

TOPCUT PLUS INDEXABLE INSERT DRILLS

WIDIA

TOP CUT PLUS DRILLS utilizing four cutting edges per insert

The Widia Top Cut Plus product line stands for increased performance and cost-efficiency. These proven drills feature inserts with four cutting edges that guarantee increased productivity and maximum production safety across the full range of applications. These superior tools are available in Inch diameters from .437" to 1.375" and in Metric diameters from 11 mm to 60 mm. There is a choice of three lengths to suit every need, from the highly rigid Top Cut Plus 2 x D to the Top Cut Plus 3 x D and the Top Cut Plus 4 x D for deep holes.

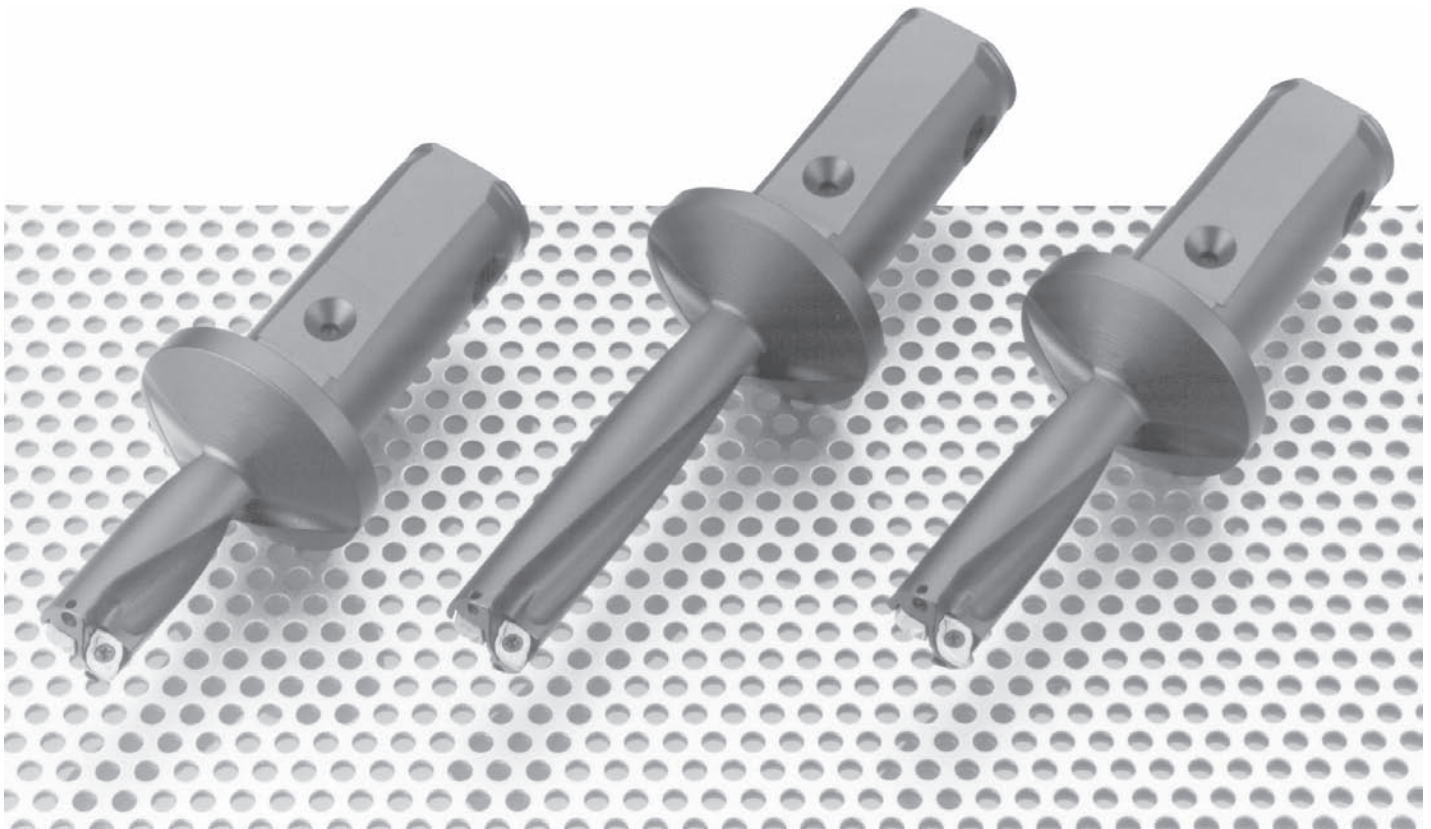
The Tool:

- designed for maximum system stiffness
- with rigid shank for both Inch & Metric Drills
- solid connection with drillholder thanks to conical-tipped clamping screw
- separate coolant passages guarantee stable drilling performance
- even better chip removal thanks to optimized chip spaces

