

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders



G-800 Series — 3-Roll Expanders

O.D. Range: 1/2" – 1-1/2" (12.7 – 38.1 mm)

- Expanders with 1-1/2" (38.1 mm) long rolls will accommodate tube sheet thicknesses of 1/2" to 1-1/2" (12.7 mm to 38.1 mm).
- Expanders with 2-1/4" (51.7 mm) long rolls will accommodate tube sheet thicknesses from 1-1/4" to 2-1/4" (31.7 mm to 57.1 mm).
- Reversible Thrust Collar design allows flush and 1/8" recess tube rolling. Collars have lubrication port for use with auto-lube configured ATR and DAS tube rolling systems.



Sizes not listed available upon request.

Tube O.D.		Tube Gauge		Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 3/8 in. Sq. Dr. (9.5 mm)	Recommended Rolling Motors (Order No.)		
						1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric	
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm			
1/2	12.7	14	0.083	2.10	0.334	8.48	797 (5005780)	797 (5512194)			0.324	8.22	0.374	9.49	797 (2131300)	720-550-B (8405391)	
		15	0.072	1.82	0.356	9.04	799 (5005782)	R-1 (5284800)			0.348	8.83	0.398	10.10	799 (2131900)		
		16	0.065	1.65	0.370	9.39	801 (5005800)					0.360	9.14	0.410	10.41	M-1 (2511800)	720-1800-B-3/8 (8405512)
		17	0.058	1.47	0.384	9.75	803 (5005900)	R-2 (5285000)			0.374	9.49	0.424	10.76			
		18	0.049	1.24	0.402	10.21	805 1/2 (5006000)	R-3 (5285200)			0.392	9.95	0.447	11.35	M-2 (2512100)		
		20	0.035	0.88	0.430	10.92	807 1/2 (5525444)	R-4 (5285400)			0.420	10.66	0.480	12.19	M-3 (2512400)		
5/8	15.8	12	0.109	2.76	0.407	10.33	805 5/8 (5006001)	R-3 (5285200)			0.392	9.95	0.447	11.35	M-2 (2512100)	850-600-A (8405398)	
		13	0.095	2.41	0.435	11.04	807 5/8 (5006100)	R-4 (5285400)			0.420	10.66	0.480	12.19	M-3 (2512400)		
		14	0.083	2.10	0.459	11.65	809 (5006200)	R-4 (5285400)	810 (5006300)	R-4-A (5285500)	0.449	11.40	0.509	12.92	M-4 (2512700)		
		15	0.072	1.82	0.481	12.21	811 5/8 (5006400)	R-5 (5285800)	812 5/8 (5006500)	R-5-A (5285900)	0.471	11.96	0.536	13.61	M-5 (2513000)	850-1250-A (8405399)	
		16	0.065	1.65	0.495	12.57	813 (5006600)	R-6 (5286200)	814 (5006700)	R-6-A (5286300)	0.485	12.31	0.550	13.97			
		17	0.058	1.47	0.509	12.92	815 5/8 (5006800)				816 5/8 (5006900)		0.499	12.67	0.564	14.32	M-6 (2513300)
		18	0.049	1.24	0.527	13.38	817 5/8 (5007000)	R-7 (5286600)	818 5/8 (5007100)	R-7-A (5286700)	0.517	13.13	0.582	14.78			
		19	0.042	1.06	0.541	13.74											
		20	0.035	0.88	0.555	14.09											
		21	0.032	0.81	0.561	14.24											
22	0.028	0.71	0.569	14.45			819 (5007200)	R-7 (5286600)	820 (5007300)	R-7-A (5286700)	0.531	13.48	0.596	15.13	M-8 (2513900)		

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Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders (cont.)

