:

DIN Standard 10CrMo9 10; 10CrSiMoV7; G17CrMo 910.

ASTM Standard ASTM A335 Gr. P22; A217 Gr. WC 9.

Delivery: Copper coated , welding rods

Weight: 5kg.

Diameter: 1-4 mm

Note: other weight & sizes are produced upon customers request.

AMA 80-18 T

Standards: AWS / ASME SFA 5.28 E R 80S-Ni2
DIN EN 1668 W2 Ni2

Application / Properties: Welding rod for high quality welds in the construction of storage tanks and piping systems for cryogenic applications. The weld deposit is noted for its particularly good low temperature properties.

Analysis of Wire electrode % (Typical value):

C	Si	Mn	Ni	S	P
0.08	0.5	1.2	2.3	<0.02	<0.02

Shielding gas: DIN EN 439 - I1 (100% Ar)

Mechanical properties of all -weld metal:

Heat Treatment	Tensile Strengt (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V -60 °C
T	570-700	>480	>22	>47

T :Heat treatment 1 h at 620C,furnace cooling to 300C

Material:

DIN Standard TStE 355 to TStE 460 ; EStE 355 to EstE 460 ; STE 255 to STE 460 ; WStE 355 to WStE 460 ;

EN Standard 12Ni14 ; 14Ni6 ; 10Ni14 ; 13MnNi 6 3 ; P355NL1 to P460NL1; P355NL2 to P460NL2 ; S255N to S460N ; S355NH to S460NH ; S255NL to S460NL ; S255NL1 to S380NL1.

ASTM Standard A633 Gr. E; A572 Gr. 65; A203 Gr. D; A333 and A334 Gr. 3; A 350 Gr. LF3

Delivery: Copper coated, welding rods

Weight: 5 kg.

Diameter: 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

Stainless Steels TIG Welding Wires

AMA

AMA 30-11 T

Standards: AWS/ASME SFA-5.9 ER 308 L

Application/ Properties: Austenitic stainless steels welding rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350 C, non-scaling up to 800C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
<0.03	0.3-0.65	19.5 -22	1-2.5	9-11

Shielding gas: 100% Ar.

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>320	>35	>80

Material:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Delivery: welding rods

weight :5 kg.

diameter : 1 - 4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-12 T

Standards: AWS/ASME SFA-5.9 ER 308 L Si

Application/ Properties: Austenitic stainless steels welding rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 350 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
<0/03	0.65-1	19.5-22	1-2.5	9-11

Shielding gas: 100% Ar.

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>320	>35	>80

Material:

DIN EN standard 1.4306 X2CrNi19 11 G-X2CrNiN 18 9 ; 1.4301 X5CrNi18 10 ; 1.4311 X2CrNiN18 10 ; 1.4312 G-X10CrNi 18 8 ; 1.4541 X6CrNiTi18-10 ; 1.4546 X5CrNiNb18-10 ; 1.4550 X6CrNiNb18 10 ; 1.4303 X4CrNi18 12 ; 1.4306 X2CrNi19 11 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi18 7

other Standard AISI 304, 304L, 304LN, 302, 321, 347 ; ASTM A157 Gr. C9 ; A320 Gr. B8C

Delivery: welding rods

weight :5 kg.

diameter : 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-13 T

Standards: AWS/ASM E SFA-5.9 ER 316 L

Application/ Properties: Austenitic stainless welding wire rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni	Mo
<0.03	0.3-0.65	18-20	1-2.5	11-14	2-3

Shielding gas: 100% Ar.

Mechanical properties of all -weld metal :

Tensile Strength (N/mm²)	0.2% Proof Stress (N/mm²)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>320	>30	>80

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Delivery: welding rods

weight :5 kg.

diameter : 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-14 T

Standards: AWS/ASM E SFA-5.9 ER 316 L Si

Application/ Properties: Austenitic stainless welding wire rod in extra low carbon quantity for TIG welding of unstabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni	Mo
<0.03	0.65-1	18-20	1-2.5	11-14	2-3

Shielding gas: 100% Ar.

