SCHOELLER - BLECKMANN OILFIELD EQUIPMENT ME FZE

PRODUCT CATALOGUE

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Company Profile

Schoeller-Bleckmann Oilfield Equipment (Middle East) F.Z.E's parent company Schoeller-Bleckmann is a leading worldwide supplier of non magnetic steel drill string components to the MWD, LWD and Directional Drilling industries. Our corporate office and main manufacturing facility is located in Ternitz which is located in the Austrian steel producing region south of Vienna. Schoeller-Bleckmann has over 100 years experience in the manufacture of specialty steels.

Schoeller-Bleckmann has an outstanding reputation for the manufacture and supply of non magnetic MWD, LWD and drill string components is based upon our continuous research and development of high strength non magnetic steels and our proven capabilities in precision machining. Our precision machining facilities are located in Ternitz Austria, Rotherham England and Houston Texas.

With the acquisition of Darron Oil Tools in 2000, Schoeller-Bleckmann expanded its product range to include the manufacture of drilling tools and offers a wide range of repair and maintenance services for oilfield equipment. In our continuing efforts to service the needs of our customers we have established a worldwide network of facilities capable of manufacturing, repairing and maintaining drilling tools. In addition to Schoeller-Bleckmann Oilfield Equipment sales office in Dubai UAE other sales offices are located in Nisku Canada and Houston Texas. There are also manufacturing facilities located in Singapore, Rotherham England, Aberdeen Scotland, Lafayette Louisiana and Anaco Venezuela.

Schoeller-Bleckmann is committed to producing products that meet the highest industry and customer quality standards and as such all manufacturing facilities are certified to both API and ISO quality standards.

This catalogue describes the main products in our extensive drilling tool product range, many of which feature prominently in drilling programs used in the major hydrocarbon and geothermal producing regions throughout the world.

Quality Assurance Accreditations

Certificate of Authority to Use the Official API Monogram

License Number: 7-0124.2 ORIGINAL

The American Petroleum Institute hereby grants to

SB DARRON PTE. LTD.
Singapore, Singapore

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and **API Spec 7** and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: **7-0124.2**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following products: Tool Joints; Drill Stem Subs; Drill Collars; Threading for Rotary Shouldered Connections

American Petroleum Institute

Effective Date: AUGUST 5, 2002
Expiration Date: JANUARY 7, 2005

Secretary

To verify the authenticity of this license, go to www.api.org/compositelist.

American Petroleum Institute

CORPORATE SEAL

Products will be manufactured within the scope of American Petroleum Specification 7 and American Petroleum Specification 5CT.

Certificate of Authority to Use the Official API Monogram

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The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: Manufacturer of Casing or Tubing Pup Joints; Manufacturer of Casing or Tubing Couplings; Threader at Groups 1, 2 and 3

American Petroleum Institute

Effective Date: AUGUST 5, 2002
Expiration Date: JANUARY 7, 2005

Secretary

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American Petroleum Institute

CORPORATE SEAL

Quality Assurance Accreditations

REGISTERED FIRM

Certificate of Registration

APIQR REGISTRATION NUMBER

0266

This certifies that the quality management system of

SB DARRON PTE. LTD.
14 Gul Street 3
629268 Singapore
Singapore

has been assessed by the American Petroleum Institute Quality Registrar (APIQR) and found it to be in compliance with the following quality system standard:

ISO 9001:2000

The scope of this registration and the approved quality management system applies to the

Manufacture, Repair, Service of Tool Joints, Drill Stem Subs, Drill Collars, and Threading for Rotary Shouldered Connections and Casing and Tubing Couplings under IAF Scope Category 17

APIQR approves the organization's justification for excluding the following section(s) of ISO 9001:2000:

Section 7.3 (Design and Development)

APIQR ISO 900x:1994 Registrant since: **N/A**

EFFECTIVE DATE: **August 5, 2002**
APIQR ISO 9001:2000 Registrant Since: January 7, 2002

Manager of Operations, APIQR

Possession of this certificate indicates validity and remains valid as long as the above registered organization continually meets all the requirements of APIQR's Registration Program and the requirements of the Registration Agreement. Registration is maintained and regularly monitored through scheduled surveillance audits. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2000 requirements may be obtained by consulting the registered organization. This certificate has been issued from APIQR offices in Washington, DC, USA.

QUALITY REGISTRAR

Schoeller-Bleckmann tools are manufactured to precise and exact specifications from a wide range of material types, grades and configurations.

SCHOELLER-BLECKMANN

SECTION 1

NON-MAGNETIC EQUIPMENT

Non-Magnetic Drill Collars

Schoeller-Bleckmann is committed to on time delivery of high quality products continually seeking both cost reductions and technological improvements.

The company's core values are efficiency, commitment to quality and flexibility to meet customer demands.

Schoeller-Bleckmann Non-Magnetic Drill Collars are manufactured through higher contents of Chromium, Molybdenum, Nitrogen and other alloy elements to increase of pitting corrosion resistance and stress corrosion resistance.

Pitting Corrosion Test Procedure

The test specimen is tested in a test cell at a controlled temperature (20°C/68°F) and in a test solution of chlorides (e.g. 1000 ppm Cl).

The test temperature and the chloride content of the test solution are principally variable.

The measurement of the Pitting Corrosion Potential of the specimen is carried out against a reference electrode (Kalomel-Electrode_. The steady increase in the applied potential is regulated by a motor potentiometer. The amount of increase of the potential is given with 150 mV/hr (comparable ASTM G5/87: 720mV/hr)

The Potential at which first a deviation from a constant current level can be examined is stated as the "Pitting Corrosion Potential".

Stress Corrosion Resistance

All Schoeller-Bleckmann Non-magnetic materials basically show a very good resistance against stress corrosion.

For the application of these materials in high chloride muds a surface treatment as an additional protection against stress corrosion is strongly recommended.

Schoeller-Bleckmann provides following special processes to apply a uniform compressive surface layer :

- Hammer Peening
- Roller Burnishing
- Shot Peening

Tests carried out on each bar during production of drill collars & MWD-Parts

- Tensile Test
- Impact Test
- Hardness Test
- Metallographic Test (grain size)
- Oxalic Acid Test (acc. To ASTM A262 – Pract.E)
- Ultrasonic Test over whole length of the bar
- Probe Test over whole length of the bar

Tests carried out on each melt

- Chemical Analysis

Relative Magnetic Permeability

Standard Certification Package

- Certification Sheet
- Ultrasonic Report
- Probe Testing Report

Additional reports based on product (mainly for MWD / LWD – Parts)

- Dimensional Report
- Surface Treatment Report
- Welding Report

Magnetic Properties

Relative Permeability : ≤ 1.001

Corrosion Resistance

- *Transgranular SCC*
  Prevented by special surface treatments ("PLUS" treatment, roller burnishing, shot peening)
- *Intergranular SCC*
  Quenching after warm forging prevents the occurrence of material sensitization. Each collar is tested according to ASTM A 262, Pract.A and E latest edition.

Non-Destructive Testing

- *Magnetic Inspection*
  Drill collars are 100% tested by a proprietary probe-testing process ("Hot Spot" –test). Magnetic permeability of each collar is certified with the printout of probe testing.
- *Ultrasonic Inspection*
  Each collar is ultrasonically inspected accordingly to ASTM E 114, latest edition as a minimum level.

Please see the next page for Non-magnetic Material Mechanical Properties and Chemical Composition

Mechanical Properties of NMDC Materials

	P 530	P 530 HS	P 550	P 580	P 750
Yield Strength min. (ksi) 3 1/2" to 6 7/8" OD 7" OD to 11" OD	 110 100	 120 110	 140 130	 140 130	 140 130
Tensile Strength min. (ksi)	120	130	150	150	150
Elongation (%)	25	25	20	20	15
Reduction of area (%)	50	50	50	50	50
Impact Energy min. (ft./lb.) **ISO-$_V$ longitudinal**	90	90	60	60	80
Hardness – Brinell	260-350	285-365	300-400	350-450	300-400
Endurance Strength min. (ksi) **N = 10^7**	--	50	60	60	50

Chemical Composition

BRAND	WEIGHT PERCENT (%)							PRE
	C	Si	Cr	Mn	Ni	Mo	N	
P 530 P 530 HS	Max. 0,05	Max. 0,5	13,0 14,0	18,5 20,0	Max. 1.5	0,3 0,6	0,25 0,35	20
P 550	Max. 0,05	Max. 0,5	17,5 19,0	18,5 20,0	Max. 1.5	Max. 0,8	0,50 0,60	28
P 580	Max. 0,05	Max. 0,5	20,5 22,0	22,0 24,0	Max. 2.5	Max. 1,0	0,75 0,90	36
P 750	Max. 0,03	Max. 0,5	26,5 29,5	1,50 3,00	28,00 31,50	2,0 4,0	0,20 0,35	42

