Precision Brand Key Steel: Metric Gold Plated

Precision Brand Metric Keystock
Sizes conform to metric keyway specifications
Material is high quality, cold drawn steel C1020 – C1045
Available in square and rectangular sizes
Plated for easy identification: Gold dichromate
Sizes clearly marked on each piece
All sizes meet ISO R773 and BS 4235
Most sizes meet DIN 6880

Element	Carbon Steel 1018	Carbon Steel 1019
	All sizes except 3/32” which can be 1018 or 1019	For 3/32” which can be 1018 or 1019
Carbon	0.15 – 0.20	0.09 – 1.03
Manganese	0.60 – 0.90	0.30 – 0.50
Sulphur	0.050 Max	0.050 Max
Phosphorus	0.040 Max	0.040 Max
Meets Specifications	ASTM-A-108	ASTM-A-108

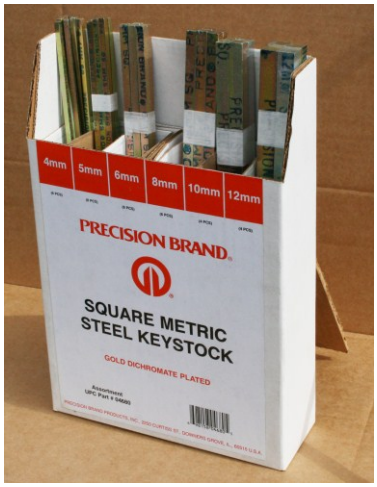
Steel: Square: Metric: Gold Plated

Code	Size mm	Max. Tolerance Plated	Length mm	Pack Qty	Weight Kilos
80-604-005	3.0	N/A	300	6	0.130
80-604-010	4.0	+0.030mm	300	6	0.227
80-604-015	5.0	+0.030mm	300	6	0.358
80-604-020	6.0	+0.030mm	300	6	0.517
80-604-025	7.0	+0.030mm	300	6	0.703
80-604-030	8.0	+0.030mm	300	6	0.916
80-604-035	10.0	+0.030mm	300	4	0.957
80-604-040	12.0	+0.030mm	300	4	1.374
80-604-045	14.0	+0.030mm	300	4	1.873
80-604-050	16.0	+0.030mm	300	4	2.445
80-604-055	18.0	+0.030mm	300	4	3.093
80-604-060	20.0	+0.030mm	300	1	0.957
80-604-065	22.0	+0.030mm	300	1	1.157
80-604-070	25.0	N/A	300	1	1.492

Packed Weight and Dimensions

Code	Pack Qty	Weight g	W mm	H mm	L mm
80-604-005	6	130	9	6	300
80-604-010	6	230	12	8	300
80-604-015	6	359	15	10	300
80-604-020	6	517	18	12	300
80-604-025	6	705	21	14	300
80-604-030	6	919	24	16	300
80-604-035	4	957	20	20	300
80-604-040	4	1378	24	24	300
80-604-045	4	1876	28	28	300
80-604-050	4	2450	32	32	300
80-604-055	4	3101	36	36	300
80-604-060	1	957	20	20	300
80-604-065	1	1158	22	22	300
80-604-070	1	1496	25	25	300

Steel: Square: Metric: Gold Plated: Assortment Pack



Assortment pack contains the following pieces of Square Metric Gold Plated Key Steel

6 x 4, 5, 6 & 8mm
4 x 10, & 12mm

The pack contains a useful storage / display stand constructed from rigid card stock

Packed Weight and Dimensions

Code	Description	Weight g	W mm	H mm	L mm
80-604-680	Steel: Square: Metric: Gold Plated: Assortment Pack	4860	210	75	340

Steel: Rectangular: Metric: Gold Plated

Code	Width mm	Width Tol. mm	Thickness mm	Thickness Tol mm	Length mm	Pack Qty	Weight Kilos
80-605-000	8	±0.025	5	+0.025/-0.079	300	6	0.576
80-605-005	10	±0.025	6	+0.025/-0.079	300	6	0.866
80-605-010	12	+0.025/-0.032	6	+0.025/-0.079	300	6	1.039
80-605-015	14	+0.025/-0.032	6	+0.025/-0.079	300	6	1.225
80-605-020	8	±0.025	7	+0.025/-0.079	300	6	0.803
80-605-025	16	+0.025/-0.032	7	+0.025/-0.079	300	6	1.633
80-605-030	18	+0.025/-0.032	7	+0.025/-0.079	300	6	1.769
80-605-035	10	±0.025	8	+0.025/-0.079	300	6	1.140
80-605-040	12	+0.025/-0.032	8	+0.025/-0.079	300	6	1.365
80-605-045	20	+0.025/-0.041	8	+0.025/-0.079	300	6	2.313
80-605-050	14	+0.025/-0.032	9	+0.025/-0.079	300	6	1.810
80-605-055	22	+0.025/-0.041	9	+0.025/-0.079	300	6	2.858
80-605-060	12	+0.025/-0.032	10	+0.025/-0.079	300	4	1.147
80-605-065	16	+0.025/-0.032	10	+0.025/-0.079	300	4	1.529
80-605-070	18	+0.025/-0.032	11	+0.025/-0.099	300	4	1.891
80-605-075	20	+0.025/-0.041	12	+0.025/-0.099	300	4	2.291
80-605-080	22	+0.025/-0.041	14	+0.025/-0.099	300	4	2.944
80-605-085	25	+0.025/-0.041	14	+0.025/-0.099	300	4	3.343
80-605-090	28	+0.025/-0.041	16	+0.025/-0.099	300	4	4.277
80-605-095	32	+0.025/-0.051	18	+0.025/-0.099	300	4	5.502
80-605-120	25	+0.025/-0.041	22	+0.025/-0.119	300	1	1.315
80-605-105	40	+0.025/-0.051	22	+0.025/-0.119	300	1	2.100
80-605-125	28	+0.025/-0.041	25	+0.025/-0.119	300	1	1.692

