SOLDER METALS
ROSIN FLUX CORED SOLDER
GM6024M

1 SCOPE. This specification (NOTE) prescribes the requirements for rosin flux cored solder. The specifications cover thirty-four grades of solder metal, three weights of flux, and three types of flux, each available as a dry powder or plastic form core.

NOTE: This specification is based on ASTM B284. The only deviation is provision added for metric sizes and GM number call out. For the benefit of those who follow the practice of using GM numbers on drawings, purchase orders, and other documents, the specifications are designated by a single number, GM6024M. The properties desired in a specific material (flux cored wire) are indicated by supplementing this number with the appropriate alloy grade numbers and the appropriate size of wire (or other form), weight of flux and type of flux; for example: Solder, Rosin Flux Cored Wire, GM6024M, Alloy Grade 30A, 2.00 mm diameter, 2.2% R flux, D Core. The following identification is equally meaningful: Solder, Rosin Flux Cored Wire, ASTM B284, Alloy Grade 30A, 2.00 mm diameter, 2.2% R flux, D Core.

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2 REQUIREMENTS. Flux cored solder wire (or other forms) furnished to these specifications shall conform to all of the requirements published in ASTM B284, unless otherwise stated by the purchaser. Portions of these requirements are duplicated below for convenience:

2.1 CHEMICAL COMPOSITION. As stated in Table 1, on next page. (Note: This is same as specified in GM6023M and ASTM B32 covering solder metal without flux core.)

2.2 DIMENSIONS. Form (round wire, or other) shall be as specified by the purchaser. When specified in wire form, the size is normally selected from standard diameters as follows:

SI UNITS, mm	CUSTOMARY UNITS, in.
0.50 1.00 1.60 2.50 4.00	.020 .040 .063 .100 .160
0.60 1.10 1.80 2.80 4.50	.025 .045 .071 .112 .180
0.80 1.20 2.00 3.00 5.00	.032 .050 .080 .125 .200
0.90 1.40 2.20 3.50	.036 .056 .090 .140

2.3 SIZE OF CORE (WEIGHT OF FLUX). Tubular wire or other forms shall have a concentric core or flux, or more than one core symmetrically spaced about the longitudinal axis, unless otherwise specified. The size of the core or cores shall be based on the specified weight of flux as shown below, or as otherwise agreed by purchaser and supplier.

Desired Weight of Flux %	Limits %
1.10	0.90 to 1.30
2.20	1.90 to 2.50
3.30	2.60 to 3.90

2.4 CORE CONDITION.

Condition Symbol	Rosin Core Condition
D (NOTE 1)	Dry Powder
P (NOTE 2)	Plastic

NOTE 1: Core condition D shall form a dry powder core and shall contain no plasticizer or binder mixtures.
NOTE 2: Unless otherwise specified, core condition P shall be dissolved in, or plasticized by a clear, nonchlorinated, volatile solvent.

2.5 TYPE OF FLUX. The flux, making up the core or cores, shall be as specified by type symbols as follows:

Type of Flux	Description
R	Rosin, Nonactivated (1)
RMA	Rosin, Mildly Activated (2)
RA	Rosin, Activated (3)

1: Gum rosin in dry powder or plastic form.
2: Gum rosin in dry powder or plastic form with mild additives introduced for the purpose of improving fluxing action.
3: Gum rosin in dry powder or plastic form with additives introduced for the purpose of improving fluxing action.

NOTE: Classification system shown above supersedes a system used for several years. The old system is shown below until all engineering and purchasing documents are updated.

Type of Flux	Description
NR	Natural Rosin (A)
MR	Modified Rosin (B)
DNR	Ductile Natural Rosin (C)
DMR	Ductile Modified Rosin (C)
DNRA	Ductile Natural Rosin, Activated (C),(D)
DMRA	Ductile Modified Rosin, Activated (C),(D)

A: Gum or wood rosin; solid or powder forms; additive agents prohibited; least corrosive.
B: Solid or powder forms; chemically or thermally treated.
C: Formerly known as "plastic rosin"; incorporate gum spirits of turpentine or other diluent.
D: Incorporate activating agent.