Pitting **R**esisting **E**quivalent PRE = Cr + 3,3 Mo + 16 N

NMDC – Pounds Per Foot & Kilograms Per Metre

DIMENSION	WEIGHT KG/PC	WEIGHT LBS/PC	LENGTH FEET	PPF	KG/M
3 1/2" x 2"	317	699	31	22.5	33.5
3 3/4" x 2"	384	847	31	27.3	40.6
4" x 2 1/4"	418	922	31	29.7	44.2
4 1/8" x 2 1/4"	460	1014	31	32.7	48.7
4 1/4" x 2 1/4"	497	1096	31	35.3	52.6
4 3/4" x 2 1/4"	658	1451	31	46.8	69.6
4 3/4" x 2 11/16"	588	1296	31	41.8	62.2
4 3/4" x 2 13/16"	560	1235	31	39.8	59.3
5" x 2 13/16"	652	1437	31	46.4	69.0
5 1/4" x 2 13/16"	750	1653	31	53.3	79.4
5 1/2" x 2 13/16"	853	1881	31	60.7	90.3
6 1/4" x 2 13/16"	1210	2668	31	86.1	128.1
6 1/2" x 2 1/4"	1450	3197	31	103.1	153.5
6 1/2" x 2 13/16"	1325	2921	31	94.2	140.2
6 1/2" x 2 13/16"	1250	2756	31	88.9	132.3
6 1/2" x 3 1/4"	1191	2626	31	84.7	126.0
6 3/4" x 2 13/16"	1460	3219	31	103.8	154.5
6 3/4" x 3"	1374	3029	31	97.7	145.4
6 3/4" x 3 1/4"	1315	2899	31	93.5	139.2
7" x 2 13/16"	1620	3571	31	115.2	171.5
7 1/8" x 2 13/16"	1637	3609	31	116.4	173.2
7 1/4" x 2 13/16"	1735	3825	31	123.4	183.6
7 3/4" x 2 13/16"	2008	4427	31	142.8	212.5
7 7/8" x 2 13/16"	2066	4555	31	146.9	218.7
8" x 2 13/16"	2150	4740	31	152.9	227.5
8" x 3"	2067	4557	31	147.0	218.8
8" x 3 1/4"	2008	4427	31	142.8	212.5
8" x 3 1/2"	1945	4288	31	138.2	205.8
8 1/8" x 2 13/16"	2219	4892	31	157.8	234.8
8 1/4" x 2 13/16"	2330	5137	31	165.7	246.8
8 1/4" x 3"	2220	4894	31	157.9	235.0
8 1/4" x 3 1/4"	2161	4764	31	153.7	228.7
8 1/4" x 3 1/2"	2098	4625	31	149.2	222.0
8 3/8" x 3"	2344	5168	31	166.7	248.1
8 1/2" x 2 13/16"	2457	5417	31	174.7	260.0
8 1/2" x 3"	2377	5240	31	169.0	251.6
8 1/2" x 3 1/4"	2318	5110	31	164.8	245.3
8 1/2" x 3 1/2"	2255	4971	31	160.4	238.7
8 3/4" x 2 13/16"	2600	5732	31	184.9	275.2
9" x 3"	2749	6061	31	195.5	290.9
9 1/2" x 3"	3150	6945	31	224.0	333.4
9 1/2" x 3 1/4"	2995	6603	31	213.0	317.0
9 1/2" x 3 1/2"	2931	6462	31	208.4	310.2
9 3/4" x 3"	3308	7293	31	235.3	350.1
10" x 3"	3475	7661	31	247.1	367.8
11" x 3"	4276	9427	31	304.1	452.5

Integral Blade Stabilizers

(Non-Magnetic)

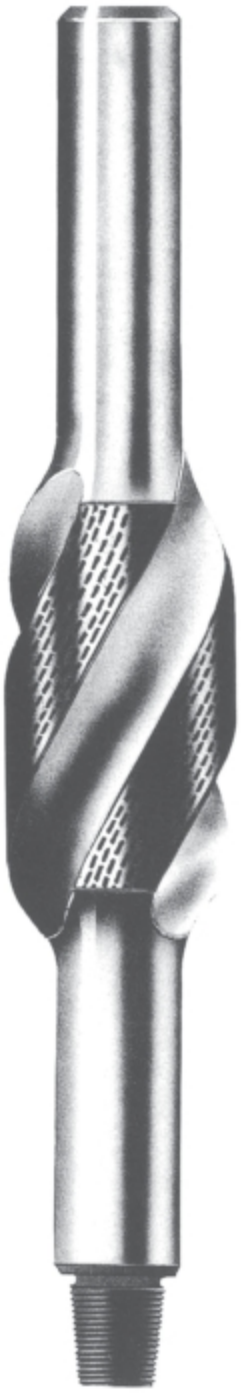
Schoeller-Bleckmann Non-Magnetic Integral Blade Stabilizers are manufactured from Chromium Manganese Austenitic Stainless Steel.

Mechanical Properties

Tensile	120,000 psi minimum
Yield	100,000 psi minimum
Hardness	285 BHN. Minimum

Magnetic Permeability

Max	1.01
Average	1.005



Surface Treatment

Schoeller-Bleckmann offer as an option, an additional treatment which, when applied to the inside diameter and/or between the blades creates a compressive layer, giving additional protection against stress induced cracking. This treatment is recommended when equipment is to be used in environments with high chloride concentrations.

Stabilizer Hardfacing

For Non-Magnetic Stabilizers, Schoeller-Bleckmann recommend hardface dressing type HF3000. This particular dressing comprises tungsten carbide inserts set in a powder spray deposit, which is ideal for abrasive formations. Dressing technique has been developed in-house to take full account of the chemical composition of the material and the need for repeat re-dressings without damage. This includes full temperature control of the parent body during the pre-heating process and also throughout the complete dressing procedure.

Quality Assured Tools

Full quality control procedures are maintained throughout all production processes and when HF3000 hardfacing is deposited, final ultrasonici nspection is carried out to ensure that a minimum of 97% bonding of carbide inserts is obtained. This is the Schoeller-Bleckmann guarantee and each tool is certified to this effect. Connections also receive full die penetrant inspection and are finally coated with an anti galling treatment.

When ordering Schoeller-Bleckmann stabilizers, please specify :

1. Drill collar size and I.D.
2. Type of stabilizer (string or nearbit)
3. Type of hardfacing
4. Spiral type
5. Connection type and size

STANDARD SIZES FOR SCHOELLER-BLECKMANN STABILIZERS				
HOLE SIZE		5¼" / 6⅞"	7" / 9⅞"	10" / 12¼"
DRILL COLLAR RANGE		4⅛" / 5½"	5¾" / 7¾"	5¾" / 7¾"
OVERALL LENGTH	NEARBIT	68"	72"	75"
	STRING	72"	84"	100"
FISHING NECK (MIN)		28"	28"	28"
CROWN LENGTH (MIN)		12"	14"	16"
BLADE WIDTH		2"	2½"	3"
TONG SPACE	NEARBIT	20"	20"	20"
	STRING	24"	24"	24"

Longer length and bigger size stabilizers will be manufactured upon request.

SCHOELLER-BLECKMANN

SECTION 2

DOWNHOLE TOOLS

Steel Drill Collars

Schoeller-Bleckmann Drill Collars are manufactured from Chromium, Molybdenum Alloy Steel conforming to AISI 4145 H Modified. Fully heat treated and supplied in accordance with A.P.I. Specification 7. An H_2S resistant steel is available on request.

Quality Control and Ultrasonic Inspection

State of the art measurement and ultrasonic techniques are used to ensure that the highest control standards within the industry are maintained.

Every Schoeller-Bleckmann Drill Collar is subject to full length, full section ultrasonic examination. Thread connections machined and gauged in accordance with A.P.I. Specification 7 and RP7G are individually examined within our own inspection department as an integral part of final inspection procedures.

Individual characteristics of each thread such as stand off, taper, pitch, etc., are fully documented on in-house documentation.

Thread Connections

All connections are machined to the highest possible accuracy and conform to the requirements of A.P.I. Specification 7.

To improve fatigue resistance all connections are cold rolled and to prevent galling during make up all connections are phosphated. Connections are coated with a thread compound conforming to the requirements of A.P.I. and for protection against mechanical damage thread protectors are fitted.

Precision Boring

Drill Collars are deep precision bored to ensure tight tolerances that eliminate wall thickness variation along the bar length and drifted to A.P.I. Specifications. In addition to the standard ranges shown on Sheet 1a special sizes, bores, connections and lengths can be made to meet customers' specific requirements.

Surface Finish

The surface finish, linear straightness, roundness and O.D. tolerances conform to A.P.I. Specification.

Identity Markings

Licensed to apply the A.P.I. monogram Schoeller-Bleckmann also mark the Drill Collars unique identification serial number, O.D., I.D., size and style of connections.

Customers' own identity markings and additional identity slots can be machined on request.

Standard ranges and sizes of Drill Collars are shown on Sheet 1a.

Details of Spiral Drill Collars, Hardbanding and Stress Relief can be found on Sheets 2 and 2a.

Steel Drill Collars

Schoeller-Bleckmann Drill Collars are available in lengths 5, 10, 15, 20, 30, 31 and 32 feet and in nominal sizes ranging from 3½" to 14".

Common sizes are listed here. Other sizes are available upon request.

Connections comparison chart.