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>320	>30	>80

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ;1.4429 X2CrNiMoN 17 13 3 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X5CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3 ; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4435 X2CrNiMo18 14 3 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb 17 12 2 , 1.4583 X10CrNiMoNb 18 12

other Standard S31653 ; AISI 316L ; 316Ti ; 316Cb

Delivery: welding rods

weight :5 kg.

diameter : 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-15 T

Standards: AWS/ASME SFA-5.9 ER 347

Application/ Properties: Stabilized austenitic stainless welding rod for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Ni	Nb
<0.08	0.3-0.65	19-21.5	9-11	>10xC

Shielding gas: 100% Ar.

Mechanical properties of all -weld metal :

Tensile Strength (N/mm²)	0.2% Proof Stress (N/mm²)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>350	>30	>65

Material:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C .

Delivery: welding rods

weight :5 kg.

diameter : 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-16 T

Standards: AWS/ASME SFA-5.9 ER 347 Si

Application/ Properties: Stabilized austenitic stainless welding rod for TIG welding of unstabilized corrosion resistant Cr Ni steels. Resistant to intergranular corrosion up to 400 C, non-scaling up to 800 C if subjected to air or oxidizing combustion gases.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Ni	Nb
<0.08	0.65-1	19-21.5	9-11	>10xC

Shielding gas: 100% Ar.

Mechanical properties of all weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>350	>30	>65

Material:

DIN EN standard 1.4301 X5CrNi 18 10 ; 1.4541 X6CrNiTi 18 10 ; 1.4550 X6CrNiNb 18 10 ; 1.4303 X5CrNi 18 12 ; 1.4308 G-X6CrNi18 9 ; 1.4310 X12CrNi17 7 ; 1.4319 X5CrNi 18 7

other Standard AISI 347 ; 321 ; 302 ; 304 ; 304L ; 304LN ; ASTM A296 Gr. CF 8 C ; A157 Gr. C9 ; A320 Gr. B8C .

Delivery: welding rods

weight :5 kg.

diameter : 1 -4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-17 T

Standards: AWS/ASME SFA-5.9 ER 309 L

Application/ Properties: Austenitic-ferritic welding rod for TIG welding of high alloy steels to unalloyed steels. Highest operating temperature is 300 C.

Wire Analysis:

C	Si	Cr	Mn	Ni
<0.030	0.30-0.65	23-25	1-2.5	12-14

Shielding gas: 100% Argon

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>400	>30	>47

Material:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Delivery: welding rods

weight :5 kg.

diameter : 1- 4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-18 T

Standards: AWS/ASME SFA-5.9 ER 309 LSi

Application/ Properties: Austenitic-ferritic welding rod for TIG welding of high alloy steels to unalloyed steels. Highest operating temperature is 300 C.

Wire Analysis:

C	Si	Cr	Mn	Ni
<0.030	0.65-1	23-25	1-2.5	12-14

Shielding gas: 100% Argon

Mechanical properties of all - weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>520	>400	>30	>47

Material:

DIN EN standard 1.4406 X2CrNiMoN 17 12 2 ; 1.4401 X5CrNiMo 17 12 2 ; 1.4404 X2CrNiMo17 13 2 G-X2CrNiMoN 18 10 ; 1.4311 X2CrNiN 18 10

other Standard ASTM/ACI A240/A312/A351 : (TP)304LN ; (TP)304L ; CF-3 ; (TP)304

Delivery: welding rods

weight :5 kg.

diameter : 1- 4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-19 T

Standards: AWS/ASME SFA-5.9 ER 310

Application/ Properties: Fully austenitic stainless steels welding rod for TIG welding of heat resistant steels, containing 25% Cr and 20% Ni. Likewise suited for welding heat and scaling resistant ferritic chromium steels unless corrosion attack by reducing sulphur-bearing combustion gases is to be expected. Non-scaling up to 1200 C. Weld metal exhibits good toughness down to -196 C.