3 PACKING AND MARKING. Each shipment shall be legibly marked with vendor's name and address, material specification number and name, purchase order, net weight, and other information as may be specified by individual purchaser.

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TABLE 1 – CHEMICAL COMPOSITION[1,2,3]

Alloy Grade	Chemical Elements (percent by weight)													
	Sn	Pb	Sb			Ag			Bi	Cu	Fe	Al	Zn	As
	Desired	Nominal	Min	Desired	Max	Min	Desired	Max	Max	Max	Max	Max	Max	Max
70A	70[6]	30.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
70B	70[6]	30.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
63A	63[5]	37.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
63B	63[5]	37.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
60A	60[6]	40.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
60B	60[6]	40.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.03
50A	50[5]	50.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.025
50B	50[5]	50.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.025
45A	45[5]	55.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.025
45B	45[5]	55.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.025
40A	40[6]	60.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
40B	40[6]	60.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
40C	40[6]	58.0	1.80	2.0	2.40	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
35A	35[6]	65.0	—	—	0.25	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
35B	35[6]	65.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
35C	35[6]	63.2	1.60	1.8	2.00	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
30A	30[6]	70.0	—	—	0.25	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
30B	30[6]	70.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
30C	30[6]	68.4	1.40	1.6	1.80	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
25A	25[6]	75.0	—	—	0.25	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
25B	25[6]	75.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
25C	25[6]	73.7	1.10	1.3	1.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
20B	20[6]	80.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
20C	20[6]	79.0	0.80	1.0	1.20	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
15B	15[6]	85.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
10B	10[6]	90.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
5A	5[4]	95.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
5B	5[4]	95.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
2A	2[5]	98.0	—	—	0.12	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
2B	2[5]	98.0	0.20	—	0.50	—	—	—	0.25	0.08	0.02	0.005	0.005	0.02
2.5S	0[8]	97.5	—	—	0.40	2.3	2.5	2.7	0.25	0.08	0.02	0.005	0.005	0.02
1.5S	1[7]	97.5	—	—	0.40	1.3	1.5	1.7	0.25	0.08	0.02	0.005	0.005	0.02
95TA	95[8]	0.20 max	4.50	5.0	5.50	—	—	—	0.15	0.08	0.04	0.005	0.005	0.05
96.5TS	96.5[8]	0.20 max	0.20	—	0.50	3.3	3.5	3.7	0.15	0.08	0.02	0.005	0.005	0.05

[1] Analysis shall regularly be made only for the elements specifically mentioned in the above table. If, however, the presence of other elements is suspected, or indicated in the course of routine analysis, further analysis such as by qualitative spectroscopic analysis shall be made to determine that total of other elements is not in excess of 0.08 percent.

[2] The chemical requirements of SAE specifications 1A, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B, 6A, and E-07 (SAE J437) conform substantially to the requirements for alloy grades 45B, 40B, 40C, 30B, 30C, 25B, 25C, 20B, 20C, 15B, and 2.5S, respectively.

[3] Federal specifications are similar to the above grades 70B, 63B, 60B, 50B, 40B, 35C, 30C, 20C, 2.5S, 1.5S, and 95TA. The apparent need for these alloys is discussed in the Appendix of ASTM B32.

[4] Permissible tin range, 4.5 to 5.5 percent.

[5] Permissible tin range, 1.5 to 2.5 percent.

[6] Tin maximum, 0.25 percent.

[7] Permissible tin range, 0.75 to 1.25 percent.

[8] Minimum tin content for alloys containing 10.0 percent or more of tin shall be as follows:

Fabricated forms	Nominal minus
At random (spot) sample	1.5%
Composite sample	1.0%
Cast form	
Composite sample	0.5%

4 INITIAL SOURCE APPROVAL. No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

4.1 Completed copies of the GM Material Safety Data Sheet and Critical Material Register (available from the engineering department or laboratory) must be submitted with any new submissions or where a composition change has occurred.

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