Heat Exchangers

ISCAR'S MACHINING SOLUTIONS FOR HEAT EXCHANGERS

LOGIQ 3 CHAM
THREE FLUTE CHAMDRILL

SUMOCHAM

DR-TWIST
INDEXABLE DRILL LINE

TRIDEEP
DEEP DRILLING

Member IMC Group

ISCAR

www.iscar.com


SUMOCHAM
CHAMDRILL LINE

Table of Contents

Heat Exchangers

Machining Solutions

A heat exchanger is a system used to transfer heat between two or more fluids. Heat exchangers are used in both cooling and heating processes. The fluids may be separated by a solid wall to prevent mixing, or they may be in direct contact. Both gasses and fluids can be transferred through heat exchangers. There are three main types of heat exchangers; shell & tube, plate & frame, and air-cooled.
Heat exchangers are critical in modern industries such as automotive, aerospace, and power. Many engineering resources are required to create optimal heat exchanging solutions for industrial demands. Advanced designs of heat exchangers are examined by using finite element methods. **ISCAR** has developed a range of full solutions for the production of heat exchangers for drilling, turning, milling, and grooving operations.

Flange Cover

Flange Shell

Stacked Baffle Plates

Tube Sheets

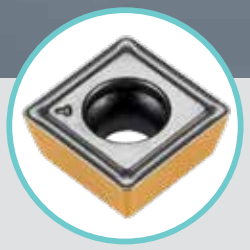
Heat Exchanger

ø4-32.9 mm
(.157-1.299")
1.5xD, 3xD, 5xD,
8xD, 10xD, 12xD

SUMOCHAM
CHAMDRILL LINE

ø12-60 mm
(.472-2.362")
2xD, 3xD, 4xD, 5xD

ø57-80 mm
(2.24-3.15")
2.5xD



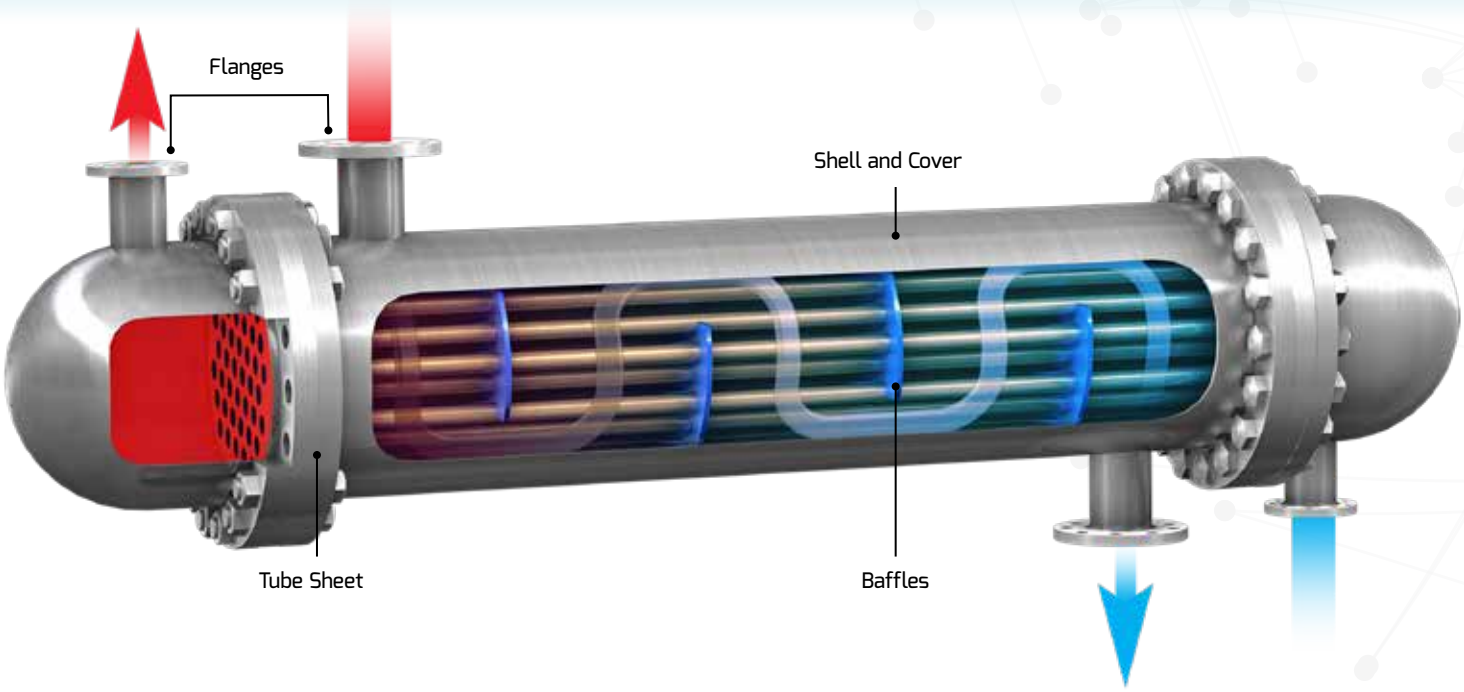
DR-TWIST
INDEXABLE DRILL LINE

ø12-32.0 mm
(.472-1.102")
10xD, 15xD, 25xD

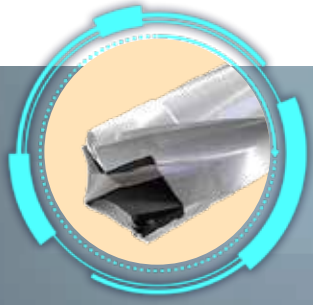
TRIDEEP
DEEP DRILLING

ø12-25.9 mm
(.472-1.019")
1.5xD, 3xD, 5xD, 8xD

LOGIQ3CHAM
THREE FLUTE CHAMDRILL



ø25-83 mm
(.984-3.2678")
10-100xD



ø33-40 mm
(1.299-1.575")
1.5xD, 3xD, 5xD, 8xD

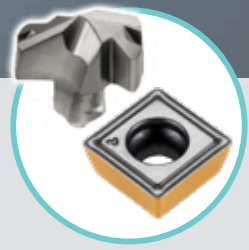
ø8-300 mm
(.315-11.8")
10-100xD

ø26-50 mm
(.984-2.165")
5xD

FINEBEAM

CHAMIQDRILL
700 LINE

ISCARDEEPDRILL

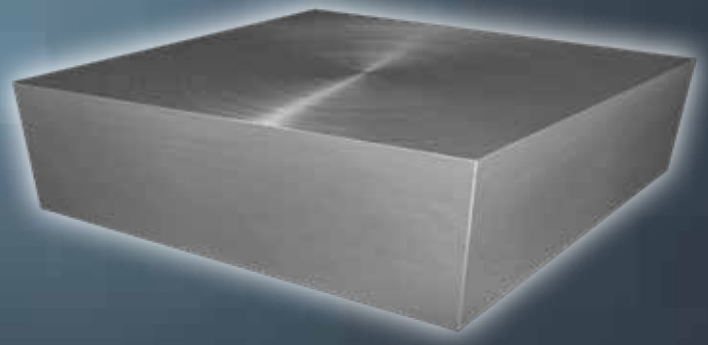


COMBICHAM

Tube Sheet Preparation
Milling

DOVEIQDRILL
700 LINE

Family of face mills carrying double sided inserts with 8 cutting edges, with positive inclination for a soft and light cut, and high surface during machining.



FFQ4 SOMT 0904

Square single-sided Inserts with 4 cutting edges for fast feed milling

H1200 HXCU 0606

Double-sided hexagonal inserts with 12 cutting edges

IQ845

Square milling inserts for general use

ONMU/ONHU 07...

