

Support



www.elliott-tool.com



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Specifying Your Needs

Thank you for considering Elliott Tool for your tube tool needs. These two pages are provided to ensure you receive the right tools for your needs. Please provide as much information as you can in the "Prospective Customer" portion and Clean/Test/Plug/Remove/Install sections and send it to Elliott Tool or your Elliott Tool local support.

Tube Tool Needs Assessment Questionnaire

Locally supported by:



Elliott Tool Technologies, Ltd.
 1760 Tuttle Avenue • Dayton, Ohio 45403-3428 • USA
 Phone: +1 937 253 6133 • +1 800 332 0447
 Fax: +1 937 253 9189
 Email: sales@elliott-tool.com

Elliott Sales Representative

Name: _____ Phone: _____
 Company: _____ Email: _____

Prospective Customer

S O L D T O
 Company: _____
 Address 1: _____
 Address 2: _____
 City: _____
 State: _____
 Zip Code: _____
 Country: _____
 Contact Name: _____
 Contact Phone: _____
 Contact Fax: _____
 Contact Email: _____
 Your Reference: _____

C O M M E R C I A L
 Preferred Date Of Delivery: _____
 Purchase Rental
 Budget Expectation (USD): _____
 Will this require new or revised credit terms? Yes No
 What will be the determining factor(s) in your purchase decision?
 Features/Benefits Price Product Availability
 Vendor Relationship Product Quality

V E S S E L
 Boiler – Watertube
 Boiler – Firetube *Please use a separate form for each vessel so we can recommend the best tools for your project.*
 Chiller / Heat Exchanger
 Process Transfer Line
 Other

		Joint 1	Joint 2
Tube Sheet or Drum Wall	Thickness: _____ Material: _____	_____	_____
Tube Info	<input type="checkbox"/> ID <input type="checkbox"/> OD Wall Thickness / Gauge: _____ Finished Tube ID/Desired Wall Reduction: _____ Min Wall: <input type="checkbox"/> Yes <input type="checkbox"/> No Material: _____ Length: _____ Number Of Tubes: _____ Tube Projection From Tube Sheet: Inlet _____ Exit _____	_____	_____
Tube Section	<input type="checkbox"/> Curved Tube <input type="checkbox"/> U-Tube (Minimum Radius if known _____) <input type="checkbox"/> Straight Tube <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal If Watertube - Drum ID: _____	Mud _____	Steam _____
Power	<input type="checkbox"/> Electric <input type="checkbox"/> Pneumatic <input type="checkbox"/> 110 V <input type="checkbox"/> 220 V		
Special reach or space constraint: _____			

Clean

Q U E S T I O N S
 Type Of Deposit: Soft, gummy or organic compounds
 Hard deposit that tends to break to powder
 Rock solid deposit
 Composition Of Deposit: _____
 Thickness Of Deposit: _____
 Number Of Tubes To Be Cleaned: _____
 Deposit Flush: Dry Wet
 Tube Surface: Prime Enhanced

I N T E R E S T S
 Cleaning Package
 Consumables
 Notes: _____

Test

Q U E S T I O N S
 Testing For: Leaky Tubes Joints
 Number Of Tubes To Be Checked: _____
 Air Test Hydrostatic Test
 Pressure (60 - 100 PSI): Air Vacuum

I N T E R E S T S
 Tube Tester: Vacuum Air Injected
 Test Plugs - High Pressure
 Joint Tester: Vacuum
 Seals And Washer Sets
 Extensions

Plug

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Number Of Tubes To Be Plugged: _____
 Are there restrictions limiting access to the face of the tube sheet?
 Yes No
 Do plugs require material certification and traceability?
 Yes No

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One-Piece (200 PSI)
 Two-Piece (200 PSI) Rings Pins
 High Pressure (6,000 PSI) Torque Wrench
 One Revolution Tube Cutter For Venting
 Tube Brushes For Cleaning Tube