Tube O.D.		Tube Gauge		Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 3/8 in. Sq. Dr. (9.5 mm)	Recommended Rolling Motors (Order No.)				
						1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric			
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm					
3/4	19.0	10	0.134	3.40	0.482	12.24	811 3/4 (5006401)	R-5 (5285800)	812 3/4 (5006501)	R-5-A (5285900)	0.471	11.96	0.536	13.61	M-5 (2513000)	850-600-A (8405398)			
		11	0.120	3.04	0.510	12.95	815 3/4 (5006801)	R-6 (5286200)	816 3/4 (5006901)	R-6-A (5286300)	0.499	12.67	0.564	14.32	M-6 (2513300)				
		12	0.109	2.76	0.532	13.51	817 3/4 (5007001)	R-7 (5286600)	818 3/4 (5007101)	R-7-A (5286700)	0.517	13.13	0.582	14.78					
		13	0.095	2.41	0.560	14.22	821 (5007400)	R-8 (5287000)	822 (5007500)	R-8-A (5287100)	0.550	13.97	0.615	15.62	M-8 (2513900)				
		14	0.083	2.10	0.584	14.83	823 (5007600)	R-9 (5287400)	824 (5007700)	R-9-A (5287500)	0.574	14.57	0.639	16.23					
		15	0.072	1.82	0.606	15.39	825 3/4 (5007800)	R-10 (5287800)	826 3/4 (5007900)	R-10-A (5287900)	0.596	15.13	0.661	16.78					
		16	0.065	1.65	0.620	15.74	827 (5008000)		828 (5008100)		0.605	15.36	0.685	17.39					
		17	0.058	1.47	0.634	16.10	831 3/4 (5008400)	R-11 (5288200)	830 3/4 (5008300)	R-11-A (5288300)	0.619	15.72	0.699	17.75	M-9 (2514200)	850-1250-A (8405399)			
		18	0.049	1.24	0.652	16.56					829 3/4 (5008200)	832 3/4 (5008500)	0.642	16.30			0.722	18.33	
		19	0.042	1.06	0.666	16.91													
		20	0.035	0.88	0.680	17.27													
		21	0.032	0.81	0.686	17.42													
22	0.028	0.71	0.694	17.62															
7/8	22.2	10	0.134	3.40	0.607	15.41	825 7/8 (5007801)	R-10 (5287800)	826 7/8 (5007901)	R-10-A (5287900)	0.596	15.13	0.661	16.78	M-8 (2513900)	850-600-A (8405398)			