Packed Weight and Dimensions

Code	Pack Qty	Weight g	W mm	H mm	L mm
80-605-000	6	576	16	15	300
80-605-005	6	866	20	18	300
80-605-010	6	1040	24	18	300
80-605-015	6	1227	28	18	300
80-605-020	6	804	21	16	300
80-605-025	6	1636	32	21	300
80-605-030	6	1773	36	21	300
80-605-035	6	1140	24	20	300
80-605-040	6	1365	24	24	300
80-605-045	6	2318	40	24	300
80-605-050	6	1809	28	27	300
80-605-055	6	2864	44	27	300
80-605-060	4	1149	24	20	300
80-605-065	4	1531	32	20	300
80-605-070	4	1895	36	22	300
80-605-075	4	2297	40	24	300
80-605-080	4	2948	44	28	300
80-605-085	4	3350	50	28	300
80-605-090	4	4288	56	32	300
80-605-095	4	5513	64	36	300
80-605-120	1	2106	40	22	300
80-605-105	1	1318	25	22	300
80-605-125	1	1695	28	22	300

Precision Brand Inch Keystock
Provides driving torque between shafts and pulleys, gears, sprockets etc
Used for new machinery and maintenance repairs
Available in square and rectangular sizes
Zinc plated finish
Sizes clearly marked on each piece

Element	Carbon Steel 1018	Carbon Steel 1019
	All sizes except 3/32” which can be 1018 or 1019	All sizes except 3/32” which can be 1018 or 1019
Carbon	0.15 – 0.20	0.09 – 1.03
Manganese	0.60 – 0.90	0.30 – 0.50
Sulphur	0.050 Max	0.050 Max
Phosphorus	0.040 Max	0.040 Max
Meets Specifications	ASTM-A-108	ASTM-A-108

Steel: Square: Inch Zinc Plated

Code	Size inches	Tolerance (plated)	Length inches	Pack Qty	Weight Kilos
80-614-125	3/32	+ 0.003” / - 0.001”	12	10	0.131
80-614-150	1/8	+ 0.003” / - 0.001”	12	10	0.240
80-614-175	5/32	+ 0.003” / - 0.001”	12	10	0.376
80-614-200	3/16	+ 0.003” / - 0.001”	12	6	0.326
80-614-225	7/32	+ 0.003” / - 0.001”	12	6	0.444
80-614-250	¼	+ 0.003” / - 0.001”	12	6	0.581
80-614-275	9/32	+ 0.003” / - 0.001”	12	6	0.730
80-614-300	5/16	+ 0.003” / - 0.001”	12	6	0.903
80-614-325	3/8	+ 0.003” / - 0.001”	12	6	1.302
80-614-350	7/16	+ 0.003” / - 0.001”	12	4	1.179
80-614-375	½	+ 0.003” / - 0.001”	12	4	1.542
80-614-400	9/16	+ 0.003” / - 0.001”	12	4	1.959
80-614-425	5/8	+ 0.003” / - 0.001”	12	4	2.408
80-614-430	11/16	+ 0.004” / - 0.002”	12	4	2.917
80-614-450	¾	+ 0.003” / - 0.001”	12	4	3.456
80-614-460	13/16	+ 0.005” / - 0.003”	12	4	4.082
80-614-575	7/8	+ 0.004” / - 0.002”	12	4	4.722
80-614-500	1	+ 0.004” / - 0.002”	12	4	6.168
80-614-525	1 1/8	+ 0.004” / - 0.002”	12	2	3.912
80-614-550	1 3/16	+ 0.004” / - 0.002”	12	2	4.350
80-614-575	1 ¼	+ 0.004” / - 0.002”	12	2	4.822
80-614-600	1 3/8	+ 0.004” / - 0.002”	12	2	5.833
80-614-625	1 ½	+ 0.004” / - 0.002”	12	2	6.940
80-614-635	1 5/8	+ 0.005” / - 0.003”	12	1	4.073
80-614-650	1 ¾	+ 0.005” / - 0.003”	12	1	4.722
80-614-655	1 7/8	+ 0.005” / - 0.003”	12	1	5.420
80-614-675	2	+ 0.005” / - 0.003”	12	1	6.169

Steel: Square: Inch Zinc Plated

Packed Weight and Dimensions

Code	Pack Qty	Weight g	W Inch	H Inch	L Inch
80-614-125	10	132	15/32	9/32	12
80-614-150	10	241	1/4	1/4	12
80-614-175	10	377	25/32	5/16	12
80-614-200	6	326	9/16	3/8	12
80-614-225	6	445	21/32	7/16	12
80-614-250	6	580	3/4	1/2	12
80-614-275	6	734	27/32	9/16	12
80-614-300	6	905	15/16	5/8	12
80-614-325	6	1304	1 1/8	3/4	12
80-614-350	4	1183	7/8	7/8	12
80-614-375	4	1545	1	1	12
80-614-400	4	1964	1 1/8	1 1/8	12
80-614-425	4	2145	1 1/4	1 1/4	12
80-614-430	4	2924	1 3/8	1 3/8	12
80-614-450	4	3478	1 1/2	1 1/2	12
80-614-460	4	4091	1 5/8	1 5/8	12
80-614-475	4	4733	1 3/4	1 3/4	12
80-614-500	4	6182	2	2	12
80-614-525	2	3912	2 1/4	1 1/8	12
80-614-550	2	4359	2 3/8	1 3/16	12
80-614-575	2	4830	2 1/2	1 1/4	12
80-614-600	2	5844	2 3/4	1 3/8	12
80-614-625	2	6955	3	1 1/2	12
80-614-635	1	4081	1 5/8	1 5/8	12
80-614-650	1	4732	1 3/4	1 3/4	12
80-614-655	1	5432	1 7/8	1 7/8	12
80-614-675	1	6182	2	2	12

Steel Square: Inch Zinc Plated: Assortment Pack

Assortment pack contains the following pieces of Square Zinc Plated Key Steel

6 x 3/16", ¼" & 5/16"
4 x 7/16" & ½"

The pack contains a useful storage / display stand constructed from rigid card stock

Packed Weight and Dimensions

Code	Description	Weight g	W mm	H mm	L mm
80-614-680	Steel Square: Inch Zinc Plated: Assortment Pack	6355	210	75	340