Remove

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Individual Tube Cutting:
 Number of Tubes to be Pulled: _____
 Frequency of Pulling Tubes: _____
 Purpose of Tube Cutting: Puncture Cut
Tube Bundle Cutting:
 Maximum Tube Sheet Diameter: ≤ 78" ≤ 98"

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Individual Tube Cutter: Blades Pins Motors
 Tube Bundle Cutter: Blades Hydraulic Clamp Support Table
 Chisels Lubricator
Tube Puller: Manual Semi-Continuous
 Pumps Balances Spears Nose Pieces
Tugger: Collet: Stub: Continuous:
 Pumps Collet Sets Spears Spears
 Balances Draw Bars Lock Collet Sets
 Nose Pieces Adapter Nose Pieces
Hammers: Pneumatic Tube Buster Knockout Tools Collapsing Tools

Install

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Number Of Tubes To Be Rolled: _____
 Reach Requirements: _____
 OR
 Expansion Length: _____
 Location of Expansion (in tubesheet): _____
 Tube Auger / End Prep Blade: (If applicable)

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Standard Blades Available:

	Part Number	Profile	
37-1/2" O.D. Bevel	EP163037		<input type="checkbox"/>
90° Face / Weld Removal	EP163190		<input type="checkbox"/>
37" I.D. Bevel	EP163137		<input type="checkbox"/>
3/16" Radius Heat Exchanger Cutter / Weld Removal	EP163012		<input type="checkbox"/>
1/4" Radius Boiler Plate Cutter / Weld Removal	EP163010		<input type="checkbox"/>

Blades come standard with special coating.
 Tool has ratchet clamping and ratchet feed.
 6070 Filter / Lubricator recommended for use with tool.



Handhole Seat Grinder Width: _____
 (If applicable)

Chiller/Heat Exchanger:


Expander Support Sheet Expander
 Rolls (Single Radius) Mandrels
 Rolls (Double Radius) Cages

Boiler:

Expander: Straight Roll Flare Roll Roll Bead
 Rolls Mandrels

Lubricant / Bead Coolant
 Rolling Motor: Torque Controlled Stall
 Electric Torque Control
 Tube Hole Gauges
 Grooving (Serrating) Tools And Spare Bits
 Tube Sheet Hole Brushes
 Tube Auger / End Prep
 Tube Pilots / Guides
 Tube End Facing And Spare Bits
 Seat Grinder: Handhole Manhole (Rental Only)

Drawings or Notes



Elliott Tool Technologies has always stood for quality tube tools. From engineering, manufacturing and quality control Elliott is committed to producing a product that you can be confident in using time after time.

Elliott Tool Technologies Quality Assurance

Elliott's Quality

You can rely on Elliott to provide tools that are tougher than the job and are the best in the industry. To achieve this goal, we utilize continuous improvement, Six Sigma and 5-S. Elliott firmly believes the last thing you should have to worry about is the quality of your tools. However, if you require a more formal assurance of quality we do offer the following options.

Certificate of Compliance/Conformance

A Certificate of Compliance/Conformance will certify your tool is manufactured according to our engineer specifications. Some refer to a Certificate of Compliance and a Certificate of Conformance as two separate Certificates; Elliott considers them as one Certificate. Should you require a Certificate of Compliance/Conformance, there is no additional charge. In most cases, customer requests for a Certificate of Compliance/Conformance will not delay the delivery of your tools. Requests for Certificates of Compliance/Conformance must be made at the time of your order.

Materials Certificate

A Materials Certificate certifies the material used to manufacture the tools. The price of a Materials Certificate will vary based on the complexity of the tool. Requests for a Materials Certificate could change availability and delivery time of your tools depending on the complexity of the part. A complete quote for pricing and availability is available upon request. Requests for Materials Certificates must be made at the time of your order.

For more specific information, contact your Elliott sales representative.

Elliott Tool strives to be the industry's leading supplier of *Quality tube tools for an 'I need it yesterday' world.*[™] Here are the services you can count on.