NUMBERED CONNECTIONS	STYLE	OTHER
NC 26	2⅜ IF	-
NC 31	2⅞ IF	-
NC 38	3½ IF	-
NC 40	4 FH	-
NC 46	4 IF	4½ XH
NC 50	4½ IF	5 XH

On enquiring, customers should specify :

1. Type (slick or spiral grooved)
2. Outside and inside diameters (O.D., I.D.)
3. Length
4. Connection size and type
5. Stress Relief Groove on pin and box ends
6. Special features i.e.; hard-banding (band location and width) slip and/or elevator recesses, fishing neck
7. Type of thread protector

DRILL COLLAR SPECIFICATIONS

SIZE O.D INS.	BORE		CONNECTION STYLE AND SIZE		APPROX WEIGHT (30FT LONG) LB.	APPROX WEIGHT (3FT LONG) LB.
	Standard Ins.	Optional Ins.	Standard Bore A.P.I. No. Other	Optional Bore A.P.I. No. Other		
3½	1½		NC26 2 IF⅝	NC26 2⅜ IF	1012	1045
4⅛	2	1¾	NC31 2 IF⅞	NC31 2⅞ IF	1045	1078
4¼	2	1¾	NC31 2 IF⅞	NC31 2⅞ IF	1122	1155
4½	2	1¾	NC31 2 IF⅞	NC31 2⅞ IF	1298	1342
4¾	2¼	2¼	NC35	NC38 3½ IF	1412	1463
5	2¼	2	NC38 3½ IF	NC38 3½ IF	1606	1659
5¼	2¼	2	NC38 3½ IF	NC38 3½ IF	1793	1848
5½	2¼	2	NC38 3½ IF	NC38 3½ IF	2046	2112
5¾	2¼	$2^{13}/_{16}$	NC40 4 FH	4½ FH	2253	2328
6	2¼	$2^{13}/_{16}$	NC44	NC40 4½ FH	2486	2570
6¼	2¼	$2^{13}/_{16}$	NC46 4 IF	NC46 4 IF	2728	2816
6½	2¼	$2^{13}/_{16}$	NC46 4 IF	NC50 4½ IF	2761	2851
6¾	2¼	$2^{13}/_{16}$	NC46 4 IF	NC50 4½ IF	3025	3124
7	$2^{13}/_{16}$	2¼	NC50 4½ IF	NC50 4½ IF	3304	3412
7¼	$2^{13}/_{16}$	3	NC50 4½ IF	5½ FH	3586	3705
7½	$2^{13}/_{16}$	2¾	NC50 4½ IF	5½ REG	3885	4013
7¾	$2^{13}/_{16}$	3	NC56 6 REG	NC56 6⅝ REG	4191	4327
8	$2^{13}/_{16}$	3	NC56 6 REG	NC56 6⅝ REG	4514	4653
8¼	$2^{13}/_{16}$	3	6⅝ REG	6⅝ REG	4840	4990
8½	$2^{13}/_{16}$	3	6⅝ REG	6⅝ REG	5181	5337
8¾	$2^{13}/_{16}$	3	6⅝ REG	6⅝ REG	5416	5577
9	3	$2^{13}/_{16}$	NC61 7⅝ REG	NC61 7⅝ REG	5786	5973
9¼	3	$2^{13}/_{16}$	NC61 7⅝ REG	NC61 7⅝ REG	6182	6369
9½	3	$2^{13}/_{16}$	7⅝ REG	7⅝ REG	6538	6750
9¾	3	$2^{13}/_{16}$	NC70 7⅝ REG	NC70 7⅝ REG	6930	7154
10	3	$2^{13}/_{16}$	NC70 8⅝ REG	NC70 8⅝ REG	7260	7480
11	3	$2^{13}/_{16}$	NC77 8⅝ REG	NC77 8⅝ REG	9020	9295
11¼	3	$2^{13}/_{16}$	NC77 8⅝ REG	NC77 8⅝ REG	9460	9768
12	3	$2^{13}/_{16}$	NC77 8⅝ REG	NC77 8⅝ REG	10868	11187
14	3	$2^{13}/_{16}$	NC77 8⅝ REG	NC77 8⅝ REG	14949	15400
With 2 ends 11¼ O.D.						

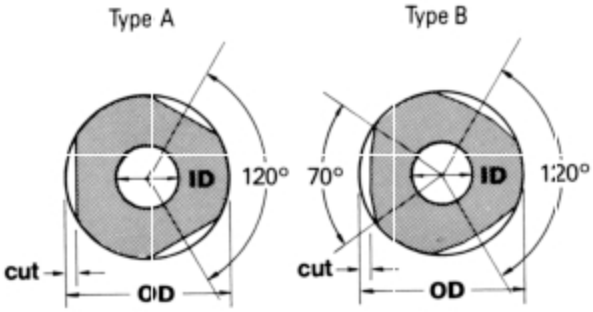
NOTE: H90 and X hole connections are supplied on request.

Steel Drill Collars

Spiral Grooving

To avoid differential pressure sticking, the surface of the Drill Collar can be spiral grooved, typically with three right hand spirals.

Drill Collar cross sections shown below show the reduced contact area with the wall of the hole.



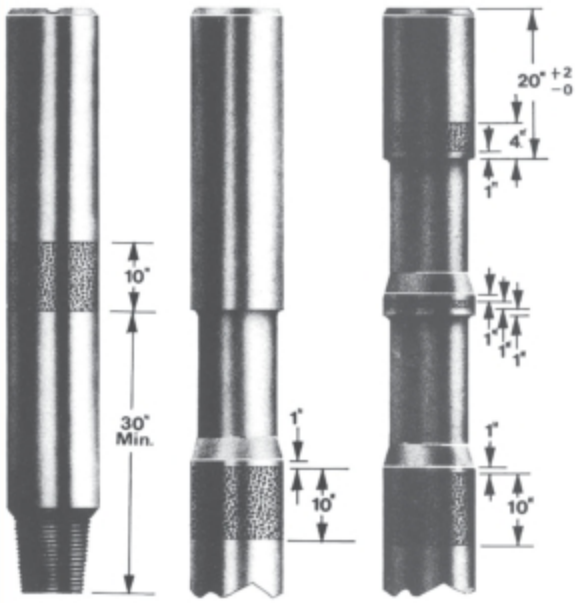
SPIRAL GROOVED DRILL COLLAR SPECIFICATIONS					
Size O.D.	Depth of Cut	Spirals	Direction	Pitch	Type
$4^1/_2$ - $5^1/_8$	$^7/_{32} \pm {}^1/_{32}$	3	R.H.	38 ± 1	A
$5^7/_8$ - $6^3/_8$	$^9/_{32} \pm {}^1/_{16}$	3	R.H.	42 ± 1	A
$6^1/_2$ - $6^7/_8$	$^5/_{16} \pm {}^1/_{16}$	3	R.H.	46 ± 1	A
7	$^5/_{16} \pm {}^1/_{16}$	3	R.H.	64 ± 1	A
$7^1/_8$ - $7^7/_8$	$^{11}/_{32} \pm {}^1/_{16}$	3	R.H.	64 ± 1	B
8 - $8^7/_8$	$^3/_8 \pm {}^1/_{16}$	3	R.H.	68 ± 1	B
9 - $9^7/_8$	$^{13}/_{32} \pm {}^3/_{32}$	3	R.H.	72 ± 1	B
10 - $10^3/_8$	$^7/_{16} \pm {}^3/_{32}$	3	R.H.	76 ± 1	B
11 - 12	$^{15}/_{32} \pm {}^3/_{32}$	3	R.H.	80 ± 1	B

The weight of a Slick Drill Collar will be reduced by approximately 4% if spiral grooved.

Hardbanding

Applied by the metal arc gas shielded consumable electrode process, incorporating granular tungsten carbide, fed automatically into the molten weld pool to obtain uniform distribution.

Precisely controlled pre-heating interpass and post weld heat treatment ensure that only weld overlays of optimum integrity are applied. The deposit is made flush to + $^1/_{32}$ above the O.D. of the collar.

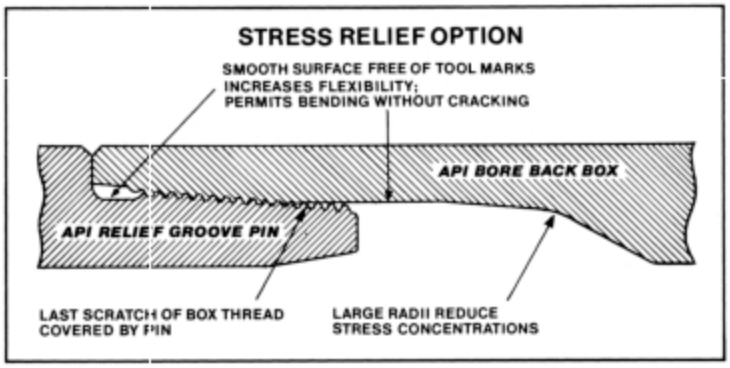


Please see Sheet 2a for stress relief information and details of slip and elevator groove specifications.

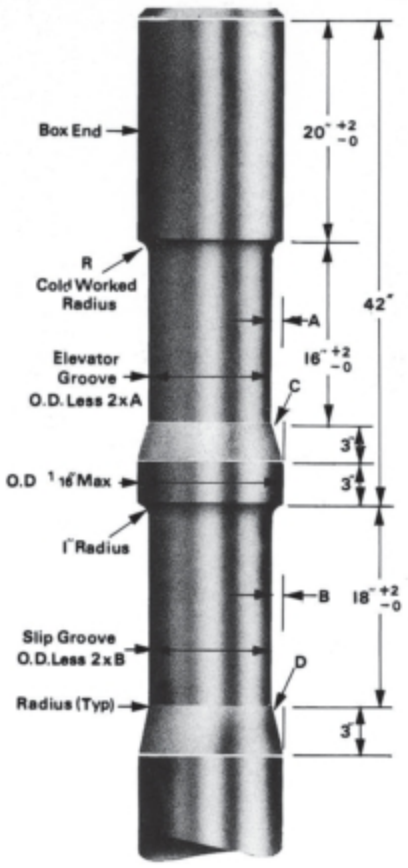
Steel Drill Collars

Stress Relief Features

Downhole tools subject to bending and subsequently cyclic fatigue have been shown to have their connections mechanical characteristics improved by the application of A.P.I. Stress Relief Grooves and Bore Backs. As shown in the illustration below Bore Backs and Stress Relief Grooves are machined in accordance with A.P.I. Specification (Latest Edition).