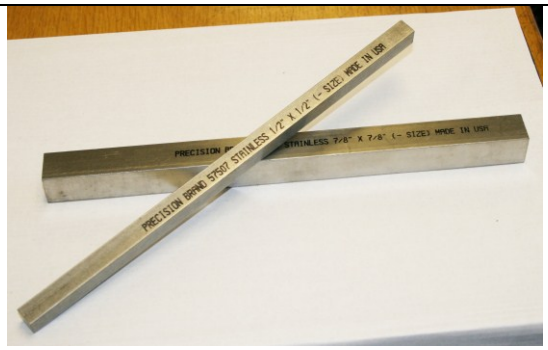
Steel: Rectangular: Inch Zinc Plated

Code	Width inch	Thickness inch	Tolerance (plated)	Length inch	Pack Qty	Weight Kilos
80-615-125	1/8	3/16	+ 0.004” / -0.002”	12	6	0.218
80-615-150	1/8	¼	+ 0.004” / -0.002”	12	6	0.290
80-615-175	1/8	3/8	+ 0.004” / -0.002”	12	6	0.431
80-615-200	3/16	¼	+ 0.004” / -0.002”	12	6	0.435
80-615-225	3/16	5/16	+ 0.004” / -0.002”	12	6	0.544
80-615-250	3/16	3/8	+ 0.004” / -0.002”	12	6	0.653
80-615-275	3/16	½	+ 0.004” / -0.002”	12	6	0.871
80-615-300	1/4	5/16	+ 0.004” / -0.002”	12	6	0.756
80-615-325	1/4	3/8	+ 0.004” / -0.002”	12	6	0.866
80-615-350	1/4	½	+ 0.004” / -0.002”	12	6	1.567
80-615-375	5/16	3/8	+ 0.004” / -0.002”	12	6	1.084
80-615-385	5/16	7/16	+ 0.004” / -0.002”	12	6	1.265
80-615-400	5/16	½	+ 0.004” / -0.002”	12	6	1.442
80-615-425	5/16	5/8	+ 0.004” / -0.002”	12	6	1.085
80-615-445	3/8	7/16	+ 0.004” / -0.002”	12	6	1.519
80-615-475	3/8	5/8	+ 0.004” / -0.002”	12	6	2.168
80-615-500	3/8	¾	+ 0.004” / -0.002”	12	6	2.599
80-615-515	7/16	½	+ 0.004” / -0.002”	12	6	2.041
80-615-510	7/16	5/8	+ 0.004” / -0.002”	12	6	2.531
80-615-520	1/2	9/16	+ 0.004” / -0.002”	12	6	2.604
80-615-525	1/2	5/8	+ 0.004” / -0.002”	12	6	2.894
80-615-550	1/2	¾	+ 0.004” / -0.002”	12	6	3.470
80-615-555	1/2	7/8	+ 0.004” / -0.002”	12	6	4.050
80-615-570	9/16	1	+ 0.004” / -0.002”	12	6	5.207
80-615-575	5/8	¾	+ 0.004” / -0.002”	12	4	2.894
80-615-585	5/8	7/8	+ 0.004” / -0.002”	12	4	3.375
80-615-600	5/8	1	+ 0.004” / -0.002”	12	4	3.855
80-615-625	3/4	1	+ 0.004” / -0.002”	12	4	4.627
80-615-635	3/4	1 14	+ 0.004” / -0.002”	12	4	5.783
80-615-645	7/8	1	+ 0.005” / -0.003”	12	4	5.398
80-615-655	7/8	1 ¼	+ 0.005” / -0.003”	12	4	6.749
80-615-665	1	1 ¼	+ 0.005” / -0.003”	12	4	7.711
80-615-675	1	1 1/2	+ 0.005” / -0.003”	12	4	9.253

Steel: Rectangular: Inch Zinc Plated

Packed Weight and Dimensions

Code	Pack Qty	Weight g	W Inch	H Inch	L Inch
80-615-125	6	218	9/16	1/4	12
80-615-150	6	290	1/2	3/8	12
80-615-175	6	431	3/4	3/8	12
80-615-200	6	435	9/16	1/2	12
80-615-225	6	544	5/8	9/16	12
80-615-250	6	653	3/4	9/16	12
80-615-275	6	871	1	9/16	12
80-615-300	6	756	3/4	5/8	12
80-615-325	6	866	3/4	3/4	12
80-615-350	6	1567	1	3/4	12
80-615-375	6	1084	15/16	3/4	12
80-615-385	6	1265	15/16	7/8	12
80-615-400	6	1442	1	15/16	12
80-615-425	6	1085	1 1/4	15/16	12
80-615-445	6	1519	1 1/8	7/8	12
80-615-475	6	2168	1 1/4	1 1/8	12
80-615-500	6	2599	1 1/2	1 1/8	12
80-615-515	6	2041	1 5/16	1 1/4	12
80-615-510	6	2531	1 5/16	1	12
80-615-520	6	2604	1 1/2	1 1/8	12
80-615-525	6	2894	1 1/2	1 1/4	12
80-615-550	6	3470	1 1/2	1 1/2	12
80-615-555	6	4050	1 3/4	1 1/2	12
80-615-570	6	5207	1 11/16	2	12
80-615-575	4	2894	1 1/2	1 1/4	12
80-615-585	4	3375	1 3/4	1 1/4	12
80-615-600	4	3855	2	1 1/4	12
80-615-625	4	4627	2	1 1/2	12
80-615-635	4	5783	2 1/2	1 1/2	12
80-615-645	4	5398	2	1 3/4	12
80-615-655	4	6749	2 1/2	1 3/4	12
80-615-665	4	7711	2 1/2	2	12
80-615-675	4	9253	3	2	12



Precision Brand Stainless Steel Keystock
Used when corrosion resistance is required
Commonly used in food and marine applications

Element	**303 Stainless**	**304 Stainless**
Carbon	0.15 Max	0.08 Max
Manganese	2.00 Max	2.00 Max
Silicon	1.00 Max	1.00 Max
Phosphorus	0.20 Max	0.045 Max
Sulphur	0.15 Max	0.030 Max
Chromium	17.00 – 19.00	18.00 – 20.00
Nickel	8.00 – 10.00	8.00 – 10.50
Zinc	0.60 Max	
Molybdenum	0.60 Max	
Tensile Strength	85,000 – 90,000 PSI	80,000 - 90,000 PSI
Yield Strength	30,000 – 40,000 PSI	30,000 - 40,000 PSI
Elongation	45 – 55% in 2”	55 – 65% in 2”
Hardness Rockwell	83 – 93 B Scale	80 – 90 B Scale
Meets Specifications (Square)	ASTM-A582 Condition A	ASTM-A-479 & QQS-763
Meets Specifications (Rectangular)	ASTM-A-276	ASTM-A-484