Catalog Items

Many of the items shown in this catalog are in stock and available for same day shipment when we receive your order on business days before 5:00 PM US Eastern. Orders destined for export or requiring shipment via freight usually can be shipped the next day. If the catalog item is not available for immediate shipment in the quantities you need, we will rapidly explore all of these options:

- Partial shipment to get you started while Elliott manufactures the balance of your needs.
- Expediting your need through the manufacturing process.
- If your need is recurring, revising Elliott's stock accordingly.

If after you have submitted an order to Elliott and later decide you need it sooner, Elliott will do everything possible to meet your needs. Your Elliott sales representative will investigate for free if the item(s):

- Are already available for complete shipment.
- Are available for partial shipment.
- If expediting through manufacturing according to your new need is possible.

If expediting is possible, a service fee of the lesser of \$250 or 25% of the extended amount of the line item(s) being expedited is applied. This service fee helps to defray Elliott's additional costs related to manufacturing rescheduling, overtime labor, and expediting fees Elliott incurs with our suppliers.

Special Items

Elliott Tool welcomes the opportunity to meet your needs for tube tools not included in this catalog and has more than 100 years of development experience to back you up. Normal lead times are 30 business days after receipt of your approval of our design. If your need is more urgent Elliott can usually provide expediting for a service fee of the lesser of \$250 or 25% of the extended amount of the line item(s) being expedited. This service fee helps to defray Elliott's additional costs related to manufacturing rescheduling, overtime labor, and expediting fees Elliott incurs with our suppliers.

Should your need for a special item be ongoing then Elliott Tool will commit to understand and supply the items to you according to your forecast. Contact your Elliott Tool sales representative for more information.

Many of the products in this catalog are available for rent to customers and sites located in the United States and Canada. There are many practical considerations prohibitively affecting rental commerce outside of the United States and Canada but such customers are invited to contact Elliott to discuss ways to overcome them.

Rentals are made on a daily basis that begins when you receive the item and finishes when you ship the item back to Elliott. *In other words, you do not pay for transit time to and from Elliott Tool.* Rentals are quoted and charged on a daily basis with a 7-day minimum. Upon shipment Elliott will invoice you for 7 days of rental, any consumable items, plus outbound freight. Upon receipt of your rental return, Elliott will invoice for the remaining balance. In the case of rentals spanning more than a month, Elliott may charge in monthly increments for customers with credit terms of that length or longer.

Return all rental equipment to:

Elliott Tool Technologies, Ltd
Attn: Rental Department
1760 Tuttle Avenue
Dayton, OH 45403
United States

A Return Material Authorization (RMA) is not required.

If you choose to purchase a new item, Elliott will credit 50%* of the current rental charges for that item towards the purchase of the same item.

**The maximum credit you will receive towards the purchase of a new tool may not exceed 25% of the Retail List Price of that brand new tool.*

If you choose to purchase the rental item, Elliott will credit 50%** of the current rental charges towards the purchase of the used rental item.

***The maximum credit you will receive towards the purchase of a used tool may not exceed 25% of the Retail List Price. (Retail List Price of a rental tool is 15% less than the list price of that of the same tool in brand new condition).*

You must notify Elliott of your interest in doing so while the rental period is still open. Please note that some equipment is excluded from this offer.

Repairs of rental equipment due to reasons other than normal wear will be charged to the renter. Rental equipment not returned will be invoiced at Elliott's list price in addition to the rental charges. Consumable items that are returned will be credited in accordance with the customer returns terms and conditions.

New Customer Information

Name: _____
Parent Company or Corporation: _____
Mailing Address: _____
City, State, Zip: _____
Phone: _____
Fax: _____
Email: _____
Website: _____

Dun & Bradstreet #: _____
Tax Payer ID or SS #: _____
Years in Business: _____
Type of Business: _____
Purchasing Contact Name: _____
Accounts Payable Contact Name: _____
Payment Schedule: _____

Billing Address
(if different from above):

Shipping Address
(if different from above):

If you plan to claim exemption from sales and use tax, please enclose a copy of your exemption certificate. Without a copy on file, taxes will be billed where we are registered to collect.