STRESS RELIEF GROOVE FOR CONNECTIONS		
Number or Size and Style of Connection	Length, Shoulder Face to Groove of Box Member, Tol. +0, -1/8 L_X	Diameter of Pin Member at Groove, Tol. +0, -1/32 D_{RG}
NC44	4 1/8	4 3/16
NC46 (4 IF)	4 1/8	4 21/64
NC50 (4 1/2 IF)	4 1/8	4 3/4
NC56	4 5/8	5 19/64
NC61	5 1/8	5 55/64
NC70	5 5/8	6 47/64
NC77	6 1/8	7 27/64
4 1/2 FH	3 5/8	4 15/64
5 1/2 REG	4 3/8	4 55/64
6 5/8 REG	4 5/8	5 27/64
7 5/8 REG	4 7/8	6 13/32



SLIP AND ELEVATOR GROOVE SPECIFICATIONS					
Groove Dimensions Based on Drill Collar O.D.					
Drill Collar O.D. Ranges	Elev. Groove Depth A*	R	C**	Slip Groove Depth B*	D**
4 - 4 5/8	7/32	1/8	4°	3/16	3 1/2°
4 3/4 - 5 5/8	1/4	1/8	5°	3/16	3 1/2°
5 3/4 - 6 5/8	5/16	1/8	6°	1/4	5°
6 3/4 - 8 5/8	3/8	3/16	7 1/2°	1/4	5°
8 3/4 & larger	7/16	1/4	9°	1/4	5°

* A and B dimensions are from nominal O.D. of a new drill collar

** Angle C and D dimensions are reference and approximate

NOTE: These dimensions are not to be construed as A.P.I. Standard.

Drill Pipe Pup Joints

Schoeller-Bleckmann fully integral Drill Pipe Pup Joints are manufactured from full length barstock in material specification AISI 4145 H Modified, fully heat treated in accordance with A.P.I. Specification 7.

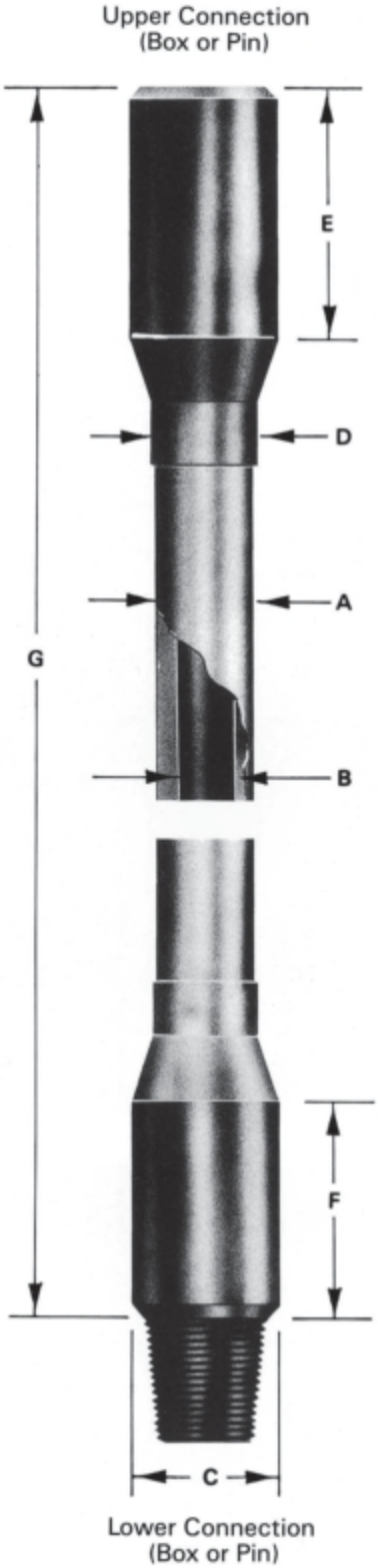
DIMENSIONAL DATA

DRILL PIPE NOMINAL SIZE (A)	INSIDE DIAMETER (B)	TOOL JOINT OUTSIDE DIAMETER (C)	CONNECTION TYPE AND SIZE	ELEVATOR UPSET DIAMETER (D)	TONG SPACE LENGTHS BOX (E)	TONG SPACE LENGTHS PIN (F)	AVAILABLE LENGTHS (FT) (G)	APPROX WEIGHT (LBS)
3 1/2	2 3/8	4 3/4	NC38 (3 1/2 IF)	3 7/8	10 1/2	8	5	143
							10	224
							15	310
		5					20	394
3 1/2	2 11/16	4 3/4	NC38 (3 1/2 IF)	3 7/8	10	7	5	132
							10	198
							15	200
		5					20	332
4	2 13/16	5 1/4	NC40 (4 FH)	4 3/16	10	7	5	178
							10	286
							15	394
		5 1/2					20	502
4	3 1/4	5 3/4	NC46 (41 IF)	4 1/2	10	7	5	167
							10	242
							15	312
		6					20	365
4 1/2	3 1/2	6	NC46 (41 IF)	4 11/16	10	7	5	220
							10	348
							15	477
		5 1/4					20	607
4 1/2	3 1/2	6 1/8	NC50 (4 1/2 IF)	5	10	7	5	205
		6 1/4					10	310
							15	418
		6 3/8					20	524
4 1/2	3 3/4	6 1/8	NC50 (4 1/2 IF)	5	10	7	5	161
		6 1/4					10	264
							15	345
		6 3/8					20	429
5	3 1/2	6 3/8	NC50 (4 1/2 IF)	5 1/8	10	7	5	253
							10	422
							15	594
		6 1/2					20	763
5	3 3/4	6 3/8	NC50 (4 1/2 IF)	5 1/8	10	7	5	229
							10	374
							15	519
		6 1/2					20	664

1. Upon request tool joints can be supplied 2" longer than standard to facilitate additional connection repairs.
2. Drill Pipe Pup Joints can be manufactured with alternative connections/diameters to those shown above.
3. All connections are machined and finished in accordance with A.P.I. Specification 7. Thread roots are cold rolled, phosphate coated and fitted with thread protectors.
4. Drill Pipe Pup Joints can be supplied with either 18 degree tapered or square shoulders.

When ordering Schoeller-Bleckmann Drill Pipe Pup Joints, please specify :

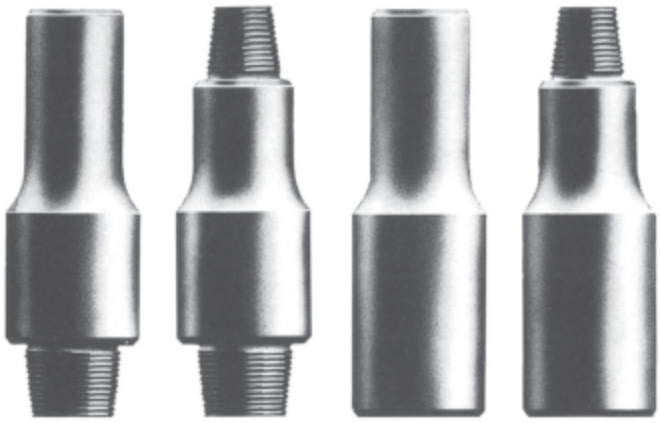
1. Nominal pipe diameter 'A'
2. Bore diameter 'B'
3. Tool joint diameter 'C'
4. Size and type of connections
5. Overall length/shoulder to shoulder 'G'
6. 18 degree or square elevator shoulder



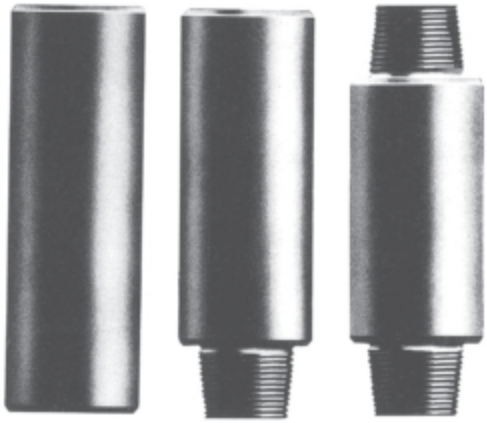
Rotary Crossover Subs

Schoeller-Bleckmann Drill Stem Substitutes are manufactured from Alloy Steel AISI 4145 H Modified conforming to the requirements of A.P.I. Specification 7.

All connections are machined to A.P.I. Specification.
Thread roots are cold rolled and kemplate coated to minimize galling on request.
Substitutes are manufactured with straight or reduced section as shown below.



Reduced Section Subs



Straight OD Subs

On enquiring and when ordering, please specify :

1. Identify use (e.g. DC/DC – DC/DP – Bit Sub etc.
2. Outside diameter(s)
3. Inside diameter(s)
4. Overall length
5. Size and style of connection
6. Whether stress relief groove and/or bore back are to be incorporated

For reduced Section Substitutes include :

1. Outside diameter of reduced section
2. Length of reduced section

For Bit Substitutes include :

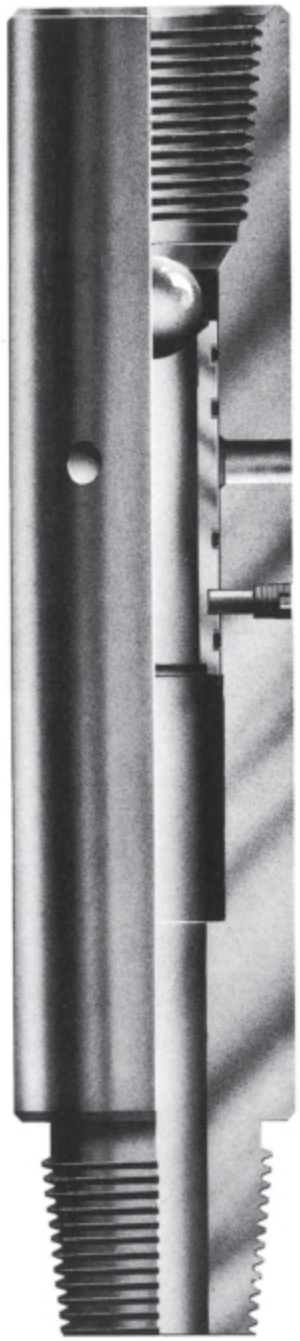
1. Float bore and style

Kelly Saver Subs

Kelly Saver Substitutes are available in 36", 18" or 12½" lengths for throw away type.