Octagonal inserts with 16 helical right-hand cutting edges for economical face milling

Heat Exchangers

Tube Sheet Preparation
Turning

SUMOTURN
HEAVY DUTY LINE

Heavy duty turning applications feature relatively large depths of cut, high feeds, and rough, non-uniform surfaces to be machined. These applications require both tough carbide grades and specifically designed chipformers.

DOVE-IQ

Double-sided inserts with R3P double-sided 7° negative side flank 80° rhombic inserts for heavy turning of steel

CNMG-R3M

Double-sided 80° rhombic inserts, first choice for rough machining of stainless and low carbon steel

RCMX

Round 7° inserts with a positive flank and strong cutting edge for rough turning

LOMX

For heavy super turn tangential inserts with 4 cutting edges for high metal removal of up to 35 mm D.O.C. on steel

Machining Tube Sheet and Baffles
Drilling

SUMOCHAM is the Ultimate Solution for Drilling Tube Sheets and Baffles

- Submicron carbide grade IC908
- TiAlN PVD coating
- Available in the diameter range of 4-32.9 mm (.157-1.299"), depending on geometry
- Unique ground flute for smooth chip flow
- Unique ground gash for improved penetration
- Unique honed cutting edge for improved performance and increased tool life
- Positive flute rake angle for excellent chip formation
- High penetration rates
- Double-margin inserts for high quality holes

SUMOCHAM CHAMDRILL LINE

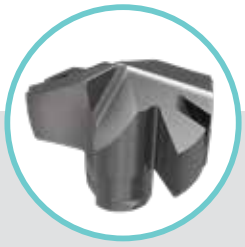
HCP

Concave cutting edges which substantially enhance the self-centering capability of the drill

SUMOCHAM CHAMDRILL LINE

QCP

Enhanced centering capabilities, improved surface finish and overall quality of the machined hole



SUMOCHAM CHAMDRILL LINE

ICM

Improved productivity output rates. Use on stainless and high temperature alloys. Negative land on the cutting edge

SUMOCHAM CHAMDRILL LINE

ICP

Designed for machining the ISO P materials group, with an ultimate shape for high productivity and outstanding chip forming on soft steel

SUMOCHAM CHAMDRILL LINE

ICG

Serrated drilling head enables splitting the chips to small segment for fluent evacuation. An excellent solution for drilling titanium, stainless steel, Ti-based alloys

SUMOCHAM CHAMDRILL LINE

Drill Body Features

- Robust high quality pocket for prolonged tool life
- Frontal coolant near to the cutting edge for increased tool life
- Twisted coolant nozzles through the drill body and not through the center core for optimized flute volume
- Highest grade of tool steel that features superior body hardness for excellent wear resistance
- Polished flutes and drill body for improved chip evacuation
- Available with cylindrical shank and flat shank
- Helical margin on body prevents chip adhesion
- Unique flute geometry
- High helix flute angle

Twisted Coolant Nozzles

For Every Type of Material

Innovative Ergonomic Key

Cost Effective Insert

Option 1

With a pre-hole

Drilling procedures for tube sheet and stacked baffle plates (L/D ≥ 5)

Step 1

- Drilling a pre-hole
- Holder: **SUMOCHAM**- 1.5xD or 3xD
- Insert: ICP/ICM/ICG/FCP
- Pre-hole depth: 1xD
- In case of clad tube sheet, the pre-hole should penetrate into the second material by 1 mm (.04")

Step 2

- Penetrating the guide hole
- Holder: **SUMOCHAM**- 8xD, 10xD, 12xD and up
- Insert: ICP/ICM/ICG/FCP
- Low speed rotation and cutting feed should be applied while penetrating the guide hole
- Stop axial movement 2 mm (.08") above guide hole bottom

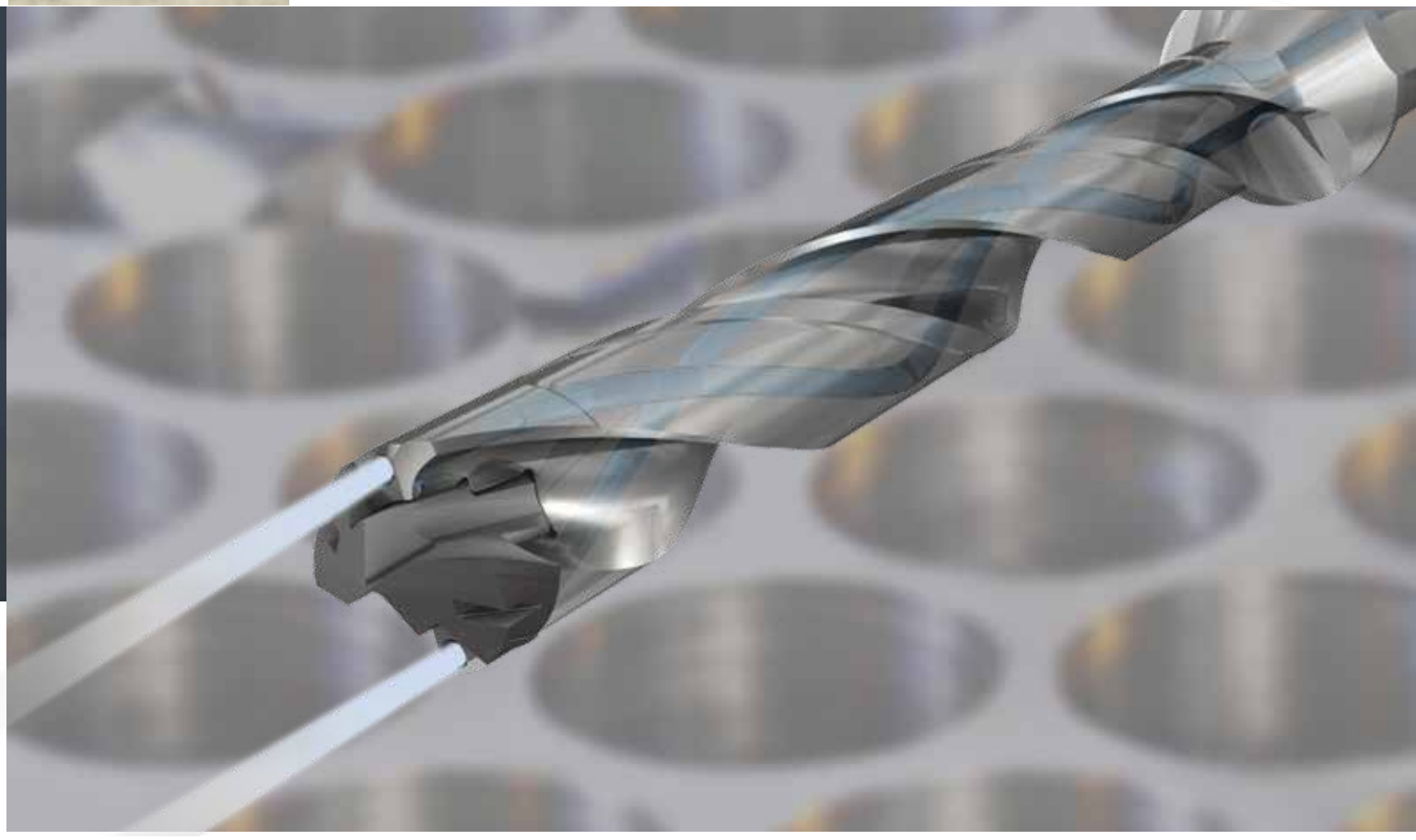
Step 3

- Drilling through hole
- Holder: **SUMOCHAM**- 8xD, 10xD, 12xD and up
- Insert: ICP/ICM/ICG/FCP
- The drill should break through the tube sheet by 2 mm (.08") before retracting