		11	0.120	3.04	0.635	16.12	829 7/8 (5008201)	R-11 (5288200)	830 7/8 (5008301)	R-11-A (5288300)	0.619	15.72	0.699	17.75	M-9 (2514200)				
		12	0.109	2.76	0.657	16.68	831 7/8 (5008401)	R-12 (5288600)	832 7/8 (5008501)	R-12-A (5288700)	0.642	16.30	0.722	18.33					
		13	0.095	2.41	0.685	17.39	833 (5008600)	R-13 (5289000)	834 (5008700)	R-13-A (5289100)	0.670	17.01	0.750	19.05	M-10 (2514500)				
		14	0.083	2.10	0.709	18.00	835 (5008800)	R-14 (5289400)	836 (5008900)	R-14-A (5289500)	0.685	17.39	0.774	19.65	M-11 (2514800)				
		15	0.072	1.82	0.731	18.56	837 (5009000)	R-15 (5289800)	838 (5009100)	R-15-A (5289900)	0.712	18.08	0.801	20.34					
		16	0.065	1.65	0.745	18.92	839 (5009200)		840 (5009300)		0.726	18.44	0.815	20.70					
		17	0.058	1.47	0.759	19.27	843 (5009600)	R-16 (5290200)	844 (5009700)	R-16-A (5290300)	0.740	18.79	0.829	21.05	M-12 (2515100)	850-1250-A (8405399)			
18	0.049	1.24	0.777	19.73															
1	25.4	8	0.165	4.19	0.670	17.01	841 (5009400)	R-13 (5289000)	842 (5009500)	R-13-A (5289100)	0.655	16.63	0.735	18.66	M-9 (2514200)	1050-400 (8404200)			
		9	0.148	3.75	0.704	17.88	835 (5008800)	R-14 (5289400)	836 (5008900)	R-14-A (5289500)	0.685	17.39	0.774	19.65	M-11 (2514800)				
		10	0.134	3.40	0.732	18.59	837 (5009000)	R-15 (5289800)	838 (5009100)	R-15-A (5289900)	0.712	18.08	0.801	20.34					
		11	0.120	3.04	0.760	19.30	843 (5009600)	R-16 (5290200)	844 (5009700)	R-16-A (5290300)	0.740	18.79	0.829	21.05	M-12 (2515100)	850-600-A (8405398)			
		12	0.109	2.76	0.782	19.86	845 (5009800)	R-17 (5290600)	846 (5009900)	R-17-A (5290700)	0.763	19.38	0.852	21.64					
		13	0.095	2.41	0.810	20.57	847 (5010000)	R-18 (5291000)	848 (5010100)	R-18-A (5291100)	0.791	20.09	0.880	22.35					
		14	0.083	2.10	0.834	21.18	849 (5010200)		850 (5010300)		0.810	20.57	0.909	23.08			M-13 (2515400)		