Stainless Square Key Steel Inch

Code	Inch Size	Metric Size	Tolerance	Length	Pack Qty	Weight Kilos
80-657-501	1/8	3.18	+ 0.003” / - 0.001”	12”	1	0.024
80-657-502	3/16	4.76	+ 0.003” / - 0.001”	12”	1	0.054
80-657-503	¼	6.35	+ 0.003” / - 0.001”	12”	1	0.095
80-657-504	5/16	7.94	+ 0.003” / - 0.001”	12”	1	0.150
80-657-505	3/8	9.53	+ 0.003” / - 0.001”	12”	1	0.218
80-657-506	7/16	11.11	+ 0.003” / - 0.001”	12”	1	0.295
80-657-507	½	12.70	+ 0.003” / - 0.001”	12”	1	0.385
80-657-508	5/8	15.88	+ 0.003” / - 0.001”	12”	1	0.603
80-657-509	¾	19.05	+ 0.003” / - 0.001”	12”	1	0.866
80-657-510	7/8	22.23	+ 0.004” / -0.002”	12”	1	1.179
80-657-511	1	25.40	+ 0.004” / -0.002”	12”	1	1.542

Packed Weight and Dimensions

Code	Pack Qty	Weight g	W Inch	H Inch	L Inch
80-657-501	1	24	1/8	1/8	12
80-657-502	1	54	3/16	3/16	12
80-657-503	1	97	1/4	1/4	12
80-657-504	1	151	5/16	5/16	12
80-657-505	1	217	3/8	3/8	12
80-657-506	1	296	7/16	7/16	12
80-657-507	1	386	1/2	1/2	12
80-657-508	1	604	5/8	5/8	12
80-657-509	1	870	3/4	3/4	12
80-657-510	1	1183	7/8	7/8	12
80-657-511	1	1545	1	1	12

Precision Brand Stainless Key Steel: Material A2 (European), 302 (US)

Stainless Square Key Steel Metric

Code	Size mm	Tolerance mm	Length mm	Pack Qty	Weight Kilos
80-604-800	4	+ 0.000 / -0.030	300	1	0.038
80-604-801	5	+ 0.000 / -0.030	300	1	0.060
80-604-802	6	+ 0.000 / -0.030	300	1	0.090
80-604-803	7	+ 0.000 / -0.036	300	1	0.117
80-604-804	8	+ 0.000 / -0.036	300	1	0.153
80-604-805	12	+ 0.000 / -0.043	300	1	0.229
80-604-807	14	+ 0.000 / -0.043	300	1	0.468
80-604-806	25	+ 0.000 / -0.065	300	1	1.492

Stainless Rectangular Key Steel Metric

Code	Size mm	Tolerance Width mm	Tolerance Height mm	Length mm	Pack Qty	Weight Kilos
80-605-800	8 x 5	+ 0.000 / -0.036	+ 0.000 / -0.030	300	1	0.096
80-605-801	8 x 7	+ 0.000 / -0.036	+ 0.000 / -0.036	300	1	0.134
80-605-802	10 x 8	+ 0.000 / -0.036	+ 0.000 / -0.036	300	1	0.190
80-605-803	12 x 8	+ 0.000 / -0.043	+ 0.000 / -0.036	300	1	0.227
80-605-804	14 x 9	+ 0.000 / -0.043	+0.000 / -0.036	300	1	0.302
80-605-805	12 x 10	+ 0.000 / -0.043	+0.000 / -0.036	300	1	0.287

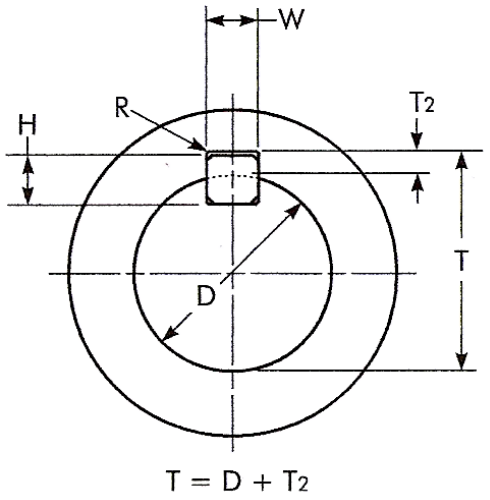
Packed Weight and Dimensions

Code	Pack Qty	Weight g	W mm	H mm	L mm
80-604-800	1	38	4	4	300
80-604-801	1	60	5	5	300
80-604-802	1	90	6	6	300
80-604-803	1	117	7	7	300
80-604-804	1	153	8	8	300
80-604-805	1	229	12	12	300
80-604-807	1	468	14	14	300
80-604-806	1	1492	25	25	300
80-605-800	1	96	5	8	300
80-605-801	1	134	7	8	300
80-605-802	1	190	8	10	300
80-605-803	1	227	8	12	300
80-605-804	1	302	9	14	300
80-605-805	1	287	10	12	300