Please list at least **four** current trade references and a bank reference: include name, mailing address, phone, fax and accounts payable contact name.

Current Trade References

- | | |
|--|--|
| 1. _____

_____ | 2. _____

_____ |
| 3. _____

_____ | 4. _____

_____ |

Bank References

- | | |
|--|--|
| 1. _____

_____ | 2. _____

_____ |
|--|--|

Your Sales Contact: _____

Tools To Help You Get The Job Done

Helpful application guides, manuals, and other information that will help you get your job done more efficiently are offered for free. In addition we offer local support in more than 30 countries around the world.

To access the free information or to find the nearest local support simply visit the Elliott Tool web site:

www.elliott-tool.com/support/

Terms & Conditions For Sale

1. **GENERAL:** This transaction is expressly limited to the terms stated herein, and any additional or different terms proposed by Buyer are rejected unless expressly assented to, in writing, by Seller.

NO PERSON HAS AUTHORITY TO MAKE A CLAIM, ANY REPRESENTATION, WARRANTY, TERMS, PROMISE OR CONDITION, WHICH IS NOT EXPRESSED HEREIN. THIS TRANSACTION SHALL BE BINDING ONLY AFTER WRITTEN ACCEPTANCE BY AN AUTHORIZED OFFICER OF SELLER. COMMENCING PERFORMANCE SHALL NOT CONSTITUTE AN ACCEPTANCE OF BUYER'S PURCHASE ORDER.

2. **WARRANTY:** Should any part, of Seller's own manufacture, prove to have been defective in material or workmanship when shipped (as determined by Seller), Seller warrants that it will, at its sole option, repair or replace said part f.o.b., point of manufacture, provided that Buyer notifies, in writing, of such defect within twelve (12) months from date of shipment from the manufacturing plant. On request of Seller, the part claimed to be defective will be returned, transportation, insurance, taxes and duties prepaid, to the factory where made, for inspection. Any item, which has been purchased by Seller, is warranted only to the extent of the original manufacturer's warranty to Seller.

Seller shall not be liable for any damages or delays caused by defective material or workmanship. No allowance will be made for repairs or alterations made by others without Seller's written consent or approval. If repairs or alterations are attempted without Seller's consent, Seller's warranty is void. Save as provided in this Clause 2., all liability of Seller, howsoever arising, and all warranties, representations or conditions, whether expressed or implied, are hereby excluded

THE WARRANTIES PROVIDED IN THE OBLIGATIONS AND LIABILITIES OF SELLER HEREUNDER, AND THE RIGHTS AND REMEDIES OF BUYER HEREUNDER ARE EXCLUSIVE AND IN SUBSTITUTION FOR, AND BUYER HEREBY WAIVES ALL OTHER WARRANTIES, GUARANTEES, OBLIGATIONS, CLAIMS FOR LIABILITIES, RIGHTS AND REMEDIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY FOR MERCHANTABILITY AND FITNESS FOR PURPOSE.

Seller's total liability is limited to the lower of the cost of repair or replacement.