Option 2

Without a pre-hole

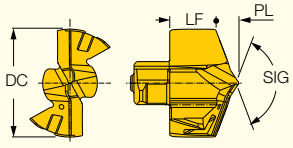
- Drilling procedures for tube sheet and stacked baffle plates (L/D ≥ 5)
- Drilling through hole
- Holder: **SUMOCHAM**- 5xD, 8xD, 10xD, 12xD and up
- Insert: HCP / QCP
- The drill should break through the tube sheet by 2 mm (.08") before retracting

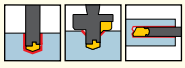


SUMOCHAM CHAMDRILL LINE

QCP-2M

Double Margin Drilling Heads for DCN Drills for Machining Steel with High Surface Finish Results





METRIC						
	Dimensions					
Designation	DC	LF	PL	SIG	SSC(1)	IC908
QCP 1927-2M	19.27	8.07	4.04	136	19.0	●
QCP 2567-2M	25.67	10.56	5.42	136	25.0	●

INCH						
	Dimensions					
Designation	DC	LF	PL	SIG	SSC(1)	IC908
QCP 0759-2M	.759	.318	.15900	136	19.0	●
QCP 1011-2M	1.011	.416	.21300	136	25.0	●

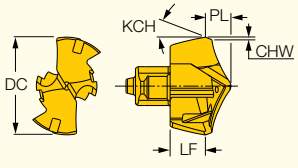
• Can provide high surface finish of up to 1.6 (64 microinches) Ra hole cylindricity and straightness of up to 0.05 mm (.002")

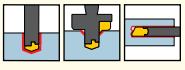
(1) Seat size code

SUMOCHAMIQ CHAMDRILL LINE

HCP-IQ

Exchangeable DCN Drill Self-Centering Heads for Alloy Steel and Cast Iron





METRIC							
		Dimensions					
	Designation	DC	LF	PL	CHW	KCH	SSC(1)	IC908
NEW	HCP 1605-IQ	16.05	5.39	3.910	0.62	30.0	16.0	●
	HCP 1927-IQ	19.27	6.34	4.660	0.75	30.0	19.0	●
NEW	HCP 2565-IQ	25.65	8.80	5.700	0.67	30.0	25.0	●

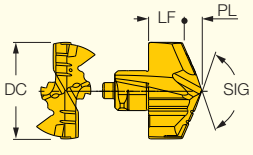
INCH							
		Dimensions					
	Designation	DC	LF	PL	CHW	KCH	SSC(1)	IC908
	HCP 0632-IQ	.632	.212	.15393	.024	30.00	16.0	●
	HCP 0759-IQ	.759	.250	.18346	.030	30.00	19.0	●
	HCP 1010-IQ	1.010	.346	.22440	.026	30.00	25.0	●

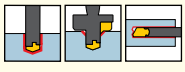
(1) Seat size code

SUMOCHAM CHAMDRILL LINE

ICG

Exchangeable Chip Splitting Drill Heads for Stainless and Alloyed Steel





METRIC						
	Dimensions					
Designation	DC	LF	PL	SIG	SSC(1)	IC908
ICG 193	19.30	6.89	3.81	130	19.0	●
ICG 257	25.70	9.18	4.92	130	25.0	●

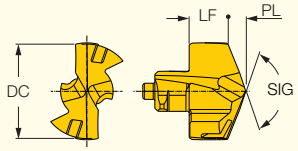
INCH						
	Dimensions					
Designation	DC	LF	PL	SIG	SSC(1)	IC908
ICG 0760	.760	.271	.15000	130	19.0	●
ICG 1012	1.012	.361	.19370	130	25.0	●

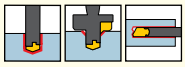
(1) Seat size code

SUMOCHAM CHAMDRILL LINE

ICP

Exchangeable DCN Drill Heads, for Carbon and Alloy Steel (ISO P Materials)





METRIC

	Designation	Dimensions DC	PL	LF	SIG	SSC(1)	IC908
NEW	ICP 135	13.50	2.05	5.55	140	13.0	●
NEW	ICP 1927	19.27	2.93	8.07	140	19.0	●
	ICP 193	19.30	2.93	8.07	140	19.0	●
	ICP 257	25.70	3.93	10.57	140	25.0	●
	ICP 264	26.40	4.02	11.05	140	26.0	●

INCH

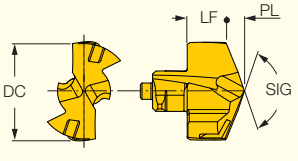
Designation	Dimensions DC	PL	LF	SIG	SSC(1)	IC908
ICP 0531	.531	.08070	.219	140	13.0	●
ICP 0759	.759	.11535	.318	140	19.0	●
ICP 0760	.760	.11535	.318	140	19.0	●
ICP 1012	1.012	.15472	.416	140	25.0	●
ICP 1039	1.039	.15826	.435	140	26.0	●

(1) Seat size code

SUMOCHAM CHAMDRILL LINE

ICP-2M

Double Margin Drilling Heads for DCN Drills for Machining Steel with High Surface Finish Results



METRIC

	Designation	Dimensions DC	LF	PL	SIG	SSC(1)	IC908
NEW	ICP 135-2M	13.50	5.14	2.46	140	13.0	●
NEW	ICP 1925-2M	19.25	7.50	3.50	140	19.0	●
	ICP 1927-2M	19.27	7.49	3.51	140	19.0	●
	ICP 193-2M	19.30	7.49	3.51	140	19.0	●
	ICP 2567-2M	25.67	10.58	3.92	140	25.0	●
	ICP 257-2M	25.70	9.82	4.68	140	25.0	●

INCH

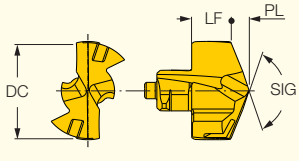
Designation	Dimensions DC	LF	PL	SIG	SSC(1)	IC908
ICP 0531-2M	.531	.202	.09685	140	13.0	●
ICP 0758-2M	.758	.295	.13779	140	19	●
ICP 0759-2M	.759	.295	.13818	140	19.0	●
ICP 0760 2M	.760	.295	.13818	140	19.0	●
ICP 1011-2M	1.011	.417	.15433	140	25.0	●
ICP 1012-2M	1.012	.387	.18425	140	25.0	●

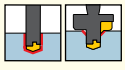
(1) Seat size code

SUMOCHAM CHAMDRILL LINE

ICM

Exchangeable DCN Drill Heads, for Stainless Steel and High Temperature Alloys (ISO MandS Materials)