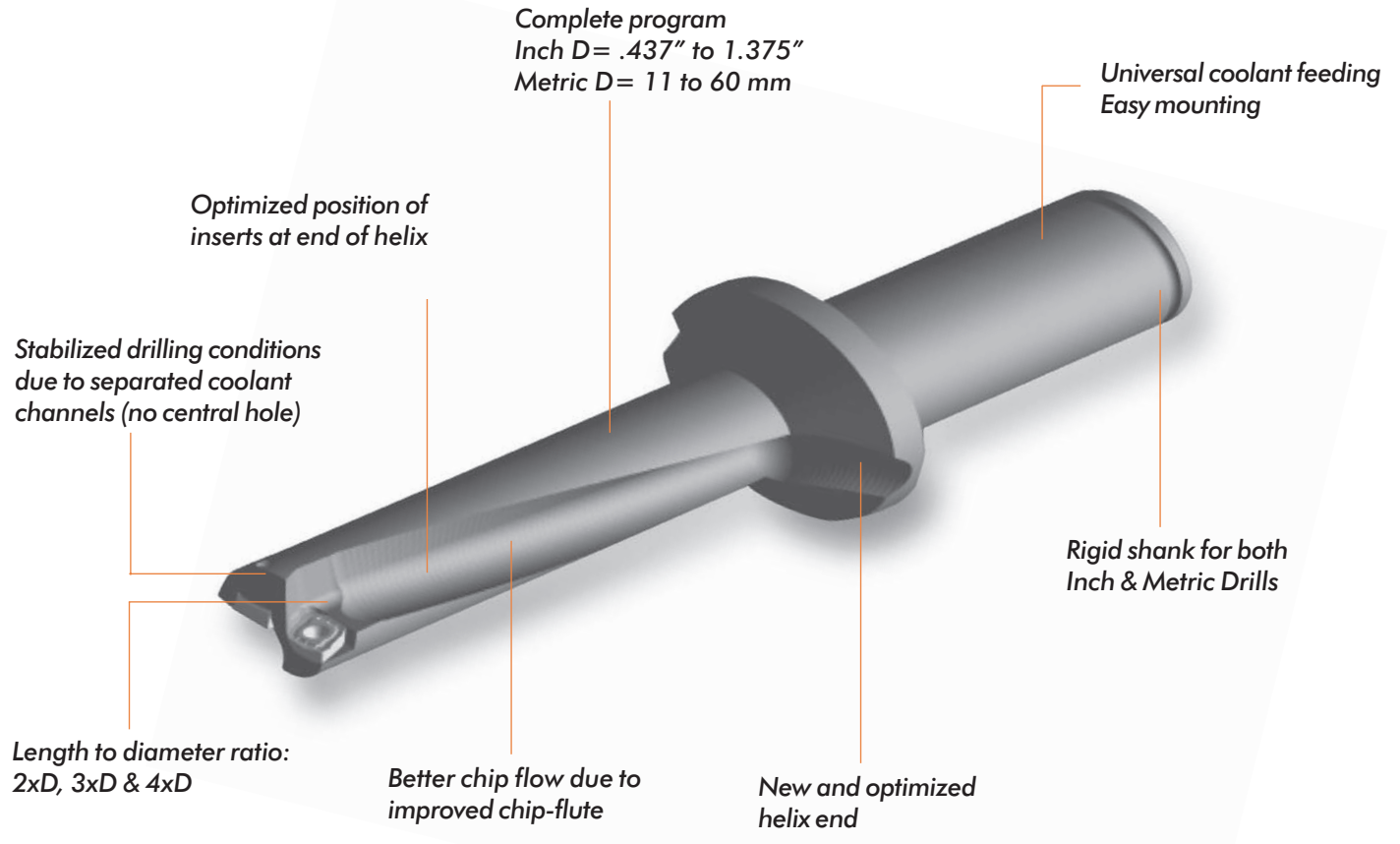
The Insert:

- four effective cutting edges thanks to complete separation of internal and external cutting edges
- basic circular shape guarantees maximum rigidity
- special flank geometry on centre and external cutting edge provides a sturdy cutting wedge and ensures favourable wear performance
- can also be used for simple turning operations

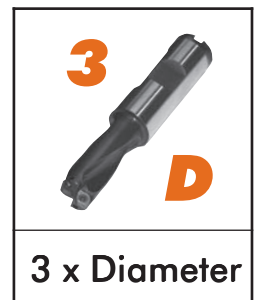
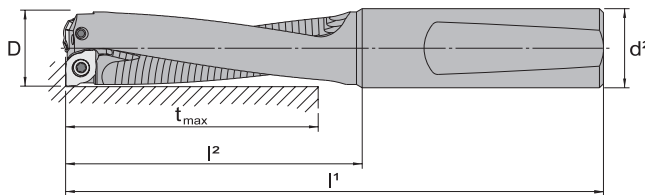
TOP CUT PLUS:
cost effective drilling
with four cutting edges.



TOPCUT PLUS INDEXABLE INSERT DRILLS



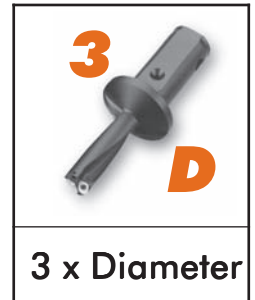
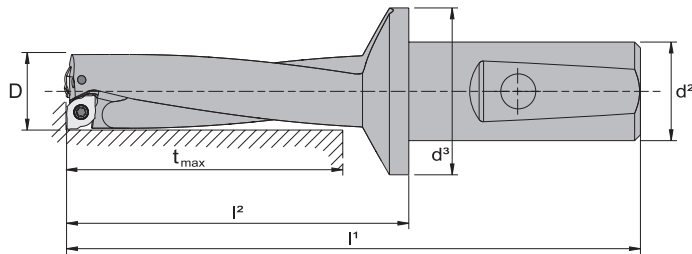
Designed for Maximum Tool Rigidity