Metric Keyway Dimensions: ISO / R773 – Js9 Width Tolerance

Key & Keyway Dimensions – Millimeters

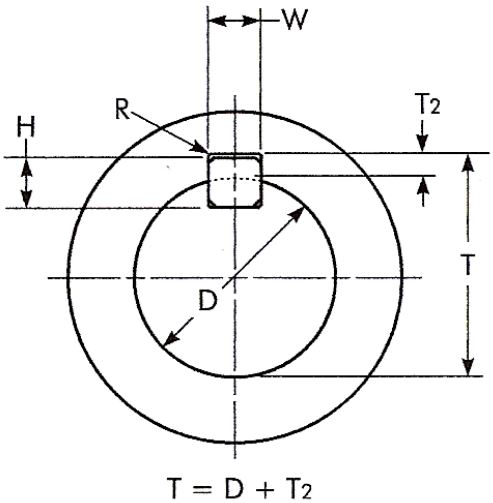
Shaft Diameter "D"		Key Size Nominal		Keyway Width Hub "W"			Keyway Depth Hub "T2"		Keyway Radius "R" †	
Over	Thru	Width "W"	Height "H"	Nominal	Min	Max	Min	Max	Min	Max
6	8	2	2	2	-.0125	+.0125	1.0	1.1	0.08	0.16
8	10	3	3	3	-.0125	+.0125	1.4	1.5	0.08	0.16
10	12	4	4	4	-.0150	+.0150	1.8	1.9	0.08	0.16
12	17	5	5	5	-.0150	+.0150	2.3	2.4	0.16	0.25
17	22	6	6	6	-.0150	+.0150	2.8	2.9	0.16	0.25
22	30	8	7	8	-.0180	+0180	3.3	3.5	0.16	0.25
30	38	10	8	10	-.0180	+0180	3.3	3.5	0.25	0.40
38	44	12	8	12	.-0215	+.0215	3.3	3.5	0.25	0.40
44	50	14	9	14	.-0215	+.0215	3.8	4.0	0.25	0.40
50	58	16	10	16	.-0215	+.0215	4.3	4.5	0.25	0.40
58	65	18	11	18	.-0215	+.0215	4.4	4.6	0.25	0.40
65	75	20	12	20	-.0260	+.0260	4.9	5.1	0.40	0.60
75	85	22	14	22	-.0260	+.0260	5.4	5.6	0.40	0.60
85	95	25	14	25	-.0260	+.0260	5.4	5.6	0.40	0.60
95	110	28	16	28	-.0260	+.0260	6.4	6.6	0.40	0.60
110	130	32	18	32	-.0310	+.0310	7.4	7.6	0.40	0.60
130	150	36	20	36	-.0310	+.0310	8.4	8.7	0.70	1.00
150	170	40	22	40	-.0310	+.0310	9.4	9.7	0.70	1.00
170	200	45	25	45	-.0310	+.0310	10.4	10.7	0.70	1.00
200	230	50	28	50	-.0310	+.0310	11.4	11.7	0.70	1.00
230	260	56	32	56	-.0370	+.0370	12.4	12.7	1.20	1.60
260	290	63	32	63	-.0370	+.0370	12.4	12.7	1.20	1.60
290	330	70	36	70	-.0370	+.0370	14.4	14.7	1.20	1.60
330	380	80	40	80	-.0370	+.0370	15.4	15.7	2.00	2.50
380	440	90	45	90	-.0435	+.0435	17.4	17.7	2.00	2.50
440	500	100	50	100	-.0435	+.0435	19.5	19.8	2.00	2.50



Metric Keyway Dimensions: ISO / R773 – J9 Width Tolerance

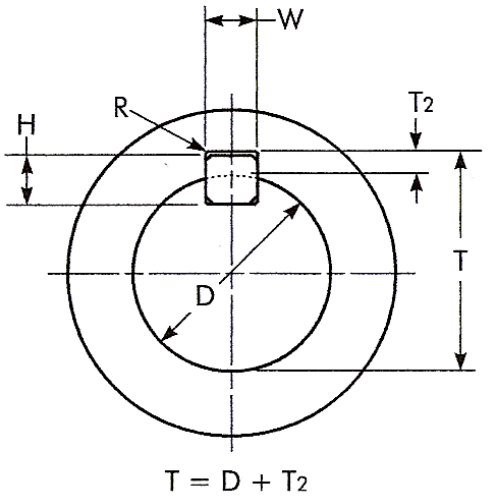
Key & Keyway Dimensions – Millimeters

Shaft Diameter "D"		Key Size Nominal		Keyway Width Hub "W"			Keyway Depth Hub "T2"		Keyway Radius "R" †	
Over	Thru	Width "W"	Height "H"	Nominal	Min	Max	Min	Max	Min	Max
6	8	2	2	2	-.031	-.006	1.0	1.1	0.08	0.16
8	10	3	3	3	-.031	-.006	1.4	1.5	0.08	0.16
10	12	4	4	4	-.042	-.012	1.8	1.9	0.08	0.16
12	17	5	5	5	-.042	-.012	2.3	2.4	0.16	0.25
17	22	6	6	6	-.042	-.012	2.8	2.9	0.16	0.25
22	30	8	7	8	-.051	-.015	3.3	3.5	0.16	0.25
30	38	10	8	10	-.051	-.015	3.3	3.5	0.25	0.40
38	44	12	8	12	-.061	-.018	3.3	3.5	0.25	0.40
44	50	14	9	14	-.061	-.018	3.8	4.0	0.25	0.40
50	58	16	10	16	-.061	-.018	4.3	4.5	0.25	0.40
58	65	18	11	18	-.061	-.018	4.4	4.6	0.25	0.40
65	75	20	12	20	-.074	-.022	4.9	5.1	0.40	0.60
75	85	22	14	22	-.074	-.022	5.4	5.6	0.40	0.60
85	95	25	14	25	-.074	-.022	5.4	5.6	0.40	0.60
95	110	28	16	28	-.074	-.022	6.4	6.6	0.40	0.60
110	130	32	18	32	-.088	-.026	7.4	7.6	0.40	0.60
130	150	36	20	36	-.088	-.026	8.4	8.7	0.70	1.00
150	170	40	22	40	-.088	-.026	9.4	9.7	0.70	1.00
170	200	45	25	45	-.088	-.026	10.4	10.7	0.70	1.00
200	230	50	28	50	-.088	-.026	11.4	11.7	0.70	1.00
230	260	56	32	56	-.106	-.032	12.4	12.7	1.20	1.60
260	290	63	32	63	-.106	-.032	12.4	12.7	1.20	1.60
290	330	70	36	70	-.106	-.032	14.4	14.7	1.20	1.60
330	380	80	40	80	-.106	-.032	15.4	15.7	2.00	2.50
380	440	90	45	90	-.124	-.037	17.4	17.7	2.00	2.50
440	500	100	50	100	-.124	-.037	19.5	19.8	2.00	2.50