METRIC

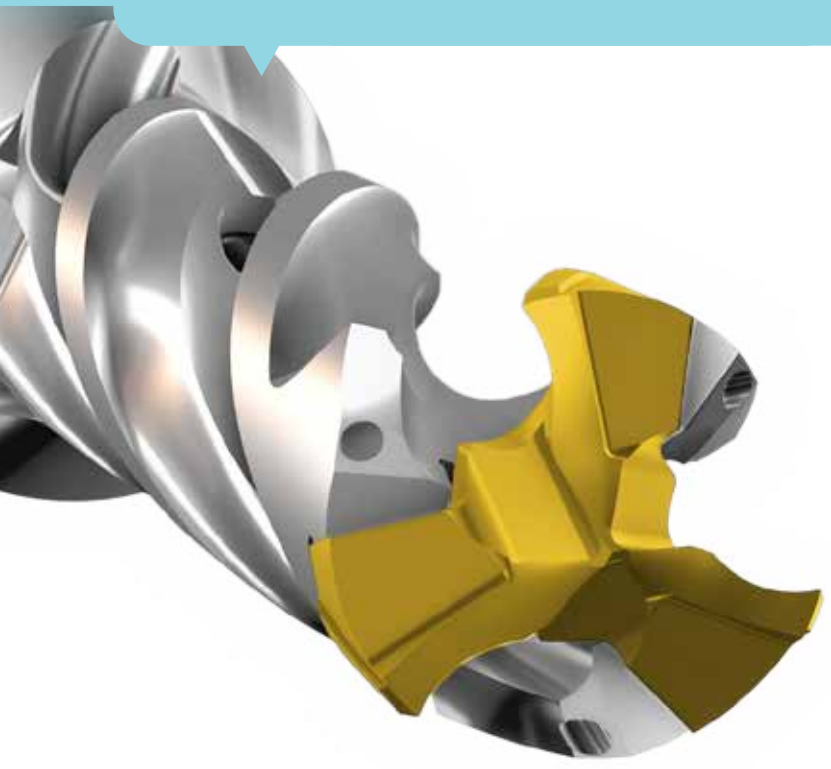
	Designation	Dimensions DC	PL	LF	SIG	SSC(1)	IC908
NEW	ICM 1605	16.05	2.430	6.87	140	16.0	●
	ICM 1925	19.25	3.500	7.50	140	19.0	●
	ICM 1927	19.27	2.920	8.08	140	19.0	●
	ICM 193	19.30	3.510	7.49	140	19.0	●
NEW	ICM 2565	25.65	3.960	10.54	140	25.0	●
	ICM 2567	25.67	3.960	10.54	140	25.0	●

INCH

Designation	Dimensions DC	PL	LF	SIG	SSC(1)	IC908
ICM 0632	.632	.09566	.270	140	16.0	●
ICM 0758	.758	.13779	.295	140	19.0	●
ICM 0759	.759	.11496	.318	140	19.0	●
ICM 0760	.760	.13818	.295	140	19.0	●
ICM 1010	1.010	.15590	.415	140	25.0	●
ICM 1011	1.011	.15590	.415	140	25.0	●

(1) Seat size code

Three Flute Exchangeable Head Drills



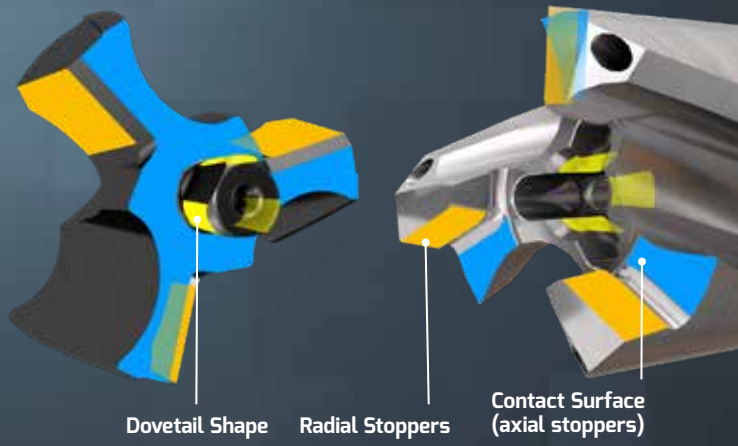
LOGIQ 3 CHAM
THREE FLUTE CHAMDRILL

LOGIQ-3-CHAM - Three flute exchangeable drills line designed to significantly increase productivity and reduce machining cycle time by up to 50% compared to conventional two flute drills. **ISCAR** introduces a new **LOGIQ-3-CHAM** drill family which raises drilling performance levels to new heights. This family was designed by utilizing highly advanced technologies, based on **ISCAR**'s successful **SUMOCHAM** drill families. The range is 12 to 25.9 mm (.472-1.02"), with drilling depth ratios of 1.5XD, 3XD, 5XD, and 8XD. **LOGIQ-3-CHAM** applies the user-friendly drilling system for easy handling in accordance with the company motto "No Setup Time".

D3N Drilling Holder

- Available in 1.5, 3, 5, and 8D diameter to drilling length ratios
- 3 high flute helix and polished flute surfaces provide a smooth and easy chip evacuation process
- Helical margin to prevent chip adhesion between the body and the hole during machining
- Internal coolant channels supply efficient cooling and lubrication during the drilling process
- Tool body made from highest grade of steel with superior hardness for high wear resistance
- Drilling head pocket designed to withstand high machining cutting conditions, allowing easy and fast head indexing
- Variable flute angle design provides durable tool structure to withstand high axial forces