DESIGNATION	DIMENSIONS						INSERT (see page 54)	SPARE PARTS	
	D	D mm	d ²	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCPR-0437R3	.437	11.11	.625	3.60	1.69	1.32	XOMT-04T103	214.60.118	214.60.100
TCPR-0500R3	.500	12.70	.625	3.84	1.93	1.50			
TCPR-0562R3	.562	14.28	.625	4.07	2.17	1.69			
TCPR-0625R3	.625	15.87	.625	4.35	2.44	1.88	XOMT-050204	214.60.125	214.75.490

* All dimensions are inch unless indicated

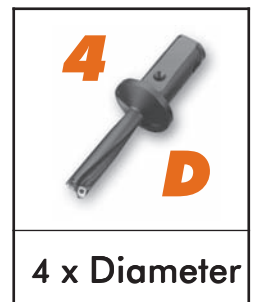
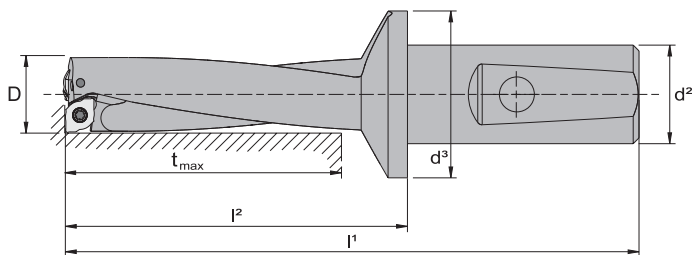
TOPCUT PLUS INDEXABLE INSERT DRILLS



3 x Diameter

DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D	D mm	d ²	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-0562R3	.562	14.28	1.000	1.63	4.52	2.17	1.70	XOMT-04T103	214.60.118	214.60.100
TCP-0625R3	.625	15.87	1.000	1.63	4.79	2.44	1.90	XOMT-050204	214.60.125	214.75.490
TCP-0687R3	.687	17.46	1.000	1.63	5.03	2.68	2.10			
TCP-0750R3	.750	19.05	1.000	1.63	5.30	2.95	2.25	XOMT-070304	214.80.800	214.80.866
TCP-0812R3	.812	20.63	1.000	1.63	5.42	3.07	2.45			
TCP-0875R3	.875	22.22	1.000	1.63	5.66	3.31	2.65			
TCP-0937R3	.937	23.81	1.000	1.63	5.78	3.43	2.85	XOMT-09T306	214.80.672	214.80.866
TCP-1000R3	1.000	25.40	1.250	1.88	6.07	3.62	3.00			
TCP-1062R3	1.062	26.98	1.250	1.88	6.19	3.74	3.19			
TCP-1125R3	1.125	28.57	1.250	1.88	6.43	3.98	3.38			
TCP-1187R3	1.187	30.16	1.250	1.88	6.66	4.21	3.56			
TCP-1250R3	1.250	31.75	1.250	1.88	6.78	4.33	3.75			
TCP-1312R3	1.312	33.33	1.250	1.88	6.98	4.53	3.94			
TCP-1375R3	1.375	34.92	1.250	1.88	7.10	4.65	4.13			

* All dimensions are inch unless indicated

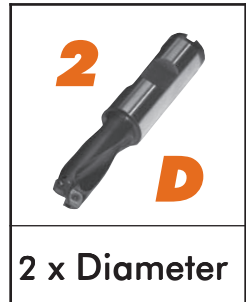
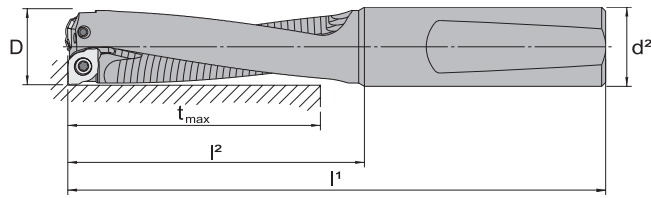


4 x Diameter

DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D	D mm	d ²	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-0625R4	.625	15.87	1.000	1.63	5.46	3.11	2.50	XOMT-050204	214.60.125	214.75.490
TCP-0750R4	.750	19.05	1.000	1.63	6.09	3.74	3.00	XOMT-070304	214.80.800	214.80.866
TCP-0875R4	.875	22.22	1.000	1.63	6.56	4.21	3.50			
TCP-1000R4	1.000	25.40	1.250	1.88	7.14	4.69	4.00	XOMT-09T306	214.80.672	214.80.866
TCP-1125R4	1.125	28.57	1.250	1.88	7.61	5.16	4.50			
TCP-1250R4	1.250	31.75	1.250	1.88	8.08	5.63	5.00			
TCP-1375R4	1.375	34.92	1.250	1.88	8.55	6.10	5.50			

* All dimensions are inch unless indicated

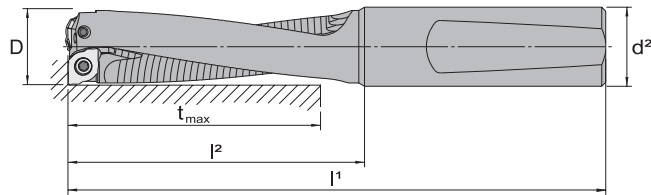
TOPCUT PLUS INDEXABLE INSERT DRILLS



2 x Diameter

DESIGNATION	DIMENSIONS						INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d _{mm} ²	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCPR-11R2	11.0	.433	12	2.99	1.22	.86	XOMT-04T103	214.60.118	214.60.100
TCPR-11.5R2	11.5	.452	12	3.07	1.30	.90			
TCPR-12R2	12.0	.472	12	3.11	1.34	.94			
TCPR-12.5R2	12.5	.492	16	3.27	1.38	.98			
TCPR-13R2	13.0	.511	16	3.35	1.46	1.02			
TCPR-13.5R2	13.5	.531	16	3.39	1.50	1.06			
TCPR-14R2	14.0	.551	16	3.47	1.60	1.10			