Key & Keyway Dimensions – Millimeters

Shaft Diameter "D"		Key Size Nominal		Keyway Width Hub "W"			Keyway Depth Hub "T2"		Keyway Radius "R"●	
Over	Thru	Width "W"	Height "H"	Nominal	Min	Max	Min	Max	Min	Max
6	8	2	2	2	+.020	+.060	1.0	1.1	0.08	0.16
8	10	3	3	3	+.020	+.060	1.4	1.5	0.08	0.16
10	12	4	4	4	+.030	+.078	1.8	1.9	0.08	0.16
12	17	5	5	5	+.030	+.078	2.3	2.4	0.16	0.25
17	22	6	6	6	+.030	+.078	2.8	2.9	0.16	0.25
22	30	8	7	8	+.040	+.098	3.3	3.5	0.16	0.25
30	38	10	8	10	+.040	+.098	3.3	3.5	0.25	0.40
38	44	12	8	12	+.050	+.120	3.3	3.5	0.25	0.40
44	50	14	9	14	+.050	+.120	3.8	4.0	0.25	0.40
50	58	16	10	16	+.050	+.120	4.3	4.5	0.25	0.40
58	65	18	11	18	+.050	+.120	4.4	4.6	0.25	0.40
65	75	20	12	20	+.065	+.149	4.9	5.1	0.40	0.60
75	85	22	14	22	+.065	+.149	5.4	5.6	0.40	0.60
85	95	25	14	25	+.065	+.149	5.4	5.6	0.40	0.60
95	110	28	16	28	+.065	+.149	6.4	6.6	0.40	0.60
110	130	32	18	32	+.080	+.180	7.4	7.6	0.40	0.60
130	150	36	20	36	+.080	+.180	8.4	8.7	0.70	1.00
150	170	40	22	40	+.080	+.180	9.4	9.7	0.70	1.00
170	200	45	25	45	+.080	+.180	10.4	10.7	0.70	1.00
200	230	50	28	50	+.080	+.180	11.4	11.7	0.70	1.00
230	260	56	32	56	+.100	+.220	12.4	12.7	1.20	1.60
260	290	63	32	63	+.100	+.220	12.4	12.7	1.20	1.60
290	330	70	36	70	+.100	+.220	14.4	14.7	1.20	1.60
330	380	80	40	80	+.100	+.220	15.4	15.7	2.00	2.50
380	440	90	45	90	+.120	+.260	17.4	17.7	2.00	2.50
440	500	100	50	100	+.120	+.260	19.5	19.8	2.00	2.50

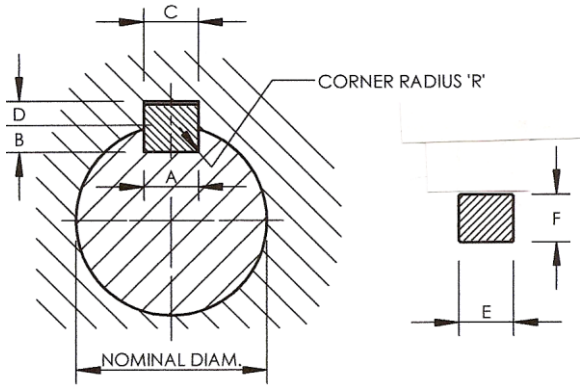


Square Keyways

Safe working loads on keys:

Torque inch/pounds = 9000 x λ x F x shaft dia. (inches)

$$HP = \frac{\text{Torque (inch/pounds)} \times \text{RPM}}{63025}$$



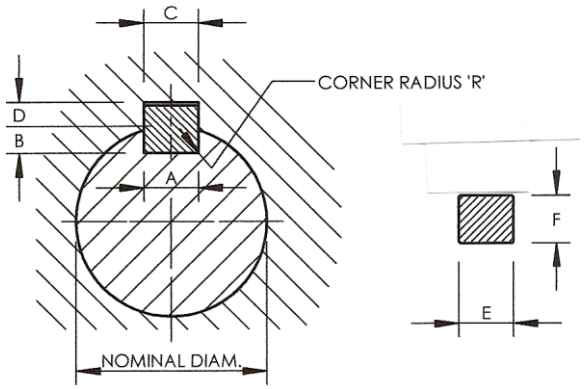
NOMINAL SHAFT DIAM.		KEY SIZE	DIMENSIONS (INCHES)						
OVER	TO (Incl.)		A	B	C	D	E	F	R
1/4"	1/2"	1/8" x 1/8"	0.124 0.125	0.072 0.078	0.125 0.126	0.060 0.066	0.127 0.125		0.010
1/2"	3/4"	3/16" x 3/16"	0.187 0.188	0.107 0.113	0.188 0.189	0.088 0.094	0.190 0.188		0.010
3/4"	1"	1/4" x 1/4"	0.249 0.250	0.142 0.148	0.250 0.251	0.115 0.121	0.252 0.250		0.010
1"	1.1/4"	5/16" x 5/16"	0.311 0.312	0.177 0.183	0.312 0.313	0.142 0.148	0.314 0.312		0.010
1.1/4"	1.1/2"	3/8" x 3/8"	0.374 0.375	0.213 0.219	0.375 0.376	0.169 0.175	0.377 0.375		0.010
1.1/2"	1.3/4"	7/16" x 7/16"	0.437 0.438	0.248 0.254	0.438 0.439	0.197 0.203	0.440 0.438		0.020
1.3/4"	2"	1/2" x 1/2"	0.499 0.500	0.283 0.289	0.500 0.501	0.224 0.230	0.502 0.500		0.020
2"	2.1/4"	9/16" x 9/16"	0.562 0.563	0.321 0.327	0.563 0.564	0.245 0.251	0.565 0.563		0.020
2"	2.1/2"	5/8" x 5/8"	0.624 0.625	0.354 0.360	0.625 0.626	0.278 0.284	0.627 0.625		0.020
2.1/2"	3"	3/4" x 3/4"	0.749 0.750	0.424 0.430	0.750 0.751	0.333 0.339	0.752 0.750		0.020
3"	3.1/2"	7/8" x 7/8"	0.874 0.875	0.495 0.501	0.875 0.876	0.387 0.393	0.877 0.875		0.062
3.1/2"	4"	1" x 1"	0.999 1.000	0.566 0.572	1.000 1.001	0.442 0.448	1.003 1.000		0.062
4"	4.1/2"	1.1/8" x 1.1/8"	1.123 1.125	0.640 0.646	1.125 1.127	0.489 0.495	1.128 1.125		0.062
4"	5"	1.1/4" x 1.1/4"	1.248 1.250	0.707 0.713	1.250 1.252	0.551 0.557	1.253 1.250		0.062
5"	5.1/2"	1.3/8" x 1.3/8"	1.373 1.375	0.782 0.788	1.375 1.377	0.598 0.604	1.378 1.375		0.062
5"	6"	1.1/2" x 1.1/2"	1.498 1.500	0.848 0.854	1.500 1.502	0.661 0.667	1.504 1.500		0.062
6.1/2"	7"	1.3/4" x 1.3/4"	1.748 1.750	0.993 0.999	1.750 1.752	0.762 0.768	1.754 1.750		0.062
7.1/2"	8"	2" x 2"	1.998 2.000	1.134 1.140	2.000 2.002	0.872 0.878	2.004 2.000		0.062

Rectangular Keyways

Safe working loads on keys:

Torque inch/pounds = 9000 x λ x F x shaft dia. (inches)

$$HP = \frac{\text{Torque (inch/pounds) x RPM}}{63025}$$



Rectangular Keys:

NOMINAL SHAFT DIAM.		KEY SIZE	DIMENSIONS (INCHES)						
OVER	TO (Incl.)		A	B	C	D	E	F	R
1”	1.1/4”	5/16” x 1/4”	0.311 0.312	0.146 0.152	0.312 0.313	0.112 0.118	0.314 0.312	0.253 0.250	0.010
1.1/4”	1.1/2”	3/8” x 1/4”	0.374 0.375	0.150 0.156	0.375 0.376	0.108 0.114	0.377 0.375	0.253 0.250	0.010
		3/8” x 5/16”	0.374 0.375	0.182 0.188	0.375 0.376	0.139 0.145	0.377 0.375	0.315 0.312	0.010
		7/16” x 1/4”	0.437 0.438	0.154 0.160	0.438 0.439	0.104 0.110	0.440 0.438	0.253 0.250	0.020
1.1/2”	1.3/4”	7/16” x 5/16”	0.437 0.438	0.186 0.192	0.438 0.439	0.135 0.141	0.440 0.438	0.315 0.312	0.020
1.3/4”	2”	1/2” x 5/16”	0.499 0.500	0.190 0.196	0.500 0.501	0.131 0.137	0.502 0.500	0.315 0.312	0.020
		1/2” x 7/16”	0.499 0.500	0.256 0.262	0.500 0.501	0.189 0.195	0.502 0.500	0.440 0.438	0.020
2”	2.1/2”	5/8” x 7/16”	0.624 0.625	0.260 0.266	0.625 0.626	0.185 0.191	0.627 0.625	0.441 0.438	0.020
		5/8” x 1/2”	0.624 0.625	0.295 0.301	0.625 0.626	0.213 0.219	0.627 0.625	0.502 0.500	0.020
2.1/2”	3”	3/4” x 1/2”	0.749 0.750	0.299 0.305	0.750 0.751	0.209 0.215	0.752 0.750	0.503 0.500	0.020
		3/4” x 5/8”	0.749 0.750	0.366 0.372	0.750 0.751	0.274 0.280	0.752 0.750	0.629 0.625	0.020
3”	3.1/2”	7/8” x 5/8”	0.874 0.875	0.370 0.376	0.875 0.876	0.264 0.270	0.877 0.875	0.629 0.625	0.062
		1” x 5/8”	0.999 1.000	0.374 0.380	1.000 1.001	0.260 0.266	1.003 1.000	0.629 0.625	0.062
3.1/2”	4”	1” x 3/4”	0.999 1.000	0.441 0.447	1.000 1.001	0.318 0.324	1.003 1.000	0.754 0.750	0.062
4”	5”	1.1/4” x 7/8”	1.248 1.250	0.518 0.524	1.250 1.251	0.366 0.372	1.253 1.250	0.879 0.875	0.062
5”	6”	1.1/2” x 1”	1.498 1.500	0.599 0.605	1.500 1.501	0.412 0.418	1.504 1.500	1.006 1.000	0.062

PRECISION BRAND®

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Trade Name: Steel and Stainless Steel Keystock and Mill Stock
Common Name: Cold Finished Carbon, Stainless and Alloy Steels
Product Codes: 14, 15, 53, 54, 55, 56, 57

Company Identification:
Precision Brand Products, Inc.
2250 Curtiss Street
Downers Grove IL 60515 USA
630-969-7200
Revision Date: 12/19/2008

Emergency Phone Numbers

Chemtrec 800-424-9300 USA & Canada
202-483-7616 International

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m³)		OSHA PEL (mg/m³)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements:							
Aluminum	(Al)	7429-90-5	0-0.01	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.002 0.01	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.09	0.01 0.002	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	0.04-0.95		Not Established		Not Established
Chromium (Alloy grades)	(Cr)	7440-47-3	0.01-1.6	0.5	Metal	1	Metal
Chromium (Stainless grades)	(Cr)	7440-47-3	4-20	0.5	Metal	1	Metal
Chromium (Carbon grades)	(Cr)	7440-47-3	0.01-1.0	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal / Dust / Fume
Copper	(Cu)	7440-50-8	0.04-1.0	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead (Leaded grades)	(Pb)	7439-92-1	0.15-0.35	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Lead (all other grades)	(Pb)	7439-92-1	0.0-0.09	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not established		Not established
Manganese	(Mn)	7439-96-5	0.2-2	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)
Molybdenum	(Mo)	7439-98-7	0.01-0.8	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	0.01-0.1	1.5	Metal	1	Metal and Insoluble compounds
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium

MSDS: Keystock, Steel and Stainless Steel and Mill Stock
Precision Brand Products, Inc.

Silicon	(Si)	7440-21-3	<0.9	10	Dust	15	Dust
Sulfur	(S)	7704-34-9	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7723-14-0	<0.9	2	Metal, Oxide and Inorganic Compounds	2	Inorganic Compounds
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	<	10 5 10	Oxide Dust Oxide Fume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

Note: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. The above listing is a summary of elements used in alloying. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications can be found by asking for a certificate of compliance.

3. HAZARDS IDENTIFICATION

Emergency Overview

WARNING! WELDING, SAWING, BRAZING, GRINDING, AND MACHINING MAY CAUSE DUSTS AND/OR FUME TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS.

Potential Health Effects

Note: Steel products in their solid state under normal conditions do not present an inhalation, ingestion, or skin hazard. However, operations resulting in fume or particulate formation such as welding, sawing, brazing, grinding, and machining may present health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulate may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact

Dusts or particulate may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching, and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation

Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion

Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Chronic or Special Toxic Effects

Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.

Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11 for additional, specific information on effects noted above.

Target Organs

Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system.

Medical Conditions Aggravated by Exposure

Diseases of the skin, such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that causes pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

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4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.
Skin Contact- In case of overexposure to dusts or particulate, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.
Inhalation- In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.
Ingestion- Not considered an ingestion hazard. However, if excessive amounts of dust or particulate are swallowed, treat symptomatically and supportively. Get medical attention.
Notes to Physician- Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method)- Not applicable
Flammable Limits (% volume in air) - Not applicable
Autoignition Temperature - Not applicable
Extinguishing Media - For molten metal, use dry powder or sand.
Special Fire Fighting Procedures - Do not use water on molten metal. Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.
Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see Section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways.
Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.
Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations.