Patented pocket design



Self Centering Insert

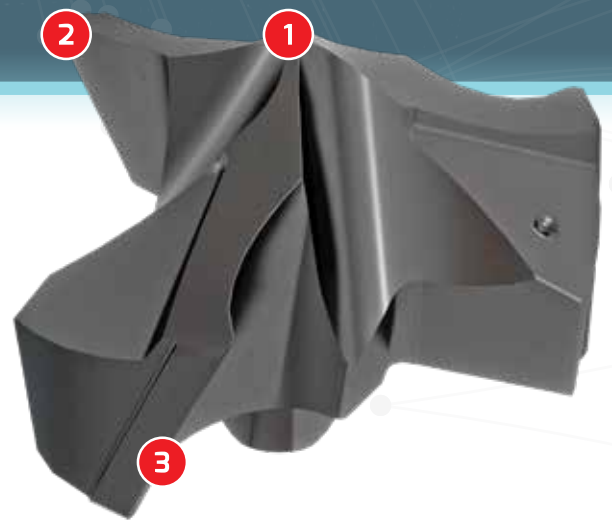
For Steel and Cast Iron

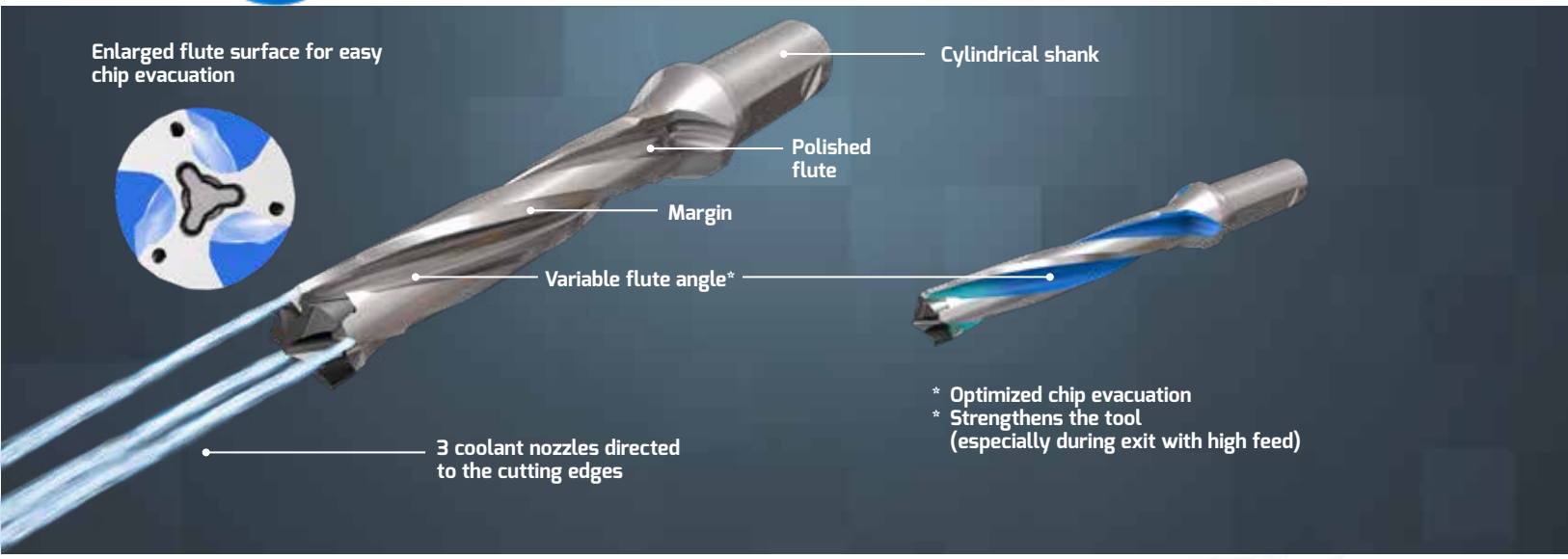
High Productivity

Cost Effective Insert

H3P Drilling Heads

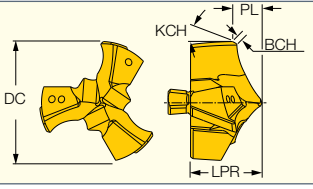
- Available in the drilling range of 12-25.9 mm (.472-1.02") diameters with 0.1 mm (.004") increments
- Single type geometry suitable for both ISO P and ISO K materials
- H3P drilling heads are made from IC908 TiAlN PVD nano layer coating grade, for prolonged and predictable tool life
- Unique wavy and honed cutting edges enable best chip form and easy evacuation process
- Patanted concave cutting edges enable smooth penetration, excellent centering and stable drilling process
- Patent-pending robust and precise chisel point and gash angle to withstand high cutting forces (Fig. 1)
- 15° corner chamfer increase wear resistance and strengthen the cutting corner (Fig. 2)
- Unique dovetail clamping to prevent the head from being extracted from the pocket during retraction
- Wiper land to strengthen the cutting corner (Fig. 3)





LOGIQ3CHAM THREE FLUTE CHAMDRILL

H3P
Exchangeable 3 Flute Drilling Heads for Carbon and Alloy Steel (ISO P) and Cast Iron (ISO K)

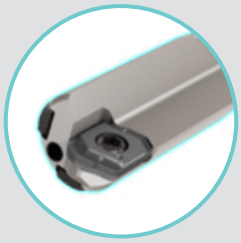


METRIC						
	Dimensions					
Designation	DC	LPR	PL	KCH	BCH	IC908
H3P 135-IQ	13.50	7.58	2.910	15.0	0.40	●
H3P 1927-IQ	19.27	10.92	4.100	15.0	0.40	●
H3P 193-IQ	19.30	10.92	4.100	15.0	0.40	●
H3P 2565-IQ	25.65	14.11	5.310	15.0	0.40	●
H3P 257-IQ	25.70	14.11	5.310	15.0	0.40	●

INCH						
	Dimensions					
Designation	DC	LPR	PL	KCH	BCH	IC908
H3P 0531-IQ	.531	.298	.11456	15.00	.016	●
H3P 0759-IQ	.759	.430	.16141	15.00	.016	●
H3P 0760-IQ	.760	.430	.16141	15.00	.016	●
H3P 1010-IQ	1.010	.556	.20905	15.00	.016	●
H3P 1012-IQ	1.012	.556	.20905	15.00	.016	●

Deep Drilling

TRIDEEP

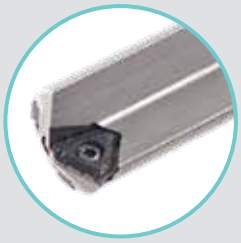


Serrated Cutting Edges Small Diameter Range: 12-13.99 mm (Ø.472”-.550”)

Small Diameter Deep Drills with New Chip Splitting Insert Concept

Indexable LOGT inserts and TRIDEEP drill bodies for drilling diameters down to 12 mm (.472”) featuring high performance and drilling consistency, and easy insert replacement. The inserts have 2 cutting edges and a chip splitting insert.
The wiper on the insert assures excellent surface finish. In deep holes, the serrated cutting edge splits the chips into small parts to enable quick evacuation.

TRIDEEP



Serrated Cutting Edges Small Diameter Range: 14-32.0 mm (Ø.551”-1.102”)

Small Diameter Deep Drills with 3 Chip Splitting Cutting Edges

The TOGT inserts feature 3 chip splitting cutting edges, a positive rake chipbreaker and a wiper for high hole surface quality.
These inserts are available in 7 sizes, made from IC908, a versatile PVD coated grade. The chip splitter produces narrow chips for efficient chip evacuation, enabling high feed rates and highly accurate peripherally ground insert. Direct insert mount - no adjustment needed for accurate hole diameter.
The drills carry the new economic solid carbide guide pads.

ISCARDEEPDRILL

Deep Hole Drilling System

Used for solid drilling in a single operation. Drilling heads are available with brazed or indexable inserts. Brazed head diameter range: 8-65 mm (.315-2.56”), Indexable head diameter range: 8-300 mm (.315-11.8”) and larger upon request.
Special form heads for performing any other special contours.Head type connection configurations: external threaded heads, internal threaded heads.

Shank Types and Cooling Methods

Single Tube System: Cooling fluid is induced through the gap between the drill and the hole, conveying the chips through the tube. Requires the use of dedicated machines.
Double Tube System: Cooling fluid is induced between the coaxial tubes, conveying the chips through the inner tube. Can be applied on standard machines.

ISCARDEEPDRILL

Indexable Drills

- For high volume production
- Wide chip gullet for better chip evacuation
- High accuracy
- Ceramic guide pads available upon request, for titanium and stainless steel
- Range: 16-40 mm (.63-1.57")

ISCARDEEPDRILL

Brazed Drills

- For short production series
- Multiple tips for chip splitting
- For difficult-to-machine materials, high temperature alloys, hardened steel, risky applications (low cost heads)
- Recommended for use by an experienced operator
- Range: 12.6-65 mm (.5-2.56")

ISCARDEEPDRILL

Trepanning Drills

- Require less power than solid drilling applications
- Trepanning leaves a core that can be used for material analysis and production of other parts
- Hole tolerance is not as accurate as with solid drilling
- Range: 120-350 mm (4.72-13.78")

Machining Tube Sheets
Grooving

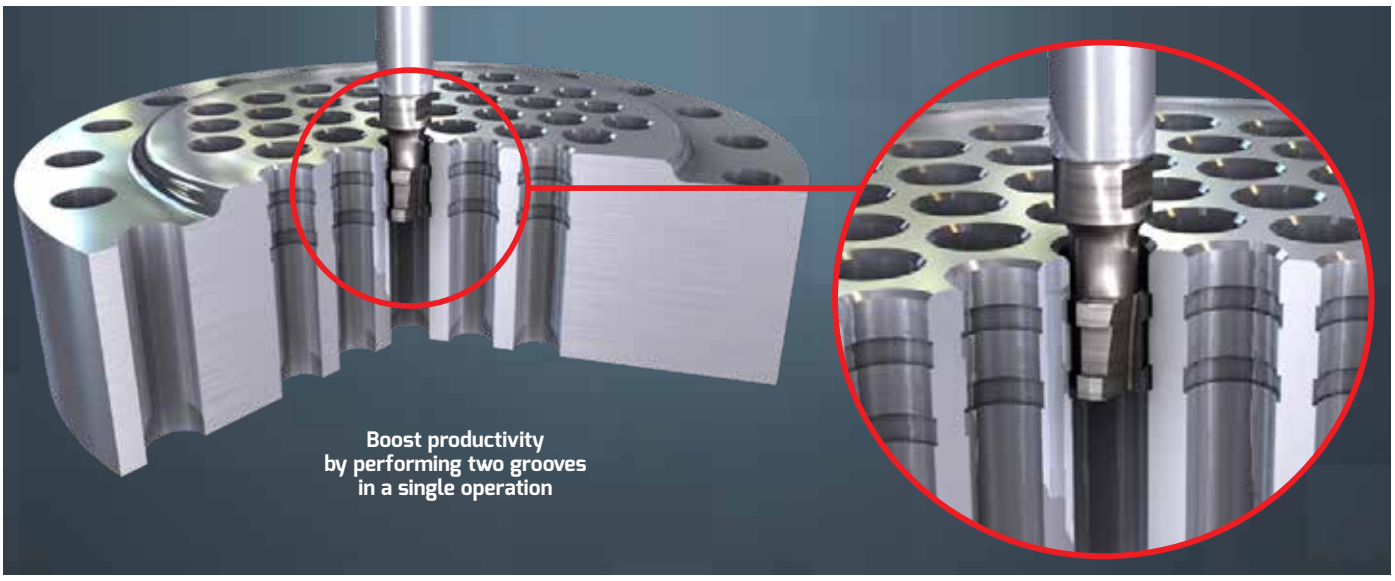
MULTI-MASTER
INDEXABLE SOLID CARBIDE LINE

Slitting Applications
Double Groove-Mill System for Internal Slitting Main Features