* All dimensions are inch unless indicated



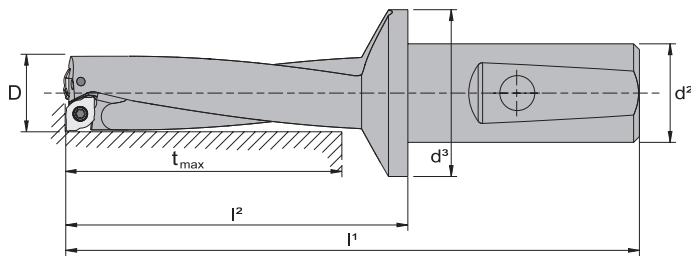
3 x Diameter

DESIGNATION	DIMENSIONS						INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d _{mm} ²	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCPR-11R3	11.0	.433	12	3.46	1.69	1.29	XOMT-04T103	214.60.118	214.60.100
TCPR-11.5R3	11.5	.452	12	3.54	1.77	1.37			
TCPR-12R3	12.0	.472	12	3.62	1.85	1.41			
TCPR-12.5R3	12.5	.492	16	3.82	1.93	1.49			
TCPR-13R3	13.0	.511	16	3.90	2.01	1.53			
TCPR-13.5R3	13.5	.531	16	3.98	2.09	1.61			
TCPR-14R3	14.0	.551	16	4.06	2.17	1.65			

* All dimensions are inch unless indicated

TOPCUT PLUS INDEXABLE INSERT DRILLS

TCP METRIC

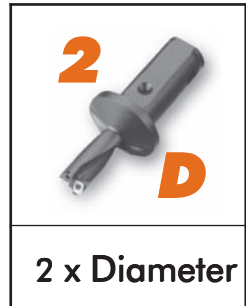
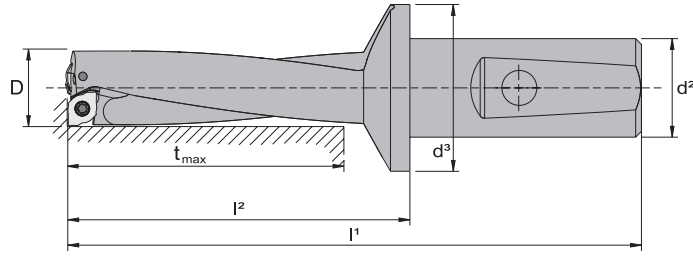


2 x Diameter

DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d _{mm} ²	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-14.5R2	14.5	.570	25	1.69	3.98	1.77	1.14	XOMT-050204	214.60.125	214.75.490
TCP-15R2	15.0	.590	25	1.69	4.02	1.81	1.18			
TCP-16R2	16.0	.629	25	1.69	4.10	1.89	1.25			
TCP-17R2	17.0	.669	25	1.69	4.17	1.97	1.33			
TCP-17.5R2	17.5	.688	25	1.69	4.21	2.01	1.37			
TCP-18R2	18.0	.708	25	1.69	4.25	2.05	1.41			
TCP-19R2	19.0	.748	25	1.69	4.33	2.13	1.49	XOMT-070304	214.80.800	214.80.866
TCP-20R2	20.0	.787	25	1.69	4.41	2.21	1.57			
TCP-21R2	21.0	.826	25	1.69	4.49	2.28	1.65			
TCP-22R2	22.0	.866	25	1.69	4.57	2.36	1.73			
TCP-23R2	23.0	.905	25	1.69	4.65	2.44	1.81			
TCP-24R2	24.0	.944	25	1.69	4.72	2.52	1.88			
TCP-25R2	25.0	.984	32	1.88	4.92	2.56	1.96	XOMT-09T306	214.80.672	214.80.866
TCP-26R2	26.0	1.023	32	1.88	5.00	2.64	2.04			
TCP-27R2	27.0	1.062	32	1.88	5.08	2.72	2.12			
TCP-28R2	28.0	1.102	32	1.88	5.12	2.76	2.20			
TCP-29R2	29.0	1.141	32	1.88	5.20	2.84	2.28			
TCP-30R2	30.0	1.181	32	1.88	5.28	2.91	2.36			
TCP-31R2	31.0	1.220	32	1.88	5.39	2.99	2.44			
TCP-32R2	32.0	1.259	32	1.88	5.43	3.07	2.51			
TCP-33R2	33.0	1.299	32	1.88	5.51	3.15	2.59			
TCP-34R2	34.0	1.338	32	1.88	5.59	3.23	2.67			

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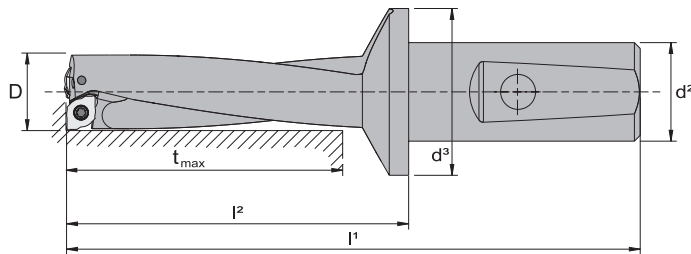
TOPCUT PLUS INDEXABLE INSERT DRILLS



DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d ² _{mm}	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-35R2	35.0	1.377	40	2.28	6.37	3.62	2.75	XOMT-12T308	214.80.558	214.80.824
TCP-36R2	36.0	1.417	40	2.28	6.45	3.70	2.83			
TCP-37R2	37.0	1.456	40	2.28	6.57	3.81	2.91			
TCP-38R2	38.0	1.496	40	2.28	6.65	3.89	2.99			
TCP-39R2	39.0	1.535	40	2.28	6.73	3.97	3.07			
TCP-40R2	40.0	1.574	40	2.28	6.81	4.05	3.14			
TCP-41R2	41.0	1.614	40	2.28	6.92	4.17	3.22			
TCP-42R2	42.0	1.653	40	2.28	7.00	4.25	3.30			
TCP-43R2	43.0	1.692	40	2.28	7.08	4.33	3.38			
TCP-44R2	44.0	1.732	40	2.28	7.20	4.44	3.46			
TCP-45R2	45.0	1.771	40	2.28	7.28	4.52	3.54			
TCP-46R2	46.0	1.811	40	2.28	7.36	4.60	3.62			
TCP-47R2	47.0	1.850	40	2.28	7.48	4.72	3.70			
TCP-48R2	48.0	1.889	40	2.28	7.55	4.80	3.77			
TCP-49R2	49.0	1.929	40	2.28	7.67	4.92	3.85			
TCP-50R2	50.0	1.968	40	2.28	7.79	5.03	3.93			
TCP-51R2	51.0	2.007	40	2.28	7.87	5.11	4.01			
TCP-52R2	52.0	2.047	40	2.28	7.99	5.23	4.09			
TCP-53R2	53.0	2.086	40	2.28	8.11	5.35	4.17			
TCP-54R2	54.0	2.125	40	2.28	8.22	5.47	4.25			
TCP-55R2	55.0	2.165	40	2.28	8.34	5.59	4.33			
TCP-56R2	56.0	2.204	40	2.28	8.46	5.70	4.40			
TCP-57R2	57.0	2.244	40	2.28	8.58	5.82	4.48			
TCP-58R2	58.0	2.283	40	2.28	8.70	5.94	4.56			
TCP-59R2	59.0	2.322	40	2.28	8.81	6.06	4.64			
TCP-60R2	60.0	2.362	40	2.28	8.93	6.18	4.72			

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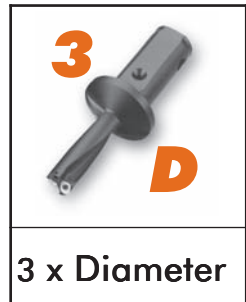
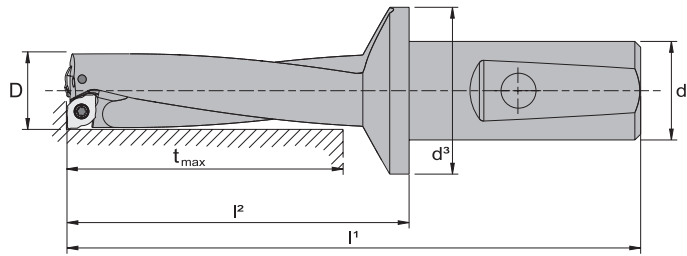
TOPCUT PLUS INDEXABLE INSERT DRILLS



DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d ² _{mm}	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-14.5R3	14.5	.570	25	1.69	4.61	2.40	1.73	XOMT-050204	214.60.125	214.75.490
TCP-15R3	15.0	.590	25	1.69	4.65	2.44	1.77			
TCP-16R3	16.0	.629	25	1.69	4.76	2.56	1.88			
TCP-17R3	17.0	.669	25	1.69	4.88	2.68	2.00			
TCP-17.5R3	17.5	.688	25	1.69	4.96	2.76	2.08			
TCP-18R3	18.0	.708	25	1.69	5.00	2.80	2.12			
TCP-19R3	19.0	.748	25	1.69	5.16	2.95	2.24	XOMT-070304	214.80.800	214.80.866
TCP-20R3	20.0	.787	25	1.69	5.28	3.07	2.36			
TCP-21R3	21.0	.826	25	1.69	5.39	3.19	2.48			
TCP-22R3	22.0	.866	25	1.69	5.51	3.31	2.59			
TCP-23R3	23.0	.905	25	1.69	5.63	3.43	2.71			
TCP-24R3	24.0	.944	25	1.69	5.71	3.50	2.83			
TCP-25R3	25.0	.984	32	1.88	5.98	3.62	2.95	XOMT-09T306	214.80.672	214.80.866
TCP-26R3	26.0	1.023	32	1.88	6.10	3.74	3.07			
TCP-27R3	27.0	1.062	32	1.88	6.22	3.86	3.18			
TCP-28R3	28.0	1.102	32	1.88	6.34	3.98	3.30			
TCP-29R3	29.0	1.141	32	1.88	6.46	4.10	3.42			
TCP-30R3	30.0	1.181	32	1.88	6.58	4.21	3.54			
TCP-31R3	31.0	1.220	32	1.88	6.69	4.33	3.66			
TCP-32R3	32.0	1.259	32	1.88	6.77	4.41	3.77			
TCP-33R3	33.0	1.299	32	1.88	6.89	4.53	3.89			
TCP-34R3	34.0	1.338	32	1.88	7.01	4.65	4.01			