Analysis of Wire electrode% (Typical value) **:**

C	Si	Cr	Mn	Ni
0.08-0.15	0.3-0.65	25-28	1-2.5	20-22.5

Shielding gas: 100% Ar

Mechanical properties of all - weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>550	>300	>30	>70

Material:

DIN EN standard 1.4745 G-X40CrSi 23 ; 1.4823 G-X40CrNiSi 27 4 ; 1.4832 G-X25CrNiSi 20 14 ; 1.4833 X7CrNi 23 14 ; 1.4841 X15CrNiSi 25 20 ; 1.4845 X12CrNi 25 21; 1.4828 X15CrNiSi 20 12 ; 1.4840 G-X15CrNi 25 20 ; 1.4846 G-X40CrNi 25 21 ; 1.4826 G-X40CrNiSi 22 9 ; 1.4713 X10CrAl7; 1.4724 X10CrAl 13 ; 1.4742 X10CrAl 18 ; 1.4762 X10CrAl 25 ; 1.4710 G-X30CrSi 6 ; 1.4740 G-X40CrSi 17

other Standard AISI 305, 310, 314; ASTM A297 HF; A297 HJ

Delivery: welding rods

weight :5 kg.

diameter : 1- 4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 30-21 T

Standards: AWS/ASME SFA-5.9 ER 318

Application/ Properties: Stabilized austenitic stainless welding rod for TIG welding of stabilized corrosion resistant Cr Ni Mo steels. Resistant to intergranular corrosion up to 400 C.

Analysis of Wire electrode% (Typical value) **:**

C	Cr	Si	Ni	Mo	Nb
<0.08	18-20	0.3-0.65	11-14	2-3	>8xC

Shielding gas: 100% Ar

Mechanical properties of all -weld metal :

Tensile Strength (N/mm^2)	0.2% Proof Stress (N/mm^2)	Elongation Lo = 4d %	Impact energy (j) (J) ISO - V 25 °C
>550	>350	>25	>65

Material:

DIN EN standard 1.4401 X5CrNiMo 17 12 2 ; 1.4406 X2CrNiMoN 17 12 2 ; 1.4408 G-X6CrNiMo 18 10 ; 1.4436 X5CrNiMo 17 13 3; 1.4581 G-X5CrNiMoNb 18 10 ; 1.4571 X6CrNiMoTi 17 12 2 ; 1.4580 X6CrNiMoNb17 12 2 ; 1.4583 X10CrNiMoNb 18 12

other Standard AISI 316L, 316Ti, 316Cb

Delivery: welding rods

weight :5 kg.

diameter : 1-4 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

Nickle base TIG Welding wires

AMA

AMA 90-11 T

AMA

Standards: AWS/ASME SFA-5.14 ERNiCr-3

Application / Properties: GTAW Rod for welding of nickel-base alloys, high-temperature and creep resisting steels, heat resisting and cryogenic materials, low-alloyed problem steels and dissimilar joints. Ferritic austenitic joints for service temperatures above +300 °C or for applications where a post weld heat treatment is required. Suitable for pressure vessel fabrication for the service temperature range -196 °C to +550 °C, otherwise resistant to scaling up to +1200 °C . Not susceptible to embrittlement . Resistant to thermal shocks, corrosion resistant, fully austenitic. Low coefficient of thermal expansion .

Weld metal analysis in % (typical values):

C	Mn	Ni	Cr	Nb+Ta
<0.05	3	rest	20.5	3.5

Shielding gas: DIN EN 439 - I1 (100 % Argon)
DIN EN 439 - I3 (Ar + He)

Mechanical Properties of all-weld metal : (single values are typical values)

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C	Impact energy (j) ISO - V -196 °C
AW	>650	>400	>35	150	90

AW :As welded

Material:

DIN Standard: 2.4816 Ni Cr 15 Fe ; 2.4817 LC-NiCr 15 Fe ; X8Ni9

Other standard: Alloy 600, Alloy 600 L

Delivery: welding rods

Weight: 5 kg.