- For internal slitting of small grooves
- Inserts are available in diameters of 15.5, 18.5 and 24.5 mm (.61, .728 and .965")
- Slitting widths are 3 mm (.118") at grooving depths of up to 0.5 mm (.02")
- No debarring operation is needed, as no burr remains on grooved edge
- Unique **CHATTERFREE** design for improved material removal rate and low vibration
- Part of **ISCAR**'s **MULTI-MASTER** family
- Standard steel holder
- Simple and fast clamping of MM SLIT insert
- Conical surface for improved rigidity and accuracy
- Face contact for groove accuracy and minimum axial run-out
- Unique insert clamping system allows use at higher feeds
- Adjustable tool overhang

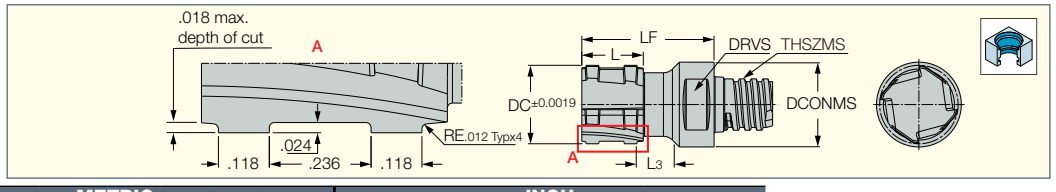
Chamfering Applications-
MM Chamfering Head

- A part of **ISCAR**'s **MULTI-MASTER** family
- Up to 6 flutes
- The heads are characterized by a 45° and 60° head point angle



MULTI-MASTER
INDEXABLE SOLID CARBIDE LINE

MM TS-DG
Double-Groove Internal Grooving Heads with Threaded Connection for Tube Sheets of Heat Exchangers



	METRIC							INCH									
	Dimensions																IC908
Designation	DC	DCONMS	PHD(1)	LF	L_3	L	DRVS(3)	DC	DCONMS	PHD(1)	LF	L_3	L	DRVS(3)	THSZMS	NOF(2)	
MM TS155-04T10-8238	15.50	16.00	15.88	34.00	18.10	14.10	10.0	.610	.630	.625	1.339	.713	.555	.394	T10	4	MM KEY 10X7* ●
MM TS185-04T12-8239	18.50	18.45	19.05	34.50	18.30	14.50	13.0	.728	.726	.750	1.358	.720	.571	.512	T12	4	MM KEY 13X8* ●
MM TS245-04T15-8240	24.50	23.90	25.40	37.40	11.00	14.40	20.0	.965	.941	1.000	1.472	.433	.567	.787	T15	4	MM KEY 20* ●

(1) For minimum tube outer diameter (2) Number of flutes (3) Clamping wrench size * Optional, should be ordered separately

Machining Tube Sheets
Reaming

BAYOT-REAM

Reaming Applications
Technical Advantages

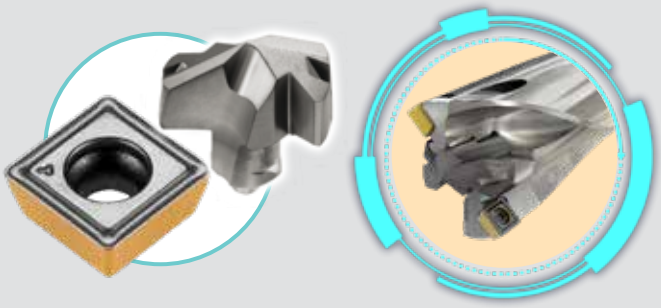
- High cutting speeds and feeds (for higher productivity)
- Low run-out - maximum 3µm (.00012")
- Diameter range: 11.5 to 32 mm (.453 to 1.26")
- L/D = 1.5, 3, 5, 8xD
- One shank can be used for a wide range of diameters, various types of cutting edges and grades
- Indexing repeatability - maximum 3µm (.00012")
- Durable, due to the combination of a solid carbide head with a flexible steel shank
- No fear of losing any clamping parts which could possibly fall during indexing
- Suitable for minimum quantity lubrication (MQL)
- Internal coolant is directed optimally to the cutting edges for the most efficient head lubrication and extremely long tool life

Interchangeable left-hand solid carbide reaming heads (shell reamers) with a quick change bayonet mechanism for H7 hole tolerance high speed reaming of through holes

Interchangeable straight flute left-hand, solid carbide reaming heads (shell reamers) with a quick change bayonet mechanism for H7 hole tolerance high speed reaming of blind holes

Machining Tube Sheets
Drilling

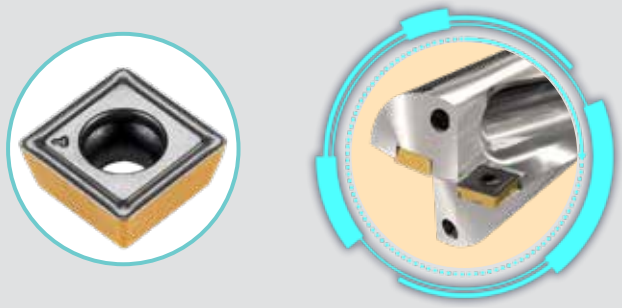
COMBICHAM



Fully Effective Large Diameter Drill

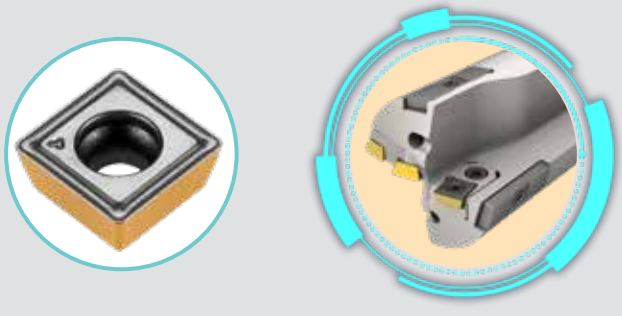
- Excellent chip evacuation, improved surface finish and hole cylindricity
- Excellent solution for drilling stacked plates
- Standard inserts
- High rigidity due to integral tool
- No need for pre-hole
- Full program from diameter 26 to 50 mm (1.023 to 2.165") in increments of 1 mm (.04")
- Standard program tools of 5xD drilling depth
- Indexable inserts are available with several chipformer types in the following grades: IC808 and IC908
- Indexable **SUMOCHAM** and **SUMOCHAM-IQ** heads are available with ICP/ICM/HCP geometries in **ISCAR**`s IC908 TiAlN PVD grade