Substitutes 36" long can be fitted with rubber body protectors on request.

Circulating Subs

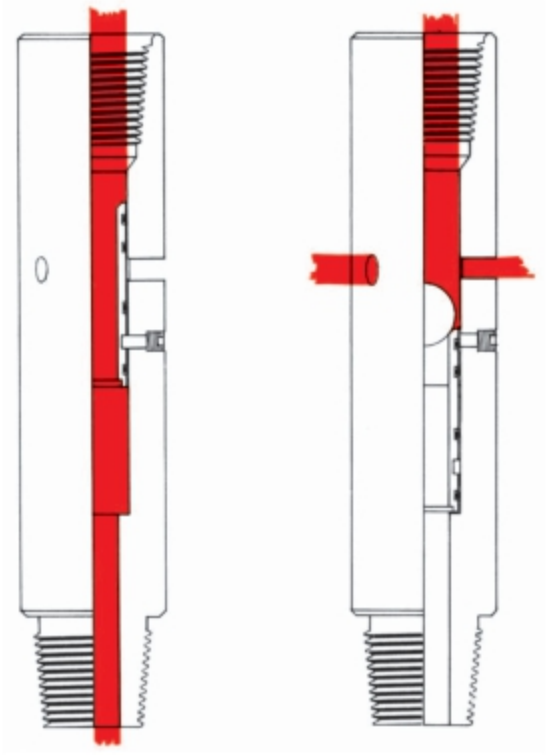


The Schoeller-Bleckmann Circulating Subs have been designed to achieve increased mud circulation by placement in the B.H.A., either above the bit or down hole motor to pump materials in case of lost circulation.

Activation is accomplished by dropping a chrome steel ball down the drill string and then engaging the mud pumps. On application of 3000 psi fluid pressure, the ball shears the pin holding the sleeve in its primary position. The sleeve and pin drop into the secondary position opening the three sub ports and diverting the downhole flow.

Schoeller-Bleckmann Circulating Subs are manufactured from AISI 4145 H material fully heat treated to give 285-341 BHN and are available in the same nominal diameters as standard drill collars or to customers own specifications.

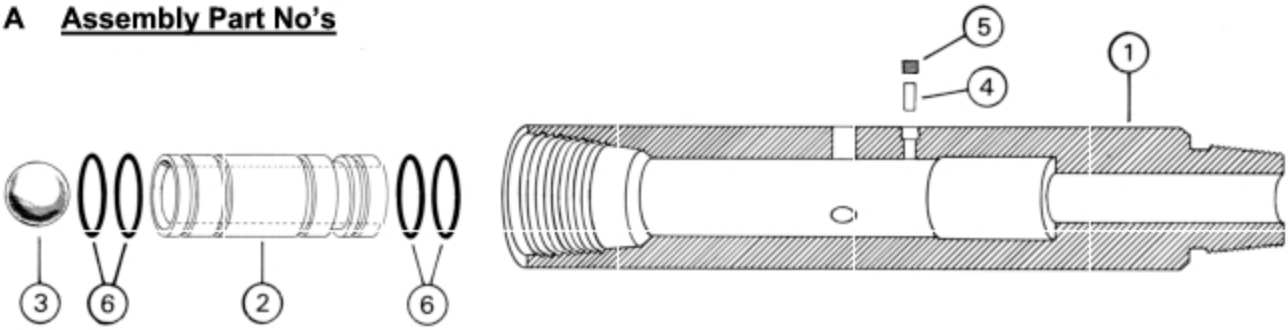
See separate sheet for Re-dress procedure.



F i g 1 Drilling fluid flow after pin is sheared

F i g 2 Drilling fluid flow after pin is sheared

A Assembly Part No's



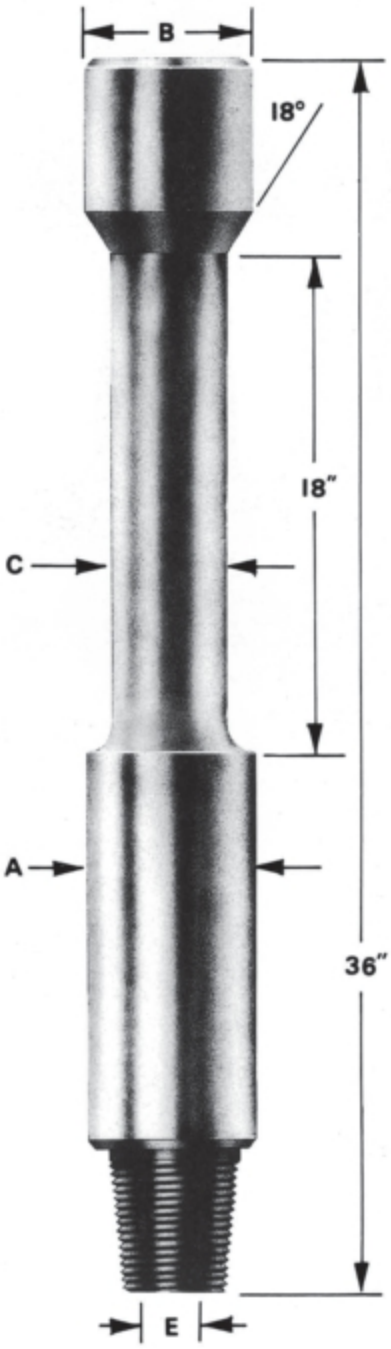
⑦ Re-Dress Kit contains : 1 Sleeve, 1 Ball, 1 Shear Pin, 1 Pressure Plug, 4 'O' Rings

ITEM NO.	DESCRIPTION	Ø4¾"	Ø6¼"	Ø6½"	Ø8"	Ø8¼"	Ø9½"
1	SUB BODY	CS – 475	CS – 625	CS – 650	CS – 800	CS – 825	CS – 950
2	SLEEVE	CS – 41	CS – 42	CS – 42	CS – 42	CS – 42	CS – 43
3	BALL	CS – 51	CS – 52	CS – 52	CS – 52	CS – 52	CS – 52
	BALL DIA	2"	2¼"	2¼"	2¼"	2¼"	2¼"
4	SHEAR PIN	CS – 61	CS – 62	CS – 63	CS – 64	CS – 65	CS – 66
5	PRESSURE PLUG	CS – 91	CS – 92	CS – 92	CS – 92	CS – 92	CS – 92
6	'O' RING SEAL	CS – 81	CS – 82	CS – 82	CS – 82	CS – 82	CS – 83
7	RE-DRESS KIT	CS – 21	CS – 22	CS – 23	CS – 24	CS – 25	CS – 26
COMPLETE ASSEMBLY		CS – 01	CS – 02	CS – 03	CS – 04	CS – 05	CS – 06
ASSEMBLED WEIGHT (KG)		52	95	105	170	185	235

B Re-Dress Procedures

1. Isolate circulating sub
2. Remove ball (if still housed in sub)
3. Select Allen Key and remove pressure plug
4. Remove top half of shear pin and discard
5. Retract sleeve until remaining half of shear pin in sleeve is visible. Remove and discard
6. Slide sleeve out of sub bore
7. Remove the 4 'O' rings and discard
8. Check condition of sleeve and ball for raised edges and physical damage
9. If ball and / or sleeve is damaged replace with new ones
10. Check conditions of sub bore and drilled tapped hole – remove burrs if required
11. Fit 4 new 'O' rings onto checked or renewed sleeve – grease O.D.
12. Grease sub I.D. thoroughly
13. Slide sleeve into sub, ensure correct insertion (i.e. counter bored end of sleeve first) until the widest groove is visible through the drilled and tapped hole
14. Select new shear pin – check for sharp edges, de-burr if necessary and position in sub body
15. Select Allen Key and pressure plug (use existing plug if undamaged) and screw into body

Lift Subs & Lift Plugs



The Schoeller-Bleckmann Lift Subs are manufactured from AISI 4145 H Modified Steel, fully heat treated and supplied in accordance with A.P.I. Specification 7.

Lift Subs can be supplied with an 18 degree tapered shoulder as shown, or alternatively with a square shoulder (Dial Head).

When ordering or requesting quotations on Lift Subs, please specify :

A. Drill collar O.D.
B. Tool joint O.D.
C. Drill pipe O.D.
D. Drill collar connection size and type
E. Bore
F. Tapered or square shoulder

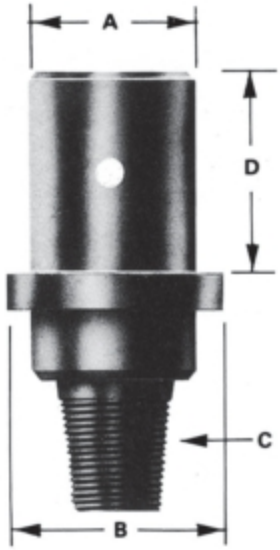
LIFT SUB DIMENSIONS	
DRILL COLLAR SIZE (A)	APPROX WEIGHT (LB)
3 1/2	40
4 1/8	50
4 3/4	84
5	88
6	150
6 1/4	168
6 1/2	168
6 3/4	168
7	169
7 1/4	169
8	257
8 1/4	257
9 1/2	320
9 3/4	320
11	368

Schoeller-Bleckmann Lift Plugs are manufactured from AISI 4145 H Modified Steel, fully heat treated and supplid in accordance with API Specification 7.