Diameter: 1.6-3.2 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 90-12 T

Standards: AWS/ASME SFA-5.14 ERNiCrMo-3

Application / Properties: TIG welding rod for high-quality joint welding of nickel-base alloys like Inconel 625 and Incoloy 825 as well as of CrNiMo stainless steels with high Mo-content. Additionally it is recommended for high temperature or creep resisting, heat resisting and cryogenic materials, joining of dissimilar steels.
This wire Can be used for pressure vessel fabrication for service temperatures in the -196 °C to +550 °C range, otherwise up to scaling resistance limit of +1200°C . Highly resistant to hot cracking. Extremely resistant to stress corrosion cracking and pitting.
Resistant to thermal shocks, fully austenitic.

Weld metal analysis in % (typical values):

C	Ni	Mo	Fe	Cr	Nb+Ta
<0.03	rest	9	1	22	3.2

Shielding gas: DIN EN 439 - I1 (100 % Argon)
DIN EN 439 - I3 (Ar + He)

Mechanical Properties of all-weld metal : (single values are typical values)

Heat treatment	Tensile Strength (N/mm^2)	Yield Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20°C	Impact energy (j) ISO - V -196 °C
AW	>740	>500	>35	110	100

AW As welded

Material:

DIN Standard: 2.4856 NiCr 22 Mo 9 Nb ; 2.4858 NiCr 21 Mo ; 2.4816 NiCr 15 Fe ; 1.4583 X10CrNiMoNb18 12 ; 1.4876 X 10 NiCrAlTi 32 20 H ; 1.4876 X 10 NiCrAlTi 32 20 ; 1.4529 X1NiCrMoCuN25 20 7 ; X 2 CrNiMoCuN 20 18 6 ; 2.4641 NiCr 21 Mo 6 Cu ; 1.5662 X8Ni9 ; 1.4529 (X 1 NiCrMoCuN 25 20 6), 1.4547(X 1 CrNiMoCu N20 18 7)

Other standard: ASTM A 553 Gr.1, Alloy 600, Alloy 625, Alloy 800, 9 % Ni-steels

Delivery: welding rods

Weight: 5 kg.

Diameter: 1.6-3.2 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

AMA 90-13 T

Standards: AWS/ASME SFA-5.14 ERNiCu-7
DIN 1736 SG-NiCu30Mn

Application / Properties: welding rods for joining and surfacing of nickel-copper alloys and of nickel-copper-clad steels. It is also used for joining different materials, such as steel to copper and copper alloys, steel to nickel-copper alloys. Excellent corrosion resistance to chloride induced stress corrosion cracking and a wide range of marine and chemical requirements. These materials are employed in high-grade apparatus construction, primarily for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

Weld metal analysis in % (typical values):

C	Mn	Si	Ti	Ni	Cu	Fe
0.05	3.7	0.1	2.3	rest	28	0.9

Shielding gas: DIN EN 439 - I1 (100 % Argon)

Mechanical Properties of all-weld metal : (single values are typical values)

Tensile Strength (N/mm^2)	Yield 0.2% Strength (N/mm^2)	Elongation A5 (%)	Impact energy (j) ISO - V +20 °C
>500	>300	>35	150

Material:

DIN Standard: NiCu30Fe (2.4360), NiCu30Al (2.4375)

Other standard: Alloy 400, ASTM B 127, B 165

Delivery: welding rods

Weight: 5 kg.

Diameter: 1.6-3.2 mm.

Length: 1000mm.

Note: other weight & sizes are produced upon customers request.