DR-TWIST
INDEXABLE DRILL LINE



- Highest steel grade with a body hardness of up to 55 HRC
- Drilling depth to diameter ratios of 2xD, 3xD, 4xD and 5xD
- Twisted coolant holes
- Diameter range of 12 to 60 mm (.472 to 2.36")
- Carries standard SOMX/SOMT indexable inserts with 4 cutting edges with DT, GF and HD chipbreaker
- Optimal flute shape for easy chip flow

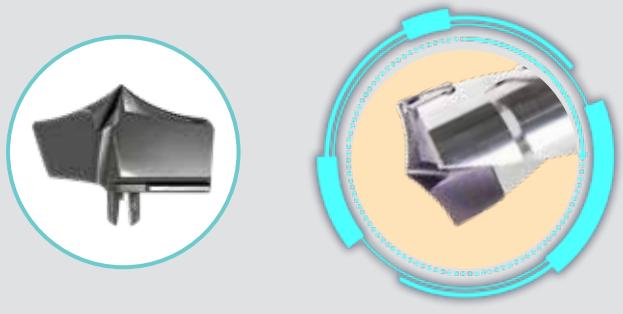
ISCARDR-DH



L=5xD and up

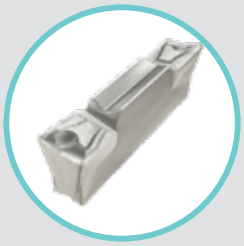
- High feed drilling
- Excellent surface quality
- High hole accuracy
- Large drilling depth: L=5xD and higher– up to 800 mm (31.5")
- Carries standard SOMX/SOMT indexable inserts with 4 cutting edges
- No dedicated machine or extra setup needed
- Standard coolant pressure as used for general drilling
- Standard indexable, double-sided guiding pads

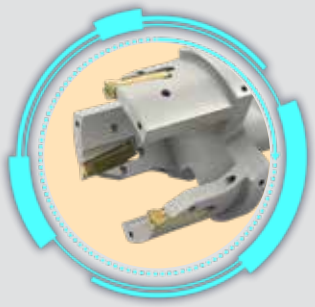
CHAMIQDRILL
700 LINE



CHAMIQDRILL drill family for the drilling range of 33 to 40 mm (1.3-1.574") with 1.5, 3, 5 and 8 length to diameter ratios. The CHAMIQDRILL features a unique design, utilizing the carbide's flexibility for self-locking; eliminating the need for clamping accessories. The robust structure of the drill with the concave cutting edge design enables drilling at high feed rate, providing very accurate IT8 – IT9 hole tolerance

TREPANDRILL

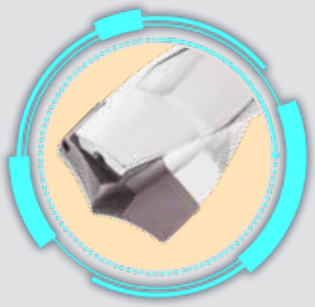




Fully Effective Specially Tailored Core Drill

- Fully effective tool which requires less power than solid drills
- Solid core left after drilling can be applied as a workpiece
- Standard double-ended, self clamped GRIP inserts
- Inserts are available with several chipformer types and in **ISCAR**'s new SUMO TEC grades IC807, IC808, and IC830
- Diameter: 60 mm (2.36") and up
- Drilling depth to diameter ratio up to 2xD

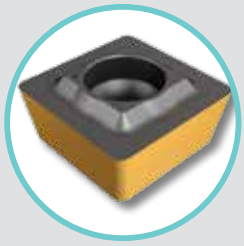
CHAMIQDRILL
700 LINE

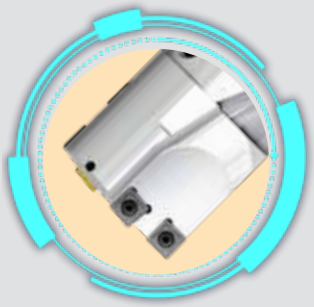


MD-DFN Modular Heads

- Carrying HFP-IQ CHAMIQDRILL solid carbide heads
- Robust structure with concave cutting edge design enables drilling at high feed rates, providing very accurate IT8-IT9 hole tolerance
- Unique pocket design enables many drilling head indexes
- Special axial stopper prevents the drilling head from being extracted during retraction
- Large radial head stoppers provide high resistance to cutting forces, enabling very high cutting conditions

ISCARDR-DH

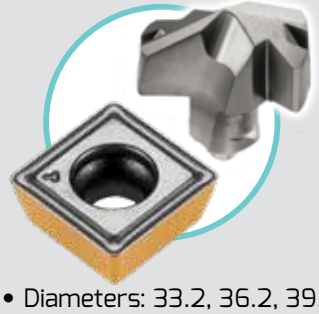


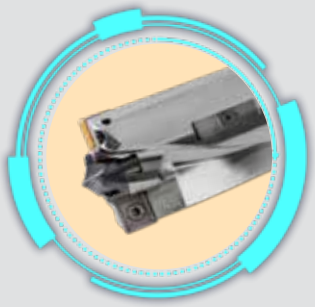


MD-DR-DH Modular Heads

- Known and proven design combined with the advantages of a modular system
- Carry standard SOMX indexable inserts with 4 cutting edges, providing an economical solution
- Standard indexable, double-sided guide pads
- Suitable for low to medium feed machining
- Suitable for semifinishing and roughing applications

COMBICHAM





- Diameters: 33.2, 36.2, 39.2 mm
- 2 effective cutting edges for high productivity
- 2 guide pads for improved stability during machining
- New drilling ratio: 7 and 8 xD
- The HCP central drilling head provides a self-centering ability for premium hole accuracy No pre-hole is needed.
- Peripheral SOMT/X wiper inserts feature 4 cutting edges and ensure premium surface quality

SUMOCHAM
CHAMDRILL LINE

SPECIALLY TAILORED

Profitability Test Report

SUMOCHAM CHAMDRILL LINE

Workpiece Tube Sheet Material ASTM A516-70 150-180 HB

	ISCAR - SUMOCHAM	Competitor
Drill	DCN 190-152-25A-8D / DCN 0748-598-100A-8D	Replaceable head
Insert	ICP 1927-2M IC908 / ICP 0759-2M IC908	
Cutting speed m/min / SFM	120 / 400	110 / 360
Feed mm/rev / IPR	0.33 / .013	0.3 / .012
Table feed mm/min / IPM	660 / 26	560 / 22
Drilling depth mm / inch	75 / 3	75 / 3
Tool life (number of holes)	1000	750
Savings	**50%**	

SUMOCHAM CHAMDRILL LINE

Workpiece Tube Sheet Material AISI 316L

	ISCAR - SUMOCHAM	Competitor
Drill	DCN 190-095-25A-5D / DCN 0748-374-100A-5D	Solid carbide
Insert	ICM 193 IC908 / ICM 0760 IC908	
Cutting speed m/min / SFM	60 / 200	50 / 160
Feed mm/rev / IPR	0.25 / .01	0.22 / .009
Table feed mm/min / IPM	250 / 10	181 / 7.1
Drilling depth mm / inch	60 / 2.36	60 / 2.36
Tool life (number of holes)	800	600
Savings	**66%**	

Stacked baffle plates

- Maximum total thickness = 150 mm
- Optimal thickness of each plate = 6÷12 mm
- Peripheraly welded
- Bolted with minimum 4 bolts
- Speeds and feeds should be 10÷20% lower than tube sheet

General notes:

- Optimal coolant pressure ≥ 50 bar
- Optimal oil concentration = 10%
- Hydraulic or power chuck adaptations are preferable for fully cylindrical shanks.
- Side lock adaptation is preferable for Weldon type shanks
- For best performance and tool life, head runout should be ≤ 0.02 mm, inspected in the machine
- Pre-hole should be done (if needed) with the same geometry and diameter as the longer drill