3. **ORDER CANCELLATION:** Should Buyer wish to cancel an order for any reason all or part of an order already accepted by the Seller, the Buyer agrees to pay an order cancellation fee of a.) for catalog items canceled within a day of scheduled shipment, of 25% the extended amount of line item(s) cancelled; and b.) for special items, recovery of time and materials. Any deposits paid to Seller are non-refundable.
4. **RETURNS:** Should Buyer wish to return item to Seller for any reason the Buyer must first contact Seller for Return Material Authorization. Items to be repaired outside of Warranty will be inspected and a repair quotation will be provided to the Buyer. Items covered under warranty are treated as defined elsewhere in this document. Unused catalog items that the Buyer wishes to be returned for credit are eligible if the item is returned within 14 days of delivery and after the Seller inspects the item and at the Seller's discretion is deemed to be unused and suitable for resell. All shipping and handling charges are the responsibility of the Buyer.
5. **TAXES:** Prices quoted herein are exclusive of all taxes. Such taxes, if applicable, shall be wholly at the expense of Buyer, and shall be collected accordingly by Seller.
6. **TERMS OF PAYMENT:** Net cash thirty (30) days after date of shipment (Bill of Lading) unless otherwise agreed.
7. **DELIVERY:** In no event shall Seller be liable for delays in delivery or subject to cancellation when such delays are occasioned by conditions beyond its reasonable control, including, but not limited to, material shortages at Seller's works or at Seller's suppliers' works, strikes, labor or transportation difficulties, war (declared or undeclared), floods, riots, earthquakes, explosions, epidemics, acts of governments, governmental priorities, allocations, regulations or orders affecting materials or facilities, acts of God or freight embargoes.
8. **DAMAGES: SELLER SHALL IN NO EVENT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OF A COMMERCIAL NATURE, RESULTING FROM ANY CAUSE.**
9. **SHIPPING TERMS:** Ex-Works. Unless otherwise agreed, title shall pass to Buyer, Ex-Works point of shipment; and the risk of loss, destruction or damage in the course of transportation shall be borne by Buyer.
10. **ARBITRATION:** Any dispute, controversy, or claim arising out of or relating to this transaction which cannot be settled amicably shall be finally settled by arbitration. If U.S. Buyer or Owner, the arbitration shall be in accordance with the rules of the American Arbitration Association and shall take place in Dayton, Ohio; if non-U.S. Buyer or Owner, the arbitration shall be in accordance with the rules of the International Chamber of Commerce and shall take place in Dayton, Ohio. The English language shall be used in all proceedings.
11. **NUCLEAR USE:** Buyer covenants, represents, and warrants that neither Buyer nor any third parties shall use or resell or otherwise dispose of for use, any equipment or part thereof, or spare parts in connection with any activity or process involving nuclear fission or fusion or any use of handling of any source, special nuclear or by-product materials, as those materials are defined in the U.S. Atomic Energy Act of 1954 (as amended), without Seller's written consent; and until such time as Buyer or such third party, at no expense to Seller, shall have arranged for insurance coverage, indemnities and waivers of liability, recourse and subrogation, all acceptable to Seller, and all fully adequate in the opinion of Seller, to protect Seller (and its subcontractors and suppliers) against liability of any kind, whether in contract, tort, strict liability, otherwise

Buyer's failure to comply with any provisions of this Clause 9., hereof shall be cause for Seller to cancel the contract, without liability to Seller, and pursue any remedies provided in law or equity by the contract, the Uniform Commercial Code, or otherwise.

Aforesaid covenants, representations, and warranties shall survive, in all respects, the contract and sale.
12. **GOVERNING LAWS:** This agreement shall be construed in accordance with the laws of the state of Ohio.
13. **ENTIRE AGREEMENT: EXCEPT AS OTHERWISE PROVIDED HEREIN. THIS DOCUMENT AND ANY MODIFICATIONS THEREOF AGREED UPON IN WRITING, SHALL CONSTITUTE THE ENTIRE AGREEMENT BETWEEN BUYER AND SELLER AND CAN ONLY BE MODIFIED BY A WRITTEN AGREEMENT SIGNED ON BEHALF OF BUYER AND SELLER BY THEIR RESPECTIVE DULY AUTHORIZED REPRESENTATIVES.**
14. **ACCEPTANCE:** Seller's acceptance is expressly made conditional on Buyer's assent to Seller's terms and conditions as set forth herein.