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Tube O.D.		Tube Gauge		Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 3/8 in. Sq. Dr. (9.5 mm)	Recommended Rolling Motors (Order No.)		
						1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric	
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm			
1	25.4	15	0.072	1.82	0.856	21.74	851 (5010400)	R-19 (5291400)	852 (5010500)	R-19-A (5291500)	0.837	21.25	0.936	23.77	M-13 (2515400)	850-600-A (8405398)	979-C-650/ ATC-900
		16	0.065	1.65	0.870	22.09											
		17	0.058	1.47	0.884	22.45	855 (5010800)	R-21 (5292200)	856 (5010900)	R-21-A (5292300)	0.865	21.97	0.964	24.48			
		18	0.049	1.24	0.902	22.91											
		19	0.042	1.06	0.916	23.26											
		20	0.035	0.88	0.930	23.62											
1-1/8	28.5	8	0.165	4.19	0.795	20.19	853 (5010600)	R-20 (5291800)	854 (5010700)	R-20-A (5291900)	0.776	19.71	0.875	22.22	M-13 (2515400)	1050-400 (8404200)	979-C-300/ ATC-900
		9	0.148	3.75	0.829	21.05	849 (5010200)	R-18 (5291000)	850 (5010300)	R-18-A (5291100)	0.810	20.57	0.909	23.08			
		10	0.134	3.40	0.857	21.76	851 (5010400)	R-19 (5291400)	852 (5010500)	R-19-A (5291500)	0.837	21.25	0.936	23.77			
		11	0.102	3.04	0.885	22.47	855 (5010800)	R-21 (5292200)	856 (5010900)	R-21-A (5292300)	0.865	21.97	0.964	24.48			
		12	0.109	2.76	0.907	23.03	857 (5011000)		858 (5011100)		0.883	22.42	0.982	24.94	M-14 (2515700) *		
		13	0.095	2.41	0.935	23.74	859 (5011200)	R-22 (5292600)	860 (5011300)	R-22-A (5292700)	0.916	23.26	1.015	25.78	M-15 (2516000) *		
		14	0.083	2.10	0.959	24.35	861 (5011400)	R-23 (5293000)	862 (5011500)	R-23-A (5293100)	0.935	23.74	1.044	26.51			
		15	0.072	1.82	0.981	24.91	863 (5011600)	R-24 (5293400)	864 (5011700)	R-24-A (5293500)	0.962	24.43	1.071	27.20			
		16	0.065	1.65	0.995	25.27											
		17	0.058	1.47	1.009	25.62	867 (5012000)	R-26 (5294200)	868 (5012100)	R-26-A (5293500)	0.990	25.14	1.099	27.91	M-16 (2516300) *		
18	0.049	1.24	1.027	26.08													
1-1/4	31.7	8	0.165	4.19	0.920	23.36	865 (5011800)	R-25 (5293800)	866 (5011900)	R-25-A (5293900)	0.901	22.88	1.010	25.65	M-15 (2516000) *	979-C-650/ ATC-900	
		9	0.148	3.75	0.954	24.23	861 (5011400)	R-23 (5293000)	862 (5011500)	R-23-A (5293100)	0.935	23.74	1.044	26.51			
		10	0.134	3.40	0.982	24.94	863 (5011600)	R-24 (5293400)	864 (5011700)	R-24-A (5293500)	0.962	24.43	1.071	27.20			
		11	0.120	3.04	1.010	25.65	867 (5012000)	R-26 (5294200)	868 (5012100)	R-26-A (5293500)	0.990	25.14	1.099	27.91	M-16 (2516300) *		
		12	0.109	2.76	1.032	26.21	869 (5012200)	R-27 (5294600)	870 (5012300)	R-27-A (5294700)	1.013	25.73	1.122	28.49			
		13	0.095	2.41	1.060	26.92	871 (5012400)	R-28 (5295000)	872 (5012500)	R-28-A (5295100)	1.041	26.44	1.150	29.21	M-17 (2516600) *		
		14	0.083	2.10	1.084	27.53	873 (5012600)	R-29 (5295400)	874 (5012700)	R-29-A (5295500)	1.060	26.92	1.169	29.69			
		15	0.072	1.82	1.106	28.09	875 (5012800)	R-30 (5295800)	876 (5012900)	R-30-A (5295900)	1.087	27.60	1.196	30.37			
		16	0.065	1.65	1.120	28.44											
		17	0.058	1.47	1.134	28.80	879 (5013200)	R-30 (5295800)	880 (5013300)	R-30-A (5295900)	1.115	28.32	1.224	31.08			
18	0.049	1.24	1.152	29.26													