Tubular Cored Wires for GAS Welding

AMA

AMA 200 F

Standards: AWS/ASME SFA 5.20 E71 T1 MJ
EN 758 T 42 3 PM 1 H5

Properties : Flux cored wire can be used in all position . weld metal has a good impact at -20°C . The weld metal has a very good wetting of beads (fatigue resistance) . this wire has a high deposition in vertical up position.

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si
M21	0.05	1.4	0.5

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V 0 °C	-20 °C
M21	580	515	27	115	90
C1(Co2)	545	475	28	105	80

Sheilding gas: DIN EN 439 M 21 (15-25% CO2, Balanc Ar)
DIN EN 439 C1 (100% CO2)

Main Application :

Shipyards , for general use.

Delivery: coil in diameter: 1 , 1.2 , 1.4 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

AMA 205 F

Standards: AWS/ASME SFA 5.20 E71 T5 for 1.2 mm
E70 T5 for 1.6 mm
EN 758 T 42 5 B M 1 H5
T 42 5 B C 1 H5

Properties : Basic cored wire for downhand and vertical up welding . Easy slag removal . the weld metal has a good impact at -40°C.

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si
M21	0.06	1.5	0.6

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)²	Yield 0.2% Strength (N/mm)²	Elongation Lo = 5d %	Impact energy (j) ISO - V 0°C	-40°C
AW	575	485	27	120	80
SR	545	440	27	125	85

AW : As welded
SR : Heat treated at 580°C for 2 hour. The heating and cooling speed is 50°C/h

Main Application :

shipyards , railroad rolling , structures requirement , pressure vessels

Delivery: coil in diameter: 1.2 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers request

AMA 210 M

Standards: AWS/ASME SFA 5.18 E70 C 6M H4

Properties : Metal cored wire , suitable for welding in all position .the weld metal has a good mechanical properties at -40°C . This wire can be used in root pass with back penetration. It can be used for automatic multi-run welding .

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si	Ni
M21	0.04	1.7	0.5	-

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V -20 °C	-40 °C
AW	580	485	28	105	80
SR	540	450	28	100	75

AW : As welded
SR : Heat treated at 620°C for 2 hour. The heating and cooling speed is 50°C/h

Main Application :

Shipbuilding , pipework , building and structures , pressure vessels

Delivery: coil in diameter:1 , 1.2, 1.4 , 1.6 , 2.4mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

= +

AMA 300 M

Standards: AWS/ASME SFA 5.29 E81 T5 G H4
EN 758 T 46 6 Mn 1 Ni 1 MMH5

Properties : Metal cored wire containing nickel. suitable for welding in all position weld metal has a high mechanical characteristics.It can be use for root pass with back penetration and automatic multi-run welding .

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si	Ni
M21	0.04	1.7	0.5	0.9

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V -40°C	-60°C
AW	600	530	27	80	60
SR	560	450	27	60	45

AW : As welded

SR : Heat treated at 580°C for 2 hour. The heating and cooling speed is 50°C/h

Main Application :

Off-shore work , pipe work , pressure vessels , shipbuildin

Delivery: coil in diameter: 1 , 1.2 , 1.4 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

= +

AMA 305 M

Standards: AWS/ASME SFA 5.29 E81 T5 B2

Properties : Metal cored wire for chromium molybdenum steels.The weld metal has resistant to creep . this wire is suitable for welding in all position and root pass with back penetration. .

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si	Cr	Mo
M21	0.04	0.7	0.6	1.25	0.5

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V 0 °C	-20 °C
SR	580	480	23	90	60

SR : Heat treated at 700 °C for 1 hour. The heating and cooling speed is 50 °C/h

Main Application :

Sheet metal work , petroleum chemistry , chemistry , incinerators , heat exchangers

Delivery: coil in diameter: 1.2 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

= +

AMA 310 M

Standards: AWS/ASME SFA 5.29 E91 T5 K3

EN 12535 T55 5 1.5NiMo MM1-H5

Properties : Metal cored wire . It is suitable for welding in all positions. The Weld metal has a very high resistance to cracking and high mechanical characteristics . It can be used for root pass with back penetration.