In addition to the standard Lift Plug shown, Lift Plugs can be manufactured Pin to Box or Bail type.

When ordering or requesting quotations on Lift Plugs, please specify :

A. Drill collar O.D.
B. Lift plate O.D.
C. Drill collar connection size and type
D. Tong space length (8" standard)
E. Standard or Bail type
F. Pin and box connections



LIFT PLUG DIMENSIONS		
DRILL COLLAR SIZE (A)	LIFTING PLATE DIA. (B)	APPROX WEIGHT (LB)
3 1/2	5 1/2	35
4 1/8	6	40
4 3/4	6 1/2	50
5	7	58
6	8	82
6 1/4	8	82
6 1/2	8 1/2	90
6 3/4	8 1/2	90
7	9	100
7 1/4	9	100
8	10	128
8 1/4	10	128
9 1/2	11 1/2	165
9 3/4	11 1/2	165
11	13	245

SECTION 3

STABILIZATION EQUIPMENT

Integral Blade Stabilizers

(Alloy Steel)

Schoeller-Bleckmann Alloy Stabilizers are manufactured from AISI 4145 H Modified Steel, fully heat treated to 285-341 Brinell hardness and 40 ft. lbs. min. izod impact strength.

The blades are spiral milled in either left hand (L.H.) or right hand (R.H.) in three main configurations :

Wide open	150° to 210°
Open	over 210° to 270°
Tight	over 270° to 360°

The spiral blades are machined to provide maximum mud circulation.

Connection features are : Bore back box/Stress relief pin/Cold rolled thread roots/Phosphate coated connections/Heavy duty rubber thread protectors are standard

Blade diameters are ground to a maximum of $^{1}/_{32}$" under gauge on all hole sizes.

Hardfacing is applied on the leading edge as an additional protection.

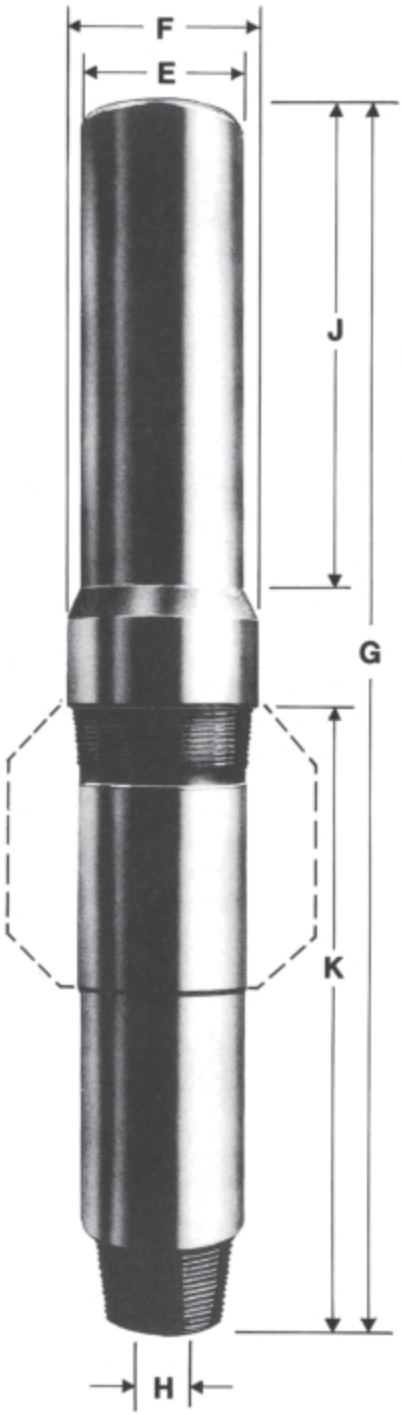
Information on Schoeller-Bleckmann Hardfacings can be found on the appropriate data sheet.

When ordering Schoeller-Bleckmann stabilizers, please specify :

1. Drill collar size and I.D.
2. Type of stabilizer (string or nearbit)
3. Type of hardfacing
4. Spiral type
5. Connection type and size

STANDARD SIZES FOR SB DARRON STABILIZERS							
Hole Size		5¼" / 6⅞"	7" / 9⅞"	10" / 13"	13½" / 17½"	18" / 22"	23" / 26"
Drill Collar Range		4⅛" / 5½"	5¾" / 7¾"	7" / 9½"	8" / 10"	8½" / 11"	8½" / 11"
Nominal Stabilizer Body OD		4¾"	6½"	8"	9½"	9½"	9½"
Std Stabilizer Overall Length	Nearbit	68"	72"	75"	85"	95"	101"
	String	72"	76"	80"	90"	100"	106"
No. of Pin Recuts Allowed to Meet DSI Specification		4	2	1	1	1	1
Extra Long Stab Overall Length	String	N/A	84"	100"	110"	120"	127"
No. of Pin Recuts Allowed to Meet DSI Specification		N/A	4	4	4	4	4
Std Stab Fishing Neck Length		28"	28"	28"	28"	28"	28"
Extra Long Stabilizer Fishing Neck Length		N/A	28"	36"	36"	36"	36"
Crown Length (Min)		14"	18"	18"	20"	22"	22"
Blade Width		2"	2½"	3"	3½"	4"	4"
Std Stabilizer Tong Space	Nearbit	22"	20"	20"	23"	23"	23"
	String	22"	20"	20"	23"	23"	23"
Extra Long Stab Tong Space (Min)	String	N/A	27"	32"	35"	35"	35"

Stabilizer Mandrels



One Piece Stabilizer Sleeve Mandrels

The Schoeller-Bleckmann Sleeve Type Stabilizer Mandrels available in either string or nearbit configurations are produced in a full range of sizes to overcome the logistics difficulties normally associated with stabilization equipment at the rig site.

Schoeller-Bleckmann Mandrels manufactured from a single piece of material for optimum integral strength are available in either AISI 4145 H Modified Steel or Non-Magnetic grades.

Engineered for easy make up using conventional plate type sleeve breakers and rig tongs, single piece Schoeller-Bleckmann Mandrels eliminate the need for any fluid seals.

Connections are manufactured and gauged to A.P.I. standards. Sufficient fishing neck, tong neck and mandrel upset lengths are provided to facilitate thread and shoulder repairs.

Used worldwide Schoeller-Bleckmann Mandrels have seen extensive service in B.H.A.'s for drilling both straight hole and directionally drilled wells.

MANDREL SPECIFICATIONS

SERIES	DRILL COLLAR DIA	UPSET DIA	OVERALL LENGTH	BORE		FISHING NECK LENGTH	SLEEVE END LENGTH
				STRING	N/BIT		
	E	F	G	H	H	J	K
41	4⅛" - 4¾"	5⅛"	62"	2"	1½"	24"	32"
47	4¾" - 5"	5¾"	62"	2¼"	1½"	24"	32"
62	6" - 7¼"	7½"	66"	$2^{13}/_{16}$"	2¼"	28"	32"
65		7¾"					
77	7¾" - 8¼"	9¼"	68"	$2^{13}/_{16}$"		28"	33"
85	8" - 9"	9⅞"	68"	$2^{13}/_{16}$"		28"	33"
96	9" - 10"	11"	74"	3"		28"	39"

Standard Stabilizer Sleeves

Rig Replaceable

Schoeller-Bleckmann Stabilizer Sleeves have been designed as rig-replaceable units to help solve the problems of logistics when drilling in remote areas.

The sleeves are manufactured from solid bar for greater strength in rugged conditions and are engineered for easy make up.

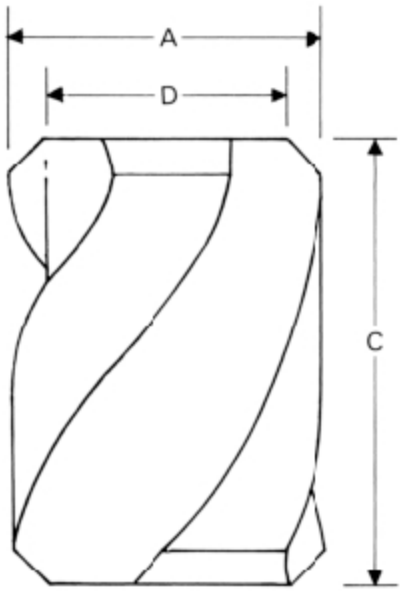
Hardfacing

Schoeller-Bleckmann offer a full range of hardfacings. A detailed spec.sheet is available.

When ordering Stabilizer Sleeves, please specify :

1. Hole size and series
2. Drill collar size
3. Type of hardfacing required

These sleeves are also produced in non-magnetic material.