Contact Us

North America, Central America, and South America

Elliott Tool Technologies, Ltd.
1760 Tuttle Avenue
Dayton OH 45403
United States

Phone: +1 (937) 253 6133
Fax: +1 (937) 253 9189
Email: Sales@elliott-tool.com
Web: www.elliott-tool.com

Remittance address:

Elliott Tool Technologies Ltd
5306 Reliable Parkway
Chicago IL 60686-0053
United States

Electronic Payment Information:

Please contact your Elliott Inside Sales Representative for electronic payment information.

If you wish to make payment via credit card, we accept Visa, MasterCard, American Express, and Discover Card. Please provide the following information at the time the order is placed:

Card type
Account number
Expiration date
Name on card
Billing address
Security number (from back of card)

We are a Limited Liability Corporation incorporated in the state of Ohio, TIN 31-1478126 classified as a small business concern.

Shipping Charges: Prices are Ex-works - Dayton, Ohio. It is our normal policy to prepay and add freight charges to invoice.

Elliott Tool Technologies Ltd.

Unit 4/5 Whitehill Farms Buildings
Alderminster
Stratford on Avon
CV37 8BW United Kingdom

Phone: +44 (0) 1789 451005

Fax: +44 (0) 1789 450785

Email: SalesUK@elliott-tool.com

Web: www.elliott-tool.com

Wire Transfer Information for Pounds Sterling payments

For bank information please contact SalesUK@elliott-tool.com

Conversion Tables

Chart to Determine Inside Diameter of Tubes*

B.W.G.	Wall Thickness	Outside Diameter Tubes																					
		1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	3 1/2"	3 3/4"	4"	4 1/4"	4 1/2"	
		6.35	9.52	12.70	15.87	19.05	22.22	25.40	31.75	38.10	44.45	50.80	57.15	63.50	69.85	76.20	82.55	88.90	95.25	101.60	107.95	114.30	
00	inch	0.380						0.115	0.240	0.490	0.740	0.990	1.240	1.490	1.740	1.990	2.240	2.490	2.740	2.990	3.240	3.490	3.740
	mm	9.65						2.92	6.10	12.45	18.80	25.15	31.50	37.85	44.20	50.55	56.90	63.25	69.60	75.95	82.30	88.65	95.00
0	inch	0.340					0.070	0.195	0.320	0.570	0.820	1.070	1.320	1.570	1.820	2.070	2.320	2.570	2.820	3.070	3.320	3.570	3.820
	mm	8.64					1.78	4.95	8.13	14.48	20.83	27.18	33.53	39.88	46.23	52.58	58.93	65.28	71.63	77.98	84.33	90.68	97.03
1	inch	0.300			0.025	0.150	0.275	0.400	0.650	0.900	1.150	1.400	1.650	1.900	2.150	2.400	2.650	2.900	3.150	3.400	3.650	3.900	
	mm	7.62			0.64	3.81	6.99	10.16	16.51	22.86	29.21	35.56	41.91	48.26	54.61	60.96	67.31	73.66	80.01	86.36	92.71	99.06	
2	inch	0.284			0.057	0.182	0.307	0.432	0.682	0.932	1.182	1.432	1.682	1.932	2.182	2.432	2.682	2.932	3.182	3.432	3.682	3.932	