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si	Ni	Mo
M21	0.09	1.3	0.4	1.7	0.4

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V -50 °C
AW	690	590	19	70

AW : As welded

Main Application :

High yield strength steels , force piping , mobile lifting equipment , turbines , armaments.

Delivery: coil in diameter: 1.2 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers reques

= +

AMA 315 M

Standards: AWS/ASME SFA 5.29 E111 T5 K3
AWS/ASME SFA 5.28 E100 C G M H4

EN 12535 T69 5 Mn2NiMo MM1-H5

Properties : Metal cored wire , for welding in all position .the weld metal has a very high resistance to cracking and high mechanical characteristics. It can be used for root pass with back penetration. .

All-Weld metal analysis(typical values)% :

Gas	C	Mn	Si	Ni	Mo
M21	0.07	1.8	0.6	2.4	0.65

Shielding gas: DIN EN 439 - M21 (15-25% CO2 , balance Ar)

Mechanical properties of all-weld metal (typical

Heat treatment	Tensile Strength (N/mm)^2	Yield 0.2% Strength (N/mm)^2	Elongation Lo = 5d %	Impact energy (j) ISO - V -50 °C
AW	840	740	17	60

AW : As welded

Main Application :

High yield strength steel, force piping , mobile lifting equipment , turbines , armaments.

Delivery: coil in diameter: 1.2 , 1.6mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

AMA MC 56

Standards: DIN 8555 MSG 6-55

Application/ Properties: Medium-alloy tubular cored electrode of basic type designed for tough and wear resistant hard facing deposits on parts subjected to heavy wear. Weld metal is though and free from cracks and therefore resistant to shock and impact. Machining is only feasibly by grinding. A buffer layer with AMA FC 31 is only required in case of difficult - to - weld base metals.

All -Welded metal analysis% (typical values) :

C	Si	Mn	Cr	Mo
0.35	0.5	1.5	5.2	0.6

Mechanical properties of all -weld metal (typical values) :

Hardness as -welded : 52 -57 RC
Values apply to the use of Co2 shielding gas.

Shielding: Co2 and mixed gas M21 (5 -25% Co2, Balance Ar) acc to EN 439

Consumption ≤1.6mm 12 -15 L/ min

≥2.0mm 15 - 20 L /min

Main Application :

Excavator parts, scraper blades, dipper teeth, worm conveyors, beaters crusher jaws, crusher cones , etc

Delivery: coil in diameter: 1.4,1.6,2,2.4 mm & weight 15kg.

Note: other weight & sizes are produced upon customers request.

= +

Cutting & Grinding Wheels

AMA

Cut-Off Wheel Safety and Cutting Procedures

1.Cut-off wheels should never be stored on edges. Instead they should be laid on solid, flat surfaces away from excessive heat and moisture to avoid warpage.

2.Machines must have adequate power transmission and capacity, spindle speeds and proper guarding of the wheel. It is best to have extra power to insure good cutting efficiency.

3.Check the speed of the machine spindle against the maximum speed specified for the wheel by the manufacturer. The maximum specified speed for the wheel should never be exceeded.

4.Flanges should be clean, straight and of equal diameter so the wheel will run true.

5.For diameters above 10" it is recommended that the flange be at least 1/3 the diameter of the wheel.

6.The bore size of the wheel is so constructed that the wheel should fit freely on the machine spindle without any slack. Never attempt to force a wheel on the spindle!

7.Always use blotter, when supplied with the wheels.

8.Be sure that the flanges are tightened securely but not too tightly to avoid springing the flanges and changing the pressure area.

9.Be sure the work piece is securely held down, including both sides of the cut, if practical. Cut-off wheels withstand a great deal of radial stress but not side stress. Even reinforced wheels are not completely unbreakable.