SLEEVE SPECIFICATIONS					
HOLE SIZE	DRILL COLLAR DIA	SERIES	SLEEVE LENGTH	SLEEVE CYLINDER DIA	RCOMMENDED MAKE UP TORQUE Ft/Lbs
A			C	D	
6" - 6¼"	4⅛" - 4¾"	41	12"	5⅛"	2000 - 2500
6¼" - 7¾"	4¾" - 5"	47	14"	5¾"	2000 - 2500
8" - 9⅞"	6" - 6¾"	62	14"	7¼"	4500 - 5500
8¾" - 9⅞"	6¾" - 7¼"	65	14"		3500 - 4500
9⅝" - 15"	7¾" - 8¼"	77	14"	9¼"	7000 - 8000
16" - 17½"			18"	11"	
10⅝" - 15"	8" - 9"	85	16"	10"	9000 - 10000
16" - 17½"			18"	11"	
13" - 15"	9" - 10"	96	18"	11"	10000 - 12000
17" - 17½"					
17½" - 26"			24"		

Machined dimensions may be modified to suit customers' requirements.

Barrel Stabilizer Sleeves

Available For Hole Sizes 8½" – 26"

The Schoeller-Bleckmann Barrel Sleeves system has been designed to overcome the logistics difficulties normally associated with transportation, storage and related costs of stabilizers at the rig site.

Developed from the original Schoeller-Bleckmann rig replaceable sleeve and fully interchangeable with standard steel and non-magnetic mandrels Barrel Sleeves may be used for both string and nearbit applications.

Manufactured from high grade Alloy Steel Barrel Sleeves are used extensively in directionally drilled wells where unconsolidated or badly faulted formations are being drilled.

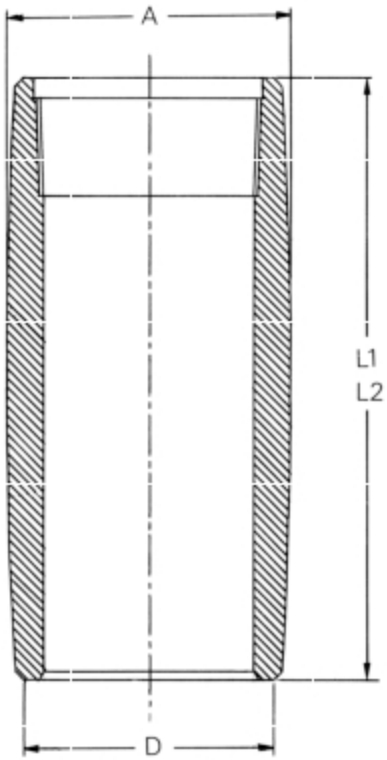
Field tests have shown that when used in conjunction with a mud motor and or steerable system the long radius and constant curvature of the sleeve blades improve directional control particularly during orientation and can reduce torque.

Barrel Sleeves are by design easily made power tight on the rig floor by using a conventional plate type sleeve breaker or tongs.

Features

1. Long radius constant curvature blade profile reduces hang up, hole wall damage and increases R.O.P.
2. Reduced fluctuation of W.O.B. caused by hang up.
3. Reduced drilling torque
4. Improved directional control when used in a steerable system

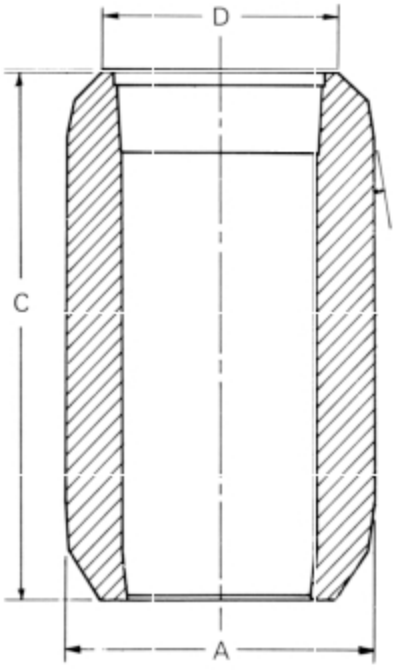
Stabilizer Sleeves may be hardfaced with any of Schoeller-Bleckmann dressing alternatives and the above illustrated blade configuration can be incorporated in Integral Blade Stabilizers, if required.



Barrel Sleeves are available in both open and tight spiral design.

SLEEVE SPECIFICATIONS						
HOLE SIZE	SERIES	DRILL COLLAR DIA	SLEEVE CYLINDER DIA	SLEEVE LENGTH		RECOMMENDED MAKE UP TORQUE FT/LB
A		B	D	L1	L2	
8" - 9⅞"	62	6" - 6¾"	7½"	14"	18"	4500 - 5500
8¾" - 9½"	65	6¾" - 7¼"	7¾"	14"	18"	3500 - 4500
9⅝" - 15"	77	7¾"-8¼"	9¼"	16"	21"	7000 – 8000
16" - 17½"			11	18"	23"	
10⅝" - 15"	85	8"-9"	10	16"	21"	9000 - 10000
16" - 17½"			11	18"	23"	
13" - 15"	96	9"-10"	11	16"	21"	10000 - 12000
16" - 17½"				18"	23"	
17¾" - 26"				24"	28"	

Heavy Duty Stabilizer Sleeves



Available For Hole Sizes 8½" – 26"

The Schoeller-Bleckmann Heavy Duty Sleeves system designed to overcome the logistics difficulties associated with hard formation drilling in remote areas is available in a full range of sizes as detailed below.

Developed from the original Schoeller-Bleckmann rig replaceable sleeve and fully interchangeable with standard steel and non-magnetic mandrels, Heavy Duty Sleeves may be used for both string and nearbit applications.

Manufactured from high grade Alloy Steel Heavy Duty Sleeves are used extensively in both straight hole and highly deviated directionally drilled wells.

Heavy Duty Sleeves are by design easily made power tight on the rig floor by using a conventionally plate type sleeve breaker or tongs.

Features

1. Blade length increased by 30% to increase wall contact for improved directional control while increasing wear resistance.

2. Secondary angles ground on the blades are designed to reduce trailing edge hang up when P.O.O.H., well bore damage and progressive leading edge degeneration due to intermittent impact loading.

3. Field tests have shown that when used in abrasive sandstone formations, Heavy Duty Sleeves dressed with Schoeller-Bleckmann HF2000 have improved rotating hour performance by 400%.

Stabilizer Sleeves may be hardfaced with any of Schoeller-Bleckmann dressing alternatives and the above illustrated blade configuration can be incorporated in Integral Blade Stabilizers if required.

Heavy Duty Sleeves are available in both open and tight spiral design.

SLEEVE SPECIFICATIONS					
HOLE SIZE	DRILL COLLAR DIA	SERIES	SLEEVE LENGTH	SLEEVE CYLINDER DIA	RECOMMENDED MAKE UP TORQUE FT/LB
A	B		C	D	
8" - 9⅞"	6" - 6¾"	62	18"	7½"	4500 – 5500
8¾" - 9½"	6¾" - 7¼"	65	18"	7¾"	3500 – 4500
9⅝" - 15"	7¾" - 8¼"	77	21"	9¼"	7000 – 8000
16" - 17½"			23"	11	
10⅝" - 15"	8" - 9"	85	21"	10	9000 – 10000
16" - 17½"			23"	11	
13" - 15"	9" - 10"	96	21"	11	10000 – 12000
16" - 17½"			23"		
17¾" - 26"			28"		

Welded Blade Stabilizers

(PH Series)

Schoeller-Bleckmann "PH Series" Weld Blade Stabilizers used in the B.H.A. for drilling soft to medium hard formation holes are available in two types as shown.

Stabilizer bodies are manufactured from AISI 4145 H Modified Steel with mechanical properties in accordance with A.P.I. Specification 7.

Mild steel blades are welded onto the body using strictly controlled pre-heating, post weld heat treatment and weld application techniques.

All areas affected by the process of welding are subject to full non-destructive examination to assure the mechanical integrity of the joint.

"PH Series" Weld Blade Stabilizers are only available in Straight Blade or Offset Straight Blade types, but can be supplied with 3 or 4 blade configuration.

Providing tools with extra bearing areas, "PH Series" tools reduce hole wall damage in soft formations and provide improved directional control where bit deviation forces exceed the formations ability to adequately support conventional blade widths.

Schoeller-Bleckmann HF 1000 or HF 2000 Hardfacings most are commonly applied to Weld Blade Stabilizers.

Information on Schoeller-Bleckmann Hardfacings can be found on the appropriate data sheet.

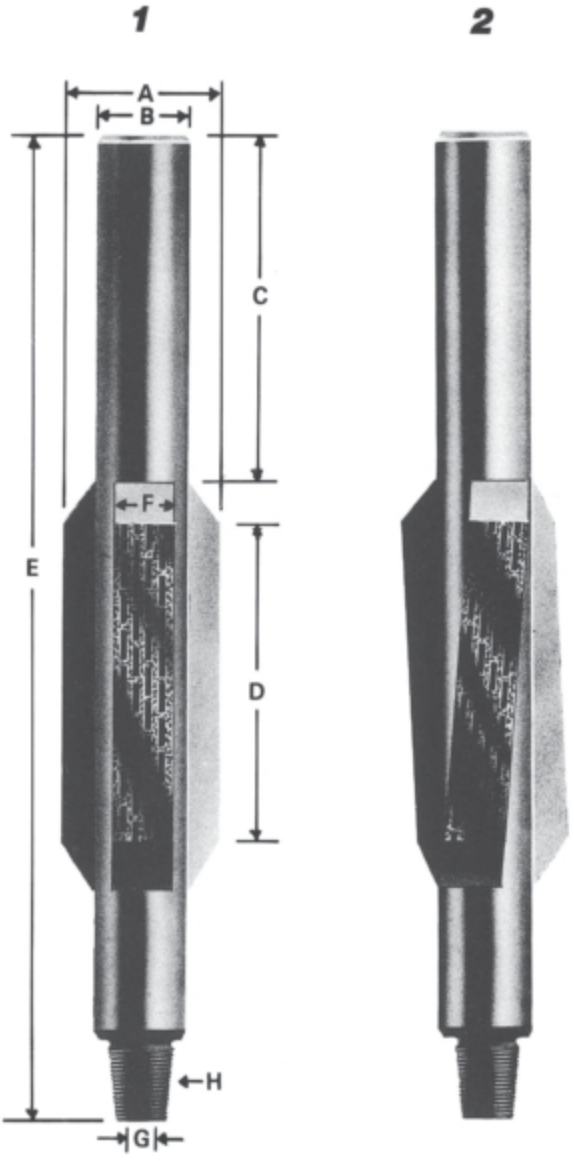
Thread connections are manufactured to A.P.I. Specification 7 and can be produced with Stress Relief Groove and Bore Back according to customer's specification.