	mm	7.21			1.45	4.62	7.80	10.97	17.32	23.67	30.02	36.37	42.72	49.07	55.42	61.77	68.12	74.47	80.82	87.17	93.52	99.87	
3	inch	0.259			0.107	0.232	0.357	0.482	0.732	0.982	1.232	1.482	1.732	1.982	2.232	2.482	2.732	2.982	3.232	3.482	3.732	3.982	
	mm	6.58			2.72	5.89	9.07	12.24	18.59	24.94	31.29	37.64	43.99	50.34	56.69	63.04	69.39	75.74	82.09	88.44	94.79	101.14	
4	inch	0.238		0.024	0.149	0.274	0.399	0.524	0.774	1.024	1.274	1.524	1.774	2.024	2.274	2.524	2.774	3.024	3.274	3.524	3.774	4.024	
	mm	6.05		0.61	3.78	6.96	10.13	13.31	19.66	26.01	32.36	38.71	45.06	51.41	57.76	64.11	70.46	76.81	83.16	89.51	95.86	102.21	
5	inch	0.220		0.060	0.185	0.310	0.435	0.560	0.810	1.060	1.310	1.560	1.810	2.060	2.310	2.560	2.810	3.060	3.310	3.560	3.810	4.060	
	mm	5.59		1.52	4.70	7.87	11.05	14.22	20.57	26.92	33.27	39.62	45.97	52.32	58.67	65.02	71.37	77.72	84.07	90.42	96.77	103.12	
6	inch	0.203		0.094	0.219	0.344	0.469	0.594	0.844	1.094	1.344	1.594	1.844	2.094	2.344	2.594	2.844	3.094	3.344	3.594	3.844	4.094	
	mm	5.16		2.39	5.56	8.74	11.91	15.09	21.44	27.79	34.14	40.49	46.84	53.19	59.54	65.89	72.24	78.59	84.94	91.29	97.64	103.99	
7	inch	0.180		0.140	0.265	0.390	0.515	0.640	0.890	1.140	1.390	1.640	1.890	2.140	2.390	2.640	2.890	3.140	3.390	3.640	3.890	4.140	
	mm	4.57		3.56	6.73	9.91	13.08	16.26	22.61	28.96	35.31	41.66	48.01	54.36	60.71	67.06	73.41	79.76	86.11	92.46	98.81	105.16	
8	inch	0.165		0.045	0.170	0.295	0.420	0.545	0.670	0.920	1.170	1.420	1.670	1.920	2.170	2.420	2.670	2.920	3.170	3.420	3.670	3.920	4.170
	mm	4.19		1.14	4.32	7.49	10.67	13.84	17.02	23.37	29.72	36.07	42.42	48.77	55.12	61.47	67.82	74.17	80.52	86.87	93.22	99.57	105.92
9	inch	0.148		0.079	0.204	0.329	0.454	0.579	0.704	0.954	1.204	1.454	1.704	1.954	2.204	2.454	2.704	2.954	3.204	3.454	3.704	3.954	4.204
	mm	3.76		2.01	5.18	8.36	11.53	14.71	17.88	24.23	30.58	36.93	43.28	49.63	55.98	62.33	68.68	75.03	81.38	87.73	94.08	100.43	106.78
10	inch	0.134		0.107	0.232	0.357	0.482	0.607	0.732	0.982	1.232	1.482	1.732	1.982	2.232	2.482	2.732	2.982	3.232	3.482	3.732	3.982	4.232
	mm	3.40		2.72	5.89	9.07	12.24	15.42	18.59	24.94	31.29	37.64	43.99	50.34	56.69	63.04	69.39	75.74	82.09	88.44	94.79	101.14	107.49
11	inch	0.120		0.135	0.260	0.385	0.510	0.635	0.760	1.010	1.260	1.510	1.760	2.010	2.260	2.510	2.760	3.010	3.260	3.510	3.760	4.010	4.260
	mm	3.05		3.43	6.60	9.78	12.95	16.13	19.30	25.65	32.00	38.35	44.70	51.05	57.40	63.75	70.10	76.45	82.80	89.15	95.50	101.85	108.20
12	inch	0.109	0.032	0.157	0.282	0.407	0.532	0.657	0.782	1.032	1.282	1.532	1.782	2.032	2.282	2.532	2.782	3.032	3.282	3.532	3.782	4.032	4.282