SUMOCHAM Speeds and Feeds Chart

Tube Sheet drilling:		Optimal Geometry	Carbide Grade	Optimal Vc (m/min)	Feed per drill diameter (mm/rev)	
Group	Designation				Ø19-19.6	Ø25-26.4
P	Low Carbon Steel	HCP (*)	IC908	150	0.35-0.5	0.35-0.55
M	Stainles steel	ICM	IC907/ IC908	60	0.22-0.32	0.22-0.35
M	Duplex 2205	ICM		50	0.2-0.3	0.22-0.32
M	Super Duplex	ICM		45	0.2-0.28	0.22-0.3
S	Inconel	ICM		30	0.18-0.25	0.2-0.28
S	Titanium	ICM		35	0.2-0.28	0.22-0.3

* HCP geometry does NOT require pre-hole

Nomemclature:

D = Drill Diameter
V = speed [m/min]
f = feed [mm/rev]

General formulas:
RPM = (1000 x V)/(3.14 x D)
Table feed = RPM x f [mm/min]

LOGIQ 3 CHAM
THREE FLUTE CHAMDRILL

Workpiece Tube Sheet Material ASTM A76.5

	ISCAR - LOGIQ-3-CHAM	Competitor
Drill	D3N 0748-374-1002-5D/D3N 190-095-25.4R-5D	Indexable inserts drill
Insert	H3P 0750-IQ IC908 / H3P 1905-IQ IC908	
Cutting speed m/min / SFM	113 / 359	122 / 388
Feed mm/rev / IPR	0.42 / 0.0167	0.29 / 0.0114
Table feed mm/min / IPM	775 / 30.51	572 / 22.51
Drilling depth mm / inch	107 / 4.2	107 / 4.2
Tool life (number of holes)	833	581
Savings	**26%**	

LOGIQ 3 CHAM
THREE FLUTE CHAMDRILL

Workpiece Tube Sheet Material ASTL 516

	ISCAR - LOGIQ-3-CHAM	Competitor
Drill	D3N 160 5D	Indexable inserts drill
Insert	H3P 163 IQ IC908	
Cutting speed m/min / SFM	115/365	120/380
Feed mm/rev / IPR	0.5/0.02	0.25/0.009
Table feed mm/min / IPM	1100/43	625/24.5"
Drilling depth mm / inch	60/2.36	60/2.36
Tool life (number of holes)	580	480
Savings	**75%**	

Stacked baffle plates

- Maximum total thickness = 6"
- Optimal thickness of each plate = .250"÷.500"
- Peripheraly welded
- Bolted with minimum 4 bolts
- Speeds and feeds should be 10÷20% lower than tube sheet

General notes:

- Optimal coolant pressure ≥ 700 psi
- Optimal oil concentration = 10%
- Hydraulic or power chuck adaptations are preferable for fully cylindrical shanks. Side lock adaptation is preferable for Weldon type shanks
- For best performance and tool life, head runout should be ≤ .008" inspected in the machine
- Pre-hole should be done (if needed) with the same geometry and diameter as the longer drill

Nomemclature:

D = Drill Diameter
V = speed [SFM]
f = feed [IPR]

General formulas:
IPM = RPM x IPR
RPM = SFPM x 3.82 / D
SFPM = RPM x .262 x D

SUMOCHAM Speeds and Feeds Chart

Tube Sheet drilling:		Optimal Geometry	Carbide Grade	Optimal SFM	Feed per drill diameter (IPR)	
Group	Designation				Ø.750"÷.772"	Ø1.008"÷1.032"
P	Low Carbon Steel	HCP (*)	IC908	500	.014"-.020"	.014"-.022"
M	Stainles steel	ICM	IC907/ IC908	200	.009"-.013"	.009"-.014"
M	Duplex 2205	ICM		170	.008"-.012"	.009"-.013"
M	Super Duplex	ICM		150	.008"-.011"	.009"-.012"
S	Inconel	ICM		90	.007"-.010"	.008"-.011"
S	Titanium	ICM		110	.008"-.011"	.009"-.012"

* HCP geometry does NOT require pre-hole

Drilling Tool Wear

Edge Chipping

Cause

- Low wear resistance carbide grade
- Built-up edge has been formed
- Insufficient coolant fluid

Remedy

- Reduce feed rate
- Increase cutting speed
- Increase coolant pressure
- Improve jet direction in case of external coolant supply
- Change to different geometry
- Check tool and part clamping rigidity

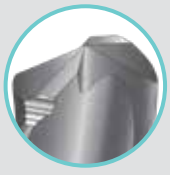
Land Wear

Cause

- Cutting speed too high
- Low wear resistance carbide grade
- Radial run-out is too high

Remedy

- Check that the correct geometry is used
- Check that T.I.R run-out does not exceed 0.02 mm
- Reduce cutting speed
- Increase coolant pressure
- Improve jet direction in case of external coolant supply
- Check and improve tool and part clamping rigidity
- Check if pocket gripping forces are too low - if so, replace the tool body



Corner Fracture

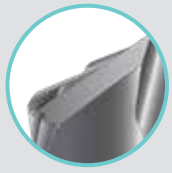
Cause

Caused by excessive insert wear before indexing the insert

- The grade and geometry could be too weak for the applications
- Excessive load on the insert
- Built-up edge has been formed on the insert

Remedy

- Check radial run-out
- Reduce feed rate
- Increase the speed
- Check tool and part clamping rigidity
- Check if pocket gripping forces are too low, replace the holder
- Increase coolant pressure
- Improve jet direction in case of external coolant supply



Corner Chipping

Cause

- Radial run-out is too high
- Insufficient coolant fluid

Remedy

- Check radial run-out
- Reduce feed rate increase the speed
- Check tool and part clamping rigidity
- Check if pocket gripping forces are too low - if so, replace the holder
- Increase coolant pressure
- Improve jet direction in case of external coolant supply

Chisel Chipping

Cause

- Chisel run-out is too big
- Combine of high feed and low speed

Remedy

- Reduce feed rate and increase the cutting speed
- Check that chisel misalignment does not exceed 0.02 mm
- Check tool and part clamping rigidity
- Check if pocket gripping forces are too low - if so, replace the holder

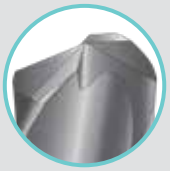
Built-up Edge

Cause

- Cutting zone temperature is too low
- Negative cutting geometry
- Machining of very sticky materials such as low-carbon steel, stainless steels, and aluminum

Remedy

- Increase the feed
- Increase cutting speed
- Increase coolant pressure
- Check oil percentage in the coolant fluid



Plastic Deformation

Cause

- Cutting temperature is too high

Remedy

- Check cutting parameters
- Reduce cutting feed
- Increase coolant pressure/volume
- Use harder grade
- Check that the correct geometry is used

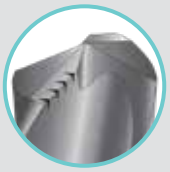
Crater Wear

Cause

- Excessive cutting temperatures and pressures on the top of the insert

Remedy

- Reduce cutting feed
- Check that the correct geometry is used



Thermal Cracking

Cause

- Excessive variations in surface temperature, intermittent machining, or variations in coolant supply

Remedy

- Increase coolant pressure/volume
- Increase oil concentration percentage

Flank Wear

Cause

- High cutting speed
- Low wear resistance carbide grade

Remedy

- Check that the correct geometry is used
- Increase coolant pressure
- Change to harder grade
- Increase oil concentration percentage
- Reduce cutting speed and increase feed

Heat Exchangers

ISCAR'S MACHINING SOLUTIONS FOR

HEAT EXCHANGERS

Member IMC Group

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