* All dimensions are inch unless indicated

TOPCUT PLUS INDEXABLE INSERT DRILLS

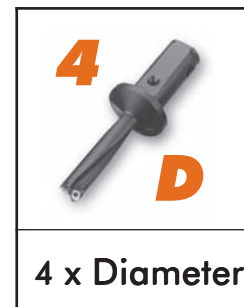
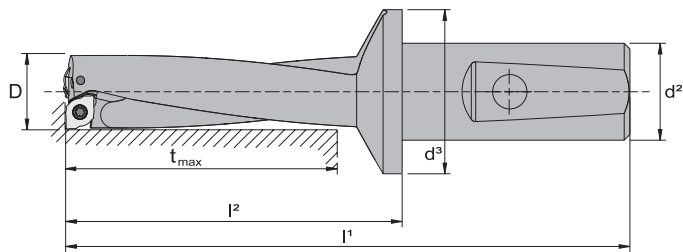


3 x Diameter

DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d ² _{mm}	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-35R3	35.0	1.377	40	2.28	7.83	5.07	4.13	XOMT-12T308	214.80.558	214.80.824
TCP-36R3	36.0	1.417	40	2.28	7.99	5.23	4.25			
TCP-37R3	37.0	1.456	40	2.28	8.11	5.35	4.37			
TCP-38R3	38.0	1.496	40	2.28	8.22	5.47	4.48			
TCP-39R3	39.0	1.535	40	2.28	8.34	5.59	4.60			
TCP-40R3	40.0	1.574	40	2.28	8.50	5.74	4.72			
TCP-41R3	41.0	1.614	40	2.28	8.62	5.86	4.84			
TCP-42R3	42.0	1.653	40	2.28	8.74	5.98	4.96			
TCP-43R3	43.0	1.692	40	2.28	8.89	6.14	5.07			
TCP-44R3	44.0	1.732	40	2.28	9.01	6.25	5.19			
TCP-45R3	45.0	1.771	40	2.28	9.17	6.41	5.31			
TCP-46R3	46.0	1.811	40	2.28	9.29	6.53	5.43			
TCP-47R3	47.0	1.850	40	2.28	9.44	6.69	5.55			
TCP-48R3	48.0	1.889	40	2.28	9.56	6.81	5.66			
TCP-49R3	49.0	1.929	40	2.28	9.72	6.96	5.78			
TCP-50R3	50.0	1.968	40	2.28	9.88	7.12	5.90			
TCP-51R3	51.0	2.007	40	2.28	10.00	7.24	6.02			
TCP-52R3	52.0	2.047	40	2.28	10.15	7.40	6.14			
TCP-53R3	53.0	2.086	40	2.28	10.31	7.55	6.25			
TCP-54R3	54.0	2.125	40	2.28	10.47	7.71	6.37			
TCP-55R3	55.0	2.165	40	2.28	10.62	7.87	6.49			
TCP-56R3	56.0	2.204	40	2.28	10.78	8.03	6.61			
TCP-57R3	57.0	2.244	40	2.28	10.94	8.18	6.73			
TCP-58R3	58.0	2.283	40	2.28	11.10	8.34	6.85			
TCP-59R3	59.0	2.322	40	2.28	11.25	8.50	6.96			
TCP-60R3	60.0	2.362	40	2.28	11.45	8.70	7.12			

* All dimensions are inch unless indicated

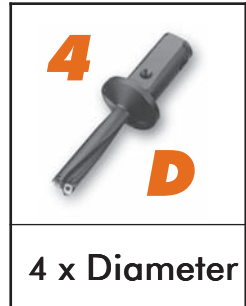
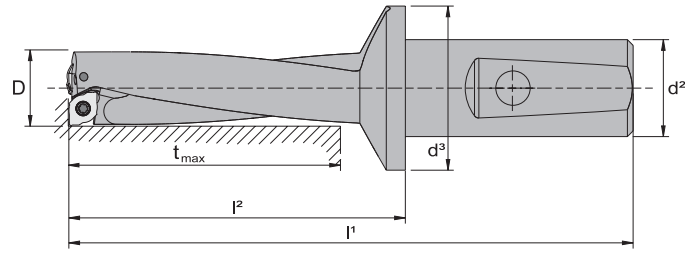
TOPCUT PLUS INDEXABLE INSERT DRILLS



DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d _{mm} ²	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-14.5R4	14.5	.570	25	1.69	5.24	3.03	2.28	XOMT-050204	214.60.125	214.75.490
TCP-15R4	15.0	.590	25	1.69	5.31	3.11	2.36			
TCP-16R4	16.0	.629	25	1.69	5.47	3.27	2.51			
TCP-17R4	17.0	.669	25	1.69	5.63	3.43	2.67			
TCP-17.5R4	17.5	.688	25	1.69	5.71	3.50	2.75			
TCP-18R4	18.0	.708	25	1.69	5.79	3.58	2.83	XOMT-070304	214.80.800	214.80.866
TCP-19R4	19.0	.748	25	1.69	5.95	3.74	2.99			
TCP-20R4	20.0	.787	25	1.69	6.10	3.90	3.14			
TCP-21R4	21.0	.826	25	1.69	6.26	4.06	3.30			
TCP-22R4	22.0	.866	25	1.69	6.42	4.21	3.46			
TCP-23R4	23.0	.905	25	1.69	6.58	4.37	3.62	XOMT-09T306	214.80.672	214.80.866
TCP-24R4	24.0	.944	25	1.69	6.73	4.53	3.77			
TCP-25R4	25.0	.984	32	1.88	7.05	4.69	3.93			
TCP-26R4	26.0	1.023	32	1.88	7.21	4.84	4.09			
TCP-27R4	27.0	1.062	32	1.88	7.36	5.00	4.25			
TCP-28R4	28.0	1.102	32	1.88	7.52	5.16	4.40			
TCP-29R4	29.0	1.141	32	1.88	7.68	5.32	4.56			
TCP-30R4	30.0	1.181	32	1.88	7.84	5.47	4.72			
TCP-31R4	31.0	1.220	32	1.88	7.99	5.63	4.88			
TCP-32R4	32.0	1.259	32	1.88	8.15	5.79	5.03			
TCP-33R4	33.0	1.299	32	1.88	8.31	5.95	5.19			
TCP-34R4	34.0	1.338	32	1.88	8.47	6.10	5.35			