	mm	2.77	0.81	3.99	7.16	10.34	13.51	16.69	19.86	26.21	32.56	38.91	45.26	51.61	57.96	64.31	70.66	77.01	83.36	89.71	96.06	102.41	108.76
13	inch	0.095	0.060	0.185	0.310	0.435	0.560	0.685	0.810	1.060	1.310	1.560	1.810	2.060	2.310	2.560	2.810	3.060	3.310	3.560	3.810	4.060	4.310
	mm	2.41	1.52	4.70	7.87	11.05	14.22	17.40	20.57	26.92	33.27	39.62	45.97	52.32	58.67	65.02	71.37	77.72	84.07	90.42	96.77	103.12	109.47
14	inch	0.083	0.084	0.209	0.334	0.459	0.584	0.709	0.834	1.084	1.334	1.584	1.834	2.084	2.334	2.584	2.834	3.084	3.334	3.584	3.834	4.084	4.334
	mm	2.11	2.13	5.31	8.48	11.66	14.83	18.01	21.18	27.53	33.88	40.23	46.58	52.93	59.28	65.63	71.98	78.33	84.68	91.03	97.38	103.73	110.08
15	inch	0.072	0.106	0.231	0.356	0.481	0.606	0.731	0.856	1.106	1.356	1.606	1.856	2.106	2.356	2.606	2.856	3.106	3.356	3.606	3.856	4.106	4.356
	mm	1.83	2.69	5.87	9.04	12.22	15.39	18.57	21.74	28.09	34.44	40.79	47.14	53.49	59.84	66.19	72.54	78.89	85.24	91.59	97.94	104.29	110.64
16	inch	0.065	0.120	0.245	0.370	0.495	0.620	0.745	0.870	1.120	1.370	1.620	1.870	2.120	2.370	2.620	2.870	3.120	3.370	3.620	3.870	4.120	4.370
	mm	1.65	3.05	6.22	9.40	12.57	15.75	18.92	22.10	28.45	34.80	41.15	47.50	53.85	60.20	66.55	72.90	79.25	85.60	91.95	98.30	104.65	111.00
17	inch	0.058	0.134	0.259	0.384	0.509	0.634	0.759	0.884	1.134	1.384	1.634	1.884	2.134	2.384	2.634	2.884	3.134	3.384	3.634	3.884	4.134	4.384
	mm	1.47	3.40	6.58	9.75	12.93	16.10	19.28	22.45	28.80	35.15	41.50	47.85	54.20	60.55	66.90	73.25	79.60	85.95	92.30	98.65	105.00	111.35
18	inch	0.049	0.152	0.277	0.402	0.527	0.652	0.777	0.902	1.152	1.402	1.652	1.902	2.152	2.402	2.652	2.902	3.152	3.402	3.652	3.902	4.152	4.402
	mm	1.24	3.86	7.04	10.21	13.39	16.56	19.74	22.91	29.26	35.61	41.96	48.31	54.66	61.01	67.36	73.71	80.06	86.41	92.76	99.11	105.46	111.81
19	inch	0.042	0.166	0.291	0.416	0.541	0.666	0.791	0.916	1.166	1.416	1.666	1.916										
	mm	1.07	4.22	7.39	10.57	13.74	16.92	20.09	23.27	29.62	35.97	42.32	48.67										
20	inch	0.035	0.180	0.305	0.430	0.555	0.680	0.805	0.930	1.180	1.430	1.680	1.930										
	mm	0.89	4.57	7.75	10.92	14.10	17.27	20.45	23.62	29.97	36.32	42.67	49.02										
21	inch	0.032	0.186	0.311	0.436	0.561	0.686	0.811	0.936	1.186	1.436	1.686	1.936										
	mm	0.81	4.72	7.90	11.07	14.25	17.42	20.60	23.77	30.12	36.47	42.82	49.17										
22	inch	0.028	0.194	0.319	0.444	0.569	0.694	0.819	0.944	1.194	1.444	1.694	1.944										
	mm	0.71	4.93	8.10	11.28	14.45	17.63	20.80	23.98	30.33	36.68	43.03	49.38										
23	inch	0.025	0.200	0.325	0.450	0.575	0.700	0.825	0.950	1.200													



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