7. HANDLING AND STORAGE

Storage Temperature - Stable under normal temperatures and pressures.
Precautions to be taken in Handling and Storing - Store away from strong oxidizers. Dusts or powders may form explosive mixtures with air. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulate or fumes should be evaluated and controlled as necessary.
Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.
Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.
Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.

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Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.
Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor – Dull or shiny grey steel.
Boiling Point - Not applicable
Melting Point - Approximately 2800°F
pH - Not applicable
Specific Gravity (at 15.6°C) - Not applicable
Density (at 15.6°C) - Not applicable
Vapor Pressure - Not applicable
Vapor Density (air=1) - Not applicable
% Volatile by Volume - Not applicable
Solubility in Water - Insoluble.
Evaporation Rate (Butyl Acetate = 1) - Not applicable
Other Physical and Chemical Date - None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1.

11. TOXICOLOGICAL INFORMATION

The primary component of this product is iron. Long-term exposure to iron dusts or fumes can result in a condition called siderosis which is considered to be a benign pneumoconiosis. Symptoms may include chronic bronchitis, emphysema, and shortness of breath upon exertion. Penetration of iron particles in the skin or eye may cause an exogenous or ocular siderosis which may be characterized by a red-brown pigmentation of the affected area. Ingestion overexposures to iron may affect the gastrointestinal, nervous, and hematopoietic system and the liver. Iron and steel founding, but not iron or iron oxide, has been listed as potentially carcinogenic by IARC.

When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above), and welding fumes as a general category have been listed by IARC as a carcinogen (Group 2B). There is also limited evidence that welding fumes may cause adverse reproductive and fetal effects. Evidence is stronger where welding materials contain known reproductive toxins, e.g. lead, which may be present in the coating material of this product.

Breathing fumes or dusts of this product may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals including cadmium, zinc, magnesium, copper, antimony, nickel, cobalt, manganese, tin, lead, beryllium, silver, chromium, aluminum, selenium, iron, and arsenic. The most common agents involved are zinc and copper.

This product may contain small amounts of manganese. Prolonged exposure to manganese dusts or fumes is associated with "manganism", a Parkinson-like syndrome characterized by a variety of neurological symptoms including muscle spasms, gait disturbances, tremors, and psychoses.

This product may contain small amounts of cadmium. Primary target organs for cadmium overexposure are the lung and the kidney. Because of its cumulative nature, chronic cadmium poisoning can cause serious disease which takes many years to develop and may continue to progress despite cessation of exposure. Progression of the disease may not reflect current exposure conditions. It is also capable of causing a painful osteomalacia called "Itai-Itai" in postmenopausal women, and has caused developmental effects and/or reproductive effects in male and female animals. Cadmium is a listed carcinogen by NTP, OSHA, and IARC (Group 1.)

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This product may contain small amounts of chromium. Prolonged and repeated overexposure to chromium dusts or fumes may cause skin ulcers, nasal irritation and ulceration, kidney damage and cancer of the respiratory system. Chromium is a skin sensitizer. Cancer is generally attributed to the hexavalent (+6) form of chromium which is listed as a carcinogen by NTP and IARC (Group 1).

This product may contain small amounts of nickel. Prolonged and repeated contact with nickel may cause sensitization dermatitis. Inhalation of nickel compounds has caused lung damage as well as sinus, nasal and lung cancer in laboratory animals. Nickel is a listed carcinogen by NTP and IARC (Group 1).

This product may contain small amounts of vanadium. Adverse effects from dermal, inhalation or parenteral exposure to various vanadium compounds have been reported. The major target for vanadium pentoxide toxicity is the respiratory tract. Fumes or dust can cause severe eye and respiratory irritation, and systemic effects. Chronic bronchitis, green tongue, conjunctivitis, pharyngitis, rhinitis, rales, chronic productive cough, and tightness of the chest have been reported following overexposure. Allergic reactions resulting from skin and inhalation exposures have also been reported. A statistical association between vanadium air levels and lung cancer has been suggested, but vanadium currently is not regarded as a human carcinogen.

This product may contain small amounts of lead. Lead can accumulate in the body. Consequently, exposure to fumes or dust may produce signs of polyneuritis, diminished vision and peripheral neuropathy, such as tingling and loss of feeling in fingers, arms, and legs. Lead is a known reproductive and developmental toxin. It is also associated with central nervous system disorders, anemia, kidney dysfunction and neurobehavioral abnormalities. The brain is a major target organ for lead exposure. Elemental lead is listed as an IARC 2B carcinogen.

This product may contain small amounts of copper. Copper dust and fume can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers and metal fume fever. Other effects from repeated inhalation of copper fume include a metallic or sweet taste, and discoloration of skin, teeth or hair. Copper also may cause an allergic skin reaction. Overexposure to copper can affect the liver.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with Federal, State and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packaging Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous.
CALIFORNIA PROPOSITION 65
This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.
Regulatory Lists
Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.

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Toxic Substances Control Act (TSCA)
Components of this product are listed on the TSCA inventory.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb.)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III
SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effects, Delayed Health Effects.
This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372):

SECTION 313 REPORATABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	<0.01	No - Less than 1%
Antimony	7440-36-0	<0.9	No - Less than 1%
Arsenic	7440-38-2	<0.09	No - Less than 0.1%
Beryllium	7440-41-7	<0.09	No - Less than 0.1%
Cadmium	7440-43-9	<0.09	No - Less than 0.1%
Chromium	7440-47-3	0.01-1.0	Yes- Greater than 0.1%
Cobalt	7440-48-4	<0.09	No - Less than 0.1%
Copper	7440-50-8	<1.0	No - Less than 1%
Lead	7439-92-1	0.0-0.09	No - Less than 0.1%
Lead (leaded steel only)	7439-92-1	0.15-0.35	Yes- Greater than 0.1%
Manganese	7439-96-5	0.2-2	Yes- Greater than 1%
Nickel	7440-02-0	0.01-0.1	Yes- Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No - Less than 1%
Selenium	7782-49-2	<0.9	No - Less than 1%
Vanadium	7440-62-2	<0.9	No - Less than 1%
Zinc	7440-66-6	<0.9	No - Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This product may be coated with a variety of materials, including oils, zinc plating, etc. that are not included in the MSDS. During welding precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition or combustible and flammable materials.

The information in this Material Safety Data Sheet (MSDS) was obtained from sources we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy of correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.