* 1/2" Sq. Dr. (12.7 mm)

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders (cont.)

Tube O.D.		Tube Gauge			Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 1/2 in. Sq. Dr. (12.7 mm)	Recommended Rolling Motors (Order No.)	
							1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm			
1-3/8	34.9	8	0.165	4.19	1.045	26.54	877 (5013000)	R-31 (5296200)	878 (5013100)	R-31-A (5296300)	1.026	26.06	1.135	28.82	M-17 (2516600)	1550-250 (8404280)	979-C-210/ ATC-900
		9	0.148	3.75	1.079	27.40	873 (5012600)	R-29 (5295400)	874 (5012700)	R-29-A (5295500)	1.060	26.92	1.169	29.69			
		10	0.134	3.40	1.107	28.11	875 (5012800)	R-30 (5295800)	876 (5012900)	R-30-A (5295900)	1.087	27.60	1.196	30.37			
		11	0.120	3.04	1.135	28.82	879 (5013200)		880 (5013300)		1.115	28.32	1.224	31.08	M-18 (2516900)		
		12	0.109	2.76	1.157	29.38	881 (5013400)	R-32 (5296600)	882 (5013500)	R-32-A (5296700)	1.133	28.77	1.242	31.54	M-19 (2517200)	1550-900 (8404290)	979-C-300/ ATC-900
		13	0.095	2.41	1.185	30.09	883 (5013600)	R-33 (5297000)	884 (5013700)	R-33-A (5297100)	1.160	29.46	1.275	32.38			
		14	0.083	2.10	1.209	30.70	885 (5013800)	R-34 (5297400)	886 (5013900)	R-34-A (5297500)	1.179	29.94	1.294	32.86			
		15	0.072	1.82	1.231	31.26									M-20 (2517500)		
		16	0.065	1.65	1.245	31.62	887 (5014000)	R-35 (5297800)	888 (5014100)	R-35-A (5297900)	1.206	30.63	1.321	33.55			
1-1/2	38.1	8	0.165	4.19	1.170	29.71	889 (5014200)	R-34 (5297400)	890 (5014300)	R-34-A (5297500)	1.145	29.08	1.260	32.00	M-19 (2517200)	1550-250 (8404280)	979-C-210/ ATC-900
		9	0.148	3.75	1.204	30.58	885 (5013800)		886 (5013900)		1.177	29.89	1.294	32.86			
		10	0.134	3.40	1.232	31.29	887 (5014000)	R-35 (5297800)	888 (5014100)	R-35-A (5297900)	1.206	30.63	1.321	33.55	M-20 (2517500)		
		11	0.120	3.04	1.260	32.00	891 (5014400)	R-36 (5298200)	892 (5014500)	R-36-A (5298300)	1.235	31.36	1.350	34.29			
		12	0.109	2.76	1.282	32.56	893 (5014600)	R-37 (5298600)	894 (5014700)	R-37-A (5298700)	1.257	31.92	1.372	34.84			
		13	0.095	2.41	1.310	33.27	895 (5014800)	R-37 (5298600)	896 (5014900)	R-37-A (5298700)	1.285	32.63	1.400	35.56	M-21 (2517800)		
		14	0.083	2.10	1.334	33.88											
		15	0.072	1.82	1.356	34.44	897 (5015000)	R-38 (5299000)	898 (5015100)	R-38-A (5299100)	1.331	33.80	1.446	36.72			
		16	0.065	1.65	1.370	34.79											
		17	0.058	1.47	1.384	35.15	899 (5015120)	R-38 (5299000)	900 (5015150)	R-38-A (5299100)	1.331	33.80	1.472	37.38	M-22 (2518100)		
		18	0.049	1.24	1.402	35.61											
19	0.042	1.06	1.416	35.96													
20	0.035	0.88	1.430	36.32													