10.Side pressure must be avoided to insure straight cuts and avoid possible wheel breakage.

11.The wheel must be brought into contact with the work piece without "bumping" or impact. The wheel should cut freely without forcing and the speed of the wheel should not be reduced by the cutting operation.

12.10. Abrasive cutting generates a great deal of localized heat which causes rapid expansion of the piece being cut. Wheels operating at speeds significantly below efficient speed and wheels fed through the cut too slowly will generate excessive heat. Result: Rapid wheel wear, fraying around edge of reinforced wheels, and wheel breakage.

WARNING!
Improper use may cause property damage or serious injuries. Comply with ANSI Safety Code B7.1 and OSHA regulations. Use Safety Goggles and machine guards.

For Cutting of cast iron

Type	Size	R.P.M
F-158B	110x2.5x(16or 22)	13300
F-158B	115x2.5x(16or 22)	13300
F-158B	180x2.5x22	8500
F-158B	230x2.5x22	6650
F-158B	300x3x40	5100
F-158B	300x3.5x40	5100
F-158B	300x4x40	5100

For Cutting of Aluminium and Cupper

Type	Size	R.P.M
L-115B	110x2.5x(16or 22)	13300
L-115B	115x2.5x(16or 22)	13300
L-115B	180x2.5x22	8500
L-115B	230x2.5x22	6650
L-115B	300x3x40	5100
L-115B	300x4x40	5100

For Cutting of stainless steel

Type	Size	R.P.M
C-144B	110x4x(16or 22)	13300
C-144B	115x2.5x(16or 22)	13300
C-144B	180x2.5x22	8500
C-144B	230x2.5x22	6650
C-144B	300x3x40	5100
C-144B	300x4x40	5100

For Cutting of steel

Type	Size	R.P.M
M- 138	115x2.5x(16or 22)	13300
M- 138	180x2.5x(16or 22)	8500
M- 138	230x2.5x22	6650
M- 138	300x3x40	5100
M- 138	300x4x40	5100

For Cutting of stone

Type	Size	R.P.M
P- 129	180x2.5x22	8500
P- 129	230x3x 22	6650
P- 129	300x3.5x40	5100
P- 129	300x4x40	5100
P- 129	400x4x40	3850

For grinding of Aluminium and Copper

Type	Size	R.P.M
L- 115	110x6.5x(16or 22)	13300
L- 115	115x4x(16or 22)	13300
L- 115	180x6.5x22	13300
L- 115	180x6.5x22	8500
L- 115	230x8x22	6650

For grinding of stainless steel

Type	Size	R.P.M
C- 144	110x7x(16or 22)	13300
C- 144	110x6.5x(16or 22)	13300
C- 144	180x4x22	8500
C- 144	180x6.5x22	8500
C- 144	180x8x22	8500
C- 144	230x4x22	5100
C- 144	230x6.5x22	5100

For grinding of cast iron

Type	Size	R.P.M
F 158	110x6.5x(16or22)	13300
F 158	115x4x(16or22)	13300
F 158	115x6.5x(16or22)	13300
F 158	180x4x22	8500
F 158	180x6.5x22	8500
F 158	180x8x22	8500

For grinding of Steel

Type	Size	R.P.M
M- 165	110x4x(16or 22)	13300
M- 165	115x4x(16or 22)	13300
M- 165	115x6.5x(16or 22)	13300
M- 165	180x4x22	8500
M- 165	180x6.5x22	8500
M- 165	180x10x22	8500
M- 165	230x4x22	6650
M- 165	230x6.5x22	6650
M- 165	230x8x22	6650
M- 165 super	115x6.5x(16or 22)	13300
M- 165 super	180x6.5x22	8500
M- 165 super	180x8x22	8500
M- 165 super	230x6.5x22	6650

AMA

NOTE...