* All dimensions are inch unless indicated

TOPCUT PLUS INDEXABLE INSERT DRILLS

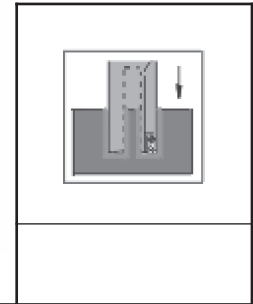
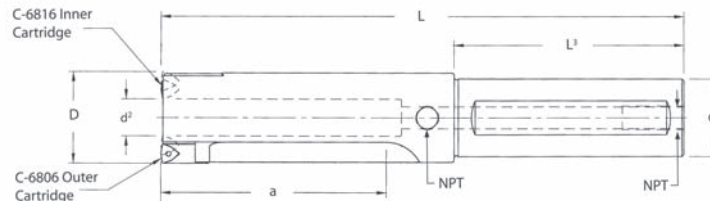


4 x Diameter

DESIGNATION	DIMENSIONS							INSERT (see page 54)	SPARE PARTS	
	D _{mm}	D	d _{mm} ²	d ³	l ¹	l ²	t _{max}		Insert Lock Screw	Torx Wrench
TCP-35R4	35.0	1.377	40	2.28	9.29	6.53	5.51	XOMT-12T308	214.80.558	214.80.824
TCP-36R4	36.0	1.417	40	2.28	9.44	6.69	5.66			
TCP-37R4	37.0	1.456	40	2.28	9.60	6.85	5.82			
TCP-38R4	38.0	1.496	40	2.28	9.80	7.04	5.98			
TCP-39R4	39.0	1.535	40	2.28	9.96	7.20	6.14			
TCP-40R4	40.0	1.574	40	2.28	10.11	7.36	6.29			
TCP-41R4	41.0	1.614	40	2.28	10.31	7.55	6.45			
TCP-42R4	42.0	1.653	40	2.28	10.47	7.71	6.61			
TCP-43R4	43.0	1.692	40	2.28	10.66	7.91	6.77			
TCP-44R4	44.0	1.732	40	2.28	10.82	8.07	6.92			
TCP-45R4	45.0	1.771	40	2.28	11.02	8.26	7.08			
TCP-46R4	46.0	1.811	40	2.28	11.18	8.42	7.24	XOMT-160508	214.80.072	214.80.075
TCP-47R4	47.0	1.850	40	2.28	11.37	8.62	7.40			
TCP-48R4	48.0	1.889	40	2.28	11.53	8.77	7.55			
TCP-49R4	49.0	1.929	40	2.28	11.73	8.97	7.71			
TCP-50R4	50.0	1.968	40	2.28	11.92	9.17	7.87			
TCP-51R4	51.0	2.007	40	2.28	12.08	9.33	8.03			
TCP-52R4	52.0	2.047	40	2.28	12.28	9.52	8.18			
TCP-53R4	53.0	2.086	40	2.28	12.48	9.72	8.34			
TCP-54R4	54.0	2.125	40	2.28	12.67	9.92	8.50			
TCP-55R4	55.0	2.165	40	2.28	12.87	10.11	8.66			
TCP-56R4	56.0	2.204	40	2.28	13.07	10.31	8.81			
TCP-57R4	57.0	2.244	40	2.28	13.26	10.51	8.97			
TCP-58R4	58.0	2.283	40	2.28	13.46	10.70	9.13			
TCP-59R4	59.0	2.322	40	2.28	13.70	10.94	9.29			
TCP-60R4	60.0	2.362	40	2.28	13.89	11.14	9.44			

* All dimensions are inch unless indicated

INDEXABLE INSERT TREPPANNING DRILLS



DESIGNATION	DIMENSIONS								INSERT (see page 53)	SPARE PARTS
	D metric	D inch	d ²	d	L	l ¹	a _{max}	npt		
TWTD-060WC06	60	2.362	.944	2.000	11.67	4.00	5.90	3/8	WCMT-06T308	C-1396 - Mounting Screw
TWTD-065WC06	65	2.559	1.141	2.000	12.26	4.00	6.49	3/8		C-1405 - Axial Adj. Screw
TWTD-070WC06	70	2.756	1.338	2.000	12.66	4.00	6.89	3/8		C-1503 - Radial Adj. Screw
TWTD-075WC06	75	2.953	1.535	2.000	13.25	4.00	7.48	3/8		214.80.012 - Torx Wrench
TWTD-080WC06	80	3.150	1.732	2.000	13.64	4.00	7.87	3/8		214.80.388 - Insert Screw
TWTD-085WC06	85	3.346	1.929	2.500	16.23	6.00	8.46	1/2		C-6806 - O.D. Cartridge
TWTD-090WC06	90	3.543	2.125	2.500	16.63	6.00	8.85	1/2		C-6816 - I.D. Cartridge
TWTD-095WC06	95	3.740	2.322	2.500	17.22	6.00	9.44	1/2		
TWTD-100WC06	100	3.937	2.519	2.500	17.61	6.00	9.84	1/2		