G-800 Series — 5-Roll Expanders

O.D. Range: 5/8" – 1-1/2" (15.8 – 38.1 mm)

- Expanders with 1-1/2" (38.1 mm) long rolls will accommodate tube sheet thicknesses of 1/2" to 1-1/2" (12.7 mm to 38.1 mm).
- Expanders with 2-1/4" (51.7 mm) long rolls will accommodate tube sheet thicknesses from 1-1/4" to 2-1/4" (31.7 mm to 57.1 mm).
- Reversible Thrust Collar design allows flush and 1/8" recess tube rolling. Collars have lubrication port for use with auto-lube configured ATR and DAS tube rolling systems.



NOTE: For best results, the Airetool five-roll expander should be fitted with a thin wall thrust collar when being used to roll tubing with 20 BWG .035" (0.9 mm).

Sizes not listed available upon request.

Tube O.D.		Tube Gauge		Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 3/8 in. Sq. Dr. (9.5 mm)	Recommended Rolling Motors (Order No.)		
						1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric	
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm			
5/8	15.8	17	0.058	1.47	0.509	12.92	815-5 (5517135)	R-4-5 (5513832)	816-5 (5519516)	R-4-A-5 (5517897PT)	0.499	12.67	0.564	14.32	M-9 (2514200)	850-1250-A (8405399)	
		18	0.049	1.24	0.527	13.38	817-5 (5514294)		818-5 (5521051)		0.517	13.13	0.576	14.63			
		19	0.042	1.06	0.541	13.74	819-5 (5514295)	R-4-5 (5513832)	820-5 (5515647)	R-4-A-5 (5517897)	0.531	13.48	0.596	15.13	M-11 (2514800)		
		20	0.035	0.88	0.555	14.09											
		21	0.032	0.81	0.561	14.24											
		22	0.028	0.71	0.569	14.45											
3/4	19.0	13	0.095	2.41	0.560	14.22	821-5 (5513230)	R-5-5 (5513231)	822-5 (5514482)	R-5-A-5 (5518189)	0.550	13.97	0.615	15.62	M-11 (2514800)	850-600-A (8405398)	979-C-650/ATC-900
		14	0.083	2.10	0.584	14.83	823-5 (5515375)	R-6-5 (5518187)	824-5 (5514171)	R-6-A-5 (5517898)	0.574	14.57	0.629	15.97			
		15	0.072	1.82	0.606	15.39	825-5 (5522104)	R-7-5 (5514393)	826-5 (5518376)	R-7-A-5 (5517899)	0.590	14.98	0.661	16.78	M-12 (2515100)		
		16	0.065	1.65	0.620	15.74	827-5 (5513799)		828-5 (5513542)						M-13 (2515400)		
		17	0.058	1.47	0.634	16.10	829-5 (5513426)	R-8-5 (5515995)	830-5 (5513413)	R-8-A-5 (5515996)	0.619	15.72	0.699	17.75	M-13 (2515400)	850-1250-A (8405399)	
		18	0.049	1.24	0.652	16.56											
		19	0.042	1.06	0.666	16.91	831-5 (5513427)	R-9-5 (5517888)	832-5 (5513264)	R-9-A-5 (5517900)	0.642	16.30	0.729	18.51	M-13 (2515400)		
		20	0.035	0.88	0.680	17.27											
		21	0.032	0.81	0.685	17.39											
		22	0.028	0.71	0.694	17.62											
7/8	22.2	13	0.095	2.41	0.685	17.39	833-5 (5517076)	R-9-5 (5517888)	834-5 (5514704)	R-9-A-5 (5517900)	0.670	17.01	0.747	18.97	M-14 (2515700) *	850-600-A (8405398)	979-C-650/ATC-900
		14	0.083	2.10	0.709	18.00	835-5 (5517735)	R-10-5 (5518191)	836-5 (5515680)	R-10-A-5 (5517901)	0.685	17.39	0.774	19.65	M-15 (2516000) *		
		16	0.065	1.65	0.745	18.93	839-5 (5518154)	R-11-5 (5517889)	840-5 (5514564)	R-11-A-5 (5517902)	0.685	17.39	0.750	19.05			
		17	0.058	1.47	0.759	19.27	843-5 (5517922)	R-11-5 (5517889)	844-5 (5517923)	R-11-A-5 (5517902)	0.740	18.79	0.824	20.92	M-17 (2516600) *	850-1250-A (8405399)	
		18	0.049	1.24	0.777	19.73											

* 1/2 in. Sq. Dr. (12.7 mm)

Condenser Expanders

Selection Guide G-800 Type Five-Roll Expanders (cont.)