Thread roots are cold rolled and can be kemplate coated to minimize galling upon request.

STANDARD DIMENSIONS						
A	6"	8½"	12¼"	17½"	26"	36"
B	4¾"	6½"	8"	9½"	9½"	9 ½"-11"
C	28"	28"	28"	28"	28"	28"
D	17"	21"	24"	26"	28"	30"
E	65"	73"	79"	82"	92"	104"
F	3"	3"	4"	4"	6"	6"
G	2¼"	$2^{13}/_{16}$"	$2^{13}/_{16}$"	3"	3"	3"
H	3½" IF	4½" IF	6⅝" REG	7⅝" REG	7⅝" REG	7⅝"-8⅝" REG

Other stabilizer sizes available on request.

1. **Straight Blade**
2. **Straight Blade Offset**



When ordering Schoeller-Bleckmann stabilizers, please specify :

1. Drill collar size and I.D.
2. Type of stabilizer (string or nearbit)
3. Type of Hardfacing
4. Blade type
5. Connection type and size

Welded Blade Stabilizers

(Standard)

Schoeller-Bleckmann "Standard" Weld Blade Stabilizers used in the B.H.A. for drilling soft to medium hard formation holes are available in three types as shown.

Stabilizer bodies are manufactured from AISI 4145 H Modified Steel with mechanical properties in accordance with A.P.I. Specification 7.

Mild steel blades are welded onto the body using strictly controlled pre-heating, post weld heat treatment and weld application techniques.

All areas affected by the process of welding are subject to full non-destructive examination to assure the mechanical integrity of the joint.

"Standard" Weld Blade Stabilizers are available in 3 or 4 blade configuration with the spiral type available with open or tight spiral.

Schoeller-Bleckmann HF 1000 or HF 2000 Hardfacings are most commonly applied to Weld Blade Stabilizers.

Information on Schoeller-Bleckmann Hardfacings can be found on the appropriate data sheet.

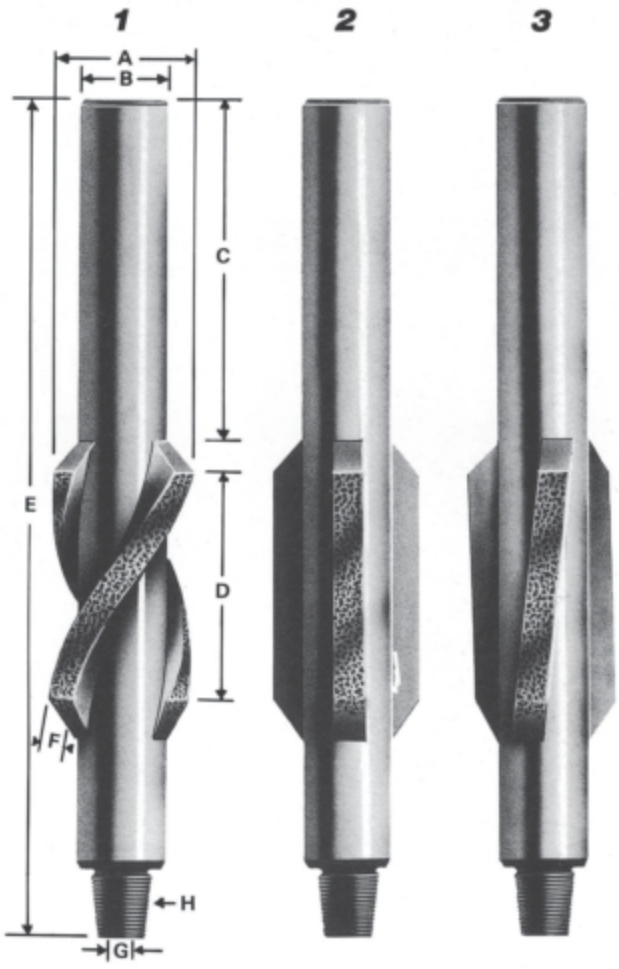
Thread connections are manufactured to A.P.I. Specification 7 and can be produced with Stress Relief Groove and Bore Back according to customer's specification.

Thread roots are cold rolled and can be kemplate coated to minimize galling upon request.

STANDARD DIMENSIONS						
A	6"	8½"	12¼"	17½"	26"	36"
B	4¾"	6½"	8"	9½"	9½"	9 ½"-11"
C	28"	28"	36"	36"	36"	36"
D	12"	14"	16"	18"	20"	20"
E	68"	77"	97"	108"	114"	124"
F	1½"	2"	2"	2½"	3"	3"
G	2¼"	$2^{13}/_{16}$"	$2^{13}/_{16}$"	3"	3"	3"
H	3½" IF	4½" IF	6⅝" REG	7⅝" REG	7⅝" REG	7⅝"-8⅝" REG

Other stabilizer sizes available on request.

1. **Spiral Blade**
2. **Straight Blade**
3. **Straight Blade Offset**

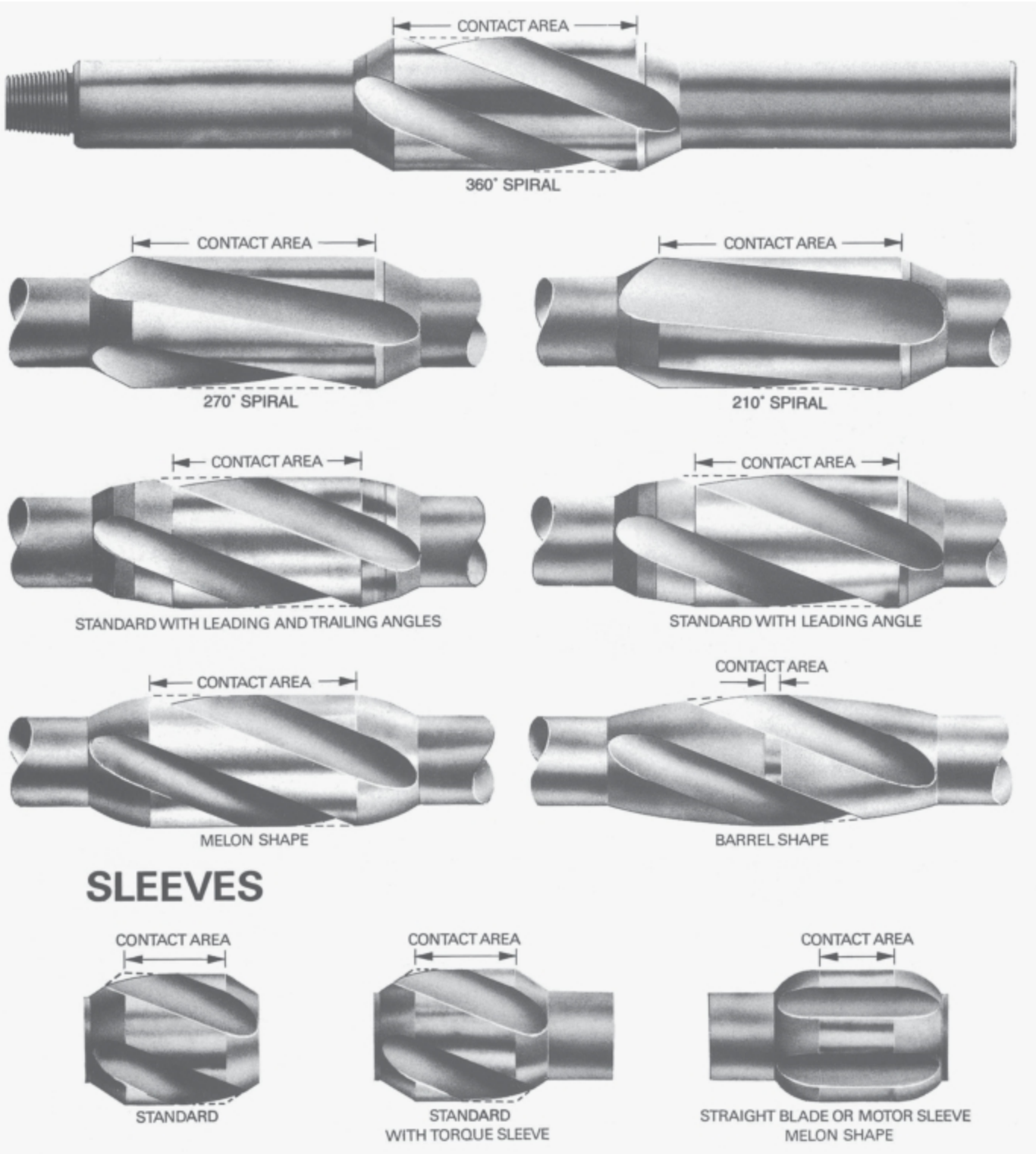


When ordering Schoeller-Bleckmann stabilizers, please specify :

1