Trepanning Drills

- New Trepanning Drills for the cost-effective production of large diameter and/or deep holes
- Dramatically lowers power requirements as compared to solid drills
- Improved cycle times versus conventional drilling
- Optimal chip formation and control
- Reduced carbide costs
- Material savings - cores are salvageable
- Replaceable cartridges
- 60mm to 100mm diameter drills, with standard inch shanks, are available from stock
- Drilling depth ratios of up to 5 to 1
- Special diameters made to order



DRILLING CUTTING DATA

WIDIA RECOMMENDED DATA FOR TOPCUT PLUS DRILLS

DIN ISO 513	Work Material	Condition	Hardness HB	Material Group	Cutting Speeds in SFPM			Feed f (inches/rev) for Drill diameter D																					
					TN7015	TPC35	THM	D																					
								D = .433" - .551" (11mm - 14mm)	D = .571" - .709" (14.5mm - 18mm)	D = .748" - .945" (19mm - 24mm)	D = .984" - 1.339" (25mm - 34mm)																		
P	Unalloyed steel, cast steel and free cutting steel	< 0.25% C annealed	125	1	975	780	585	845	666	487	.0015	.002	.003	.004	.0015	.003	.004	.002	.0035	.005	.003	.005	.0055						
			190	2	910	747	585	780	601	422	.002	.003	.004	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
		< 0.55% C hardened	250	3	910	715	520	715	552	390	.002	.003	.004	.002	.004	.0055	.003	.005	.007	.004	.006	.008							
			220	4	910	715	520	715	552	390	.002	.003	.004	.002	.004	.0055	.003	.005	.007	.004	.006	.008							
		300	5	845	650	455	650	487	325	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055								
	Low alloy steel and cast steel	annealed	200	6	910	747	585	780	601	422	.002	.003	.004	.002	.004	.0055	.003	.005	.007	.004	.006	.008							
			275	7	910	715	520	715	552	390	.002	.003	.004	.002	.004	.0055	.003	.005	.007	.004	.006	.008							
		hardened	300	8	845	650	455	650	487	325	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
			350	9	780	585	390	585	422	260	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
		High alloy steel, cast steel & tool steel	annealed	200	10	910	715	520	715	552	390	.002	.003	.004	.002	.004	.0055	.003	.005	.007	.004	.006	.008						
			hardened	325	11	780	585	390	585	422	260	.002	.003	.004	.002	.003	.005	.002	.004	.0055	.003	.005	.0055						
M	400 Series Stainless steel and cast steel	ferritic / martensitic	200	12	845	650	455	650	487	325	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
		martensitic	240	13	780	617	455	585	422	260	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
	300 Series Stainless steel	austenitic	180	14	747	585	422	487	357	228	.0015	.002	.003	.002	.003	.005	.002	.004	.0055	.003	.005	.0055							
K	Work Material	Condition	Hardness HB	Material Group	Cutting Speeds in SFPM			Feed f (inches/rev) for Drill diameter D																					
					TN5515	TPC35	THM	D																					
								D = .433" - .551" (11mm - 14mm)	D = .571" - .709" (14.5mm - 18mm)	D = .748" - .945" (19mm - 24mm)	D = .984" - 1.339" (25mm - 34mm)																		
					Grey cast iron	ferritic/pearlitic	180	15	845	650	455				520	390	260	.003	.0035	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.0085
						pearlitic	260	16	747	568	390				422	308	195	.0025	.003	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.0085
					Nodular cast iron	ferritic	160	17	812	617	422	650	487	325	520	390	260	.0025	.003	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.0085
						pearlitic	250	18	747	568	390	585	422	260	422	308	195	.0025	.003	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.008
					Malleable cast iron	ferritic	130	19	812	617	422	715	552	390	585	438	293	.0025	.003	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.008
						pearlitic	230	20	682	520	357	650	487	325	520	390	260	.0025	.003	.004	.003	.004	.0055	.004	.006	.008	.004	.006	.008
					Aluminum alloys wrought	non-age-hardenable	60	21							1625	1218	813	.0025	.004	.005	.0025	.004	.0055	.003	.005	.007	.004	.006	.0085
						age-hardenable	100	22							1625	1218	813	.0025	.004	.005	.0025	.004	.0055	.003	.005	.007	.004	.006	.0085
					Cast aluminum alloys	≤ 12% Si	75	23							1462	1056	650	.0025	.004	.005	.0025	.004	.0055	.003	.005	.007	.004	.006	.0085
						> 12% Si	90	24							1462	1056	650	.0025	.004	.005	.0025	.004	.0055	.003	.005	.007	.004	.006	.0085
					Copper & copper alloys	lead alloy	130	25							1040	764	488	.0025	.004	.005	.0025	.004	.0055	.003	.005	.007	.004	.006	.0085
						Brass, red brass	110	26							487	374	260	.0025	.004	.005	.003	.004	.0055	.004	.006	.008	.005	.006	.0095
						Brass, electrolytic-Cu	90	27							487	374	260	.0025	.004	.005	.003	.004	.0055	.004	.006	.008	.005	.006	.0095
						Bronze, electrolytic-Cu	100	28							455	325	195	.0025	.004	.005	.003	.004	.0055	.004	.006	.008	.005	.006	.0095