Tube O.D.		Tube Gauge			Tube I.D.		Tube Sheet Thickness				Min. I.D. Tool Enters		Max. Expan. of Tool		Mandrel Number (Order No.) 1/2 in. Sq. Dr. (12.7 mm)	Recommended Rolling Motors (Order No.)	
							1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)							Airetool	Electric
in.	mm	bwg	in.	mm	in.	mm	Tool No. (Order No.)	Roll Set No. (Order No.)	Tool No. (Order No.)	Roll Set No. (Order No.)	in.	mm	in.	mm			
7/8	22.2	19	0.042	1.06	0.791	20.09	845-5 (5513810)	R-11-5 (5517889)	846-5 (5517924)	R-11-A-5 (5517902)	0.763	19.38	0.851	21.61	M-18 (2516900)	850-1250-A (8405399)	
		20	0.035	0.88	0.805	20.44											
		21	0.032	0.81	0.811	20.59											
		22	0.028	0.71	0.819	20.80											
1	25.4	12	0.109	2.76	0.782	19.86	845-5 (5513810)	R-11-5 (5517889)	846-5 (5517924)	R-11-A-5 (5517902)	0.763	19.38	0.852	21.64	M-18 (2516900)	850-600-A (8405398)	979-C-650/ ATC-900
		13	0.095	2.41	0.810	20.57	847-5 (5513379)	R-13-5 (5513741)	848-5 (5517099)	R-13-A-5 (5517903)	0.791	20.09	0.880	22.35			
		14	0.083	2.10	0.834	21.18	849-5 (5514922)	R-12-5 (5517890)	850-5 (5513331)	R-12-A-5 (5515825)	0.810	20.57	0.909	23.08	M-20 (2517500)		
		15	0.072	1.82	0.856	21.74	851-5 (5513778)	R-14-5 (5517894)	852-5 (5513330)	R-14-A-5 (5515826)	0.837	21.25	0.936	23.77			
		16	0.065	1.65	0.870	22.09											
		17	0.058	1.47	0.884	22.45	855-5 (5515194)	R-13-5 (5513741)	856-5 (5513745)	R-13-A-5 (5517903)	0.865	21.97	0.965	24.51	M-21 (2517800)	850-1250-A (8405399)	
		18	0.049	1.24	0.902	22.91											
		19	0.042	1.06	0.916	23.26											
		20	0.035	0.88	0.930	23.62											
		21	0.032	0.81	0.936	23.77	857-5 (5513825)	R-15-5 (5513833)	858-5 (5515935)	R-15-A-5 (5517907)	0.883	22.42	0.997	25.32	M-21 (2517800)		
22	0.028	0.71	0.944	23.97													
1-1/8	28.5	12	0.109	2.76	0.907	23.03	857-5 (5513825)	R-15-5 (5513833)	858-5 (5515935)	R-15-A-5 (5517907)	0.883	22.42	0.997	25.32	M-21 (2517800)	1050-400 (8404200)	979-C-300/ ATC-900
		13	0.095	2.41	0.935	23.74	859-5 (5514397)	R-16-5 (5518056)	860-5 (5513492)	R-16-A-5 (5517904)	0.916	23.26	1.000	25.40			
		14	0.083	2.10	0.959	24.35	861-5 (5513325)	R-17-5 (5517891)	862-5 (5513747)	R-17-A-5 (5517905)	0.935	23.74	1.043	26.49			
1-1/4	31.8	15	0.072	1.82	1.106	28.09	875-5 (5513884)	R-21-5 (5517887)	876-5 (5519970)	R-21-A-5 (5513291)	1.087	27.60	1.196	30.37	876-5 (2975348)	1050-400 (8404200)	979-C-650/ ATC-900
		16	0.065	1.65	1.120	28.44											
		17	0.058	1.47	1.134	28.80	879-5 (5513993)	R-21-5 (5517887)	880-5 (5512151)	R-21-A-5 (5513291)	1.115	28.32	1.231	31.26	880-5 (2968789)		
		18	0.049	1.24	1.152	29.26											
		19	0.042	1.06	1.166	29.61											
		20	0.035	0.88	1.180	29.97											
		21	0.032	0.81	1.186	30.12											
22	0.028	0.71	1.194	30.32													
1-3/8	34.9	12	0.109	2.76	1.154	29.31	881-5 (5516001)	R-21-5 (5517887)	882-5 (5514657)	R-21-A-5 (5513291)	1.133	28.77	1.242	31.54	882-5 (2973230)	1550-250 (8404280)	979-C-210/ ATC-900
		14	0.083	2.10	1.209	30.70	885-5 (5513252)	R-23-5 (5517892)	886-5 (5515778)	R-23-A-5 (5518192)	1.179	29.94	1.296	32.91			
1-1/2	38.1	17	0.058	1.47	1.384	35.15	899-5 (5513850)	R-29-5 (5517893)	900-5 (5517605)	R-29-A-5 (5517906)	1.331	33.80	1.489	37.82	900-5 (2975262)	1550-900 (8404290)	979-C-300/ ATC-900
		18	0.049	1.24	1.402	35.61											
		19	0.042	1.06	1.416	35.96											
		20	0.035	0.88	1.430	36.32											
		21	0.032	1	1.436	36.47											
		22	0.028	0.71	1.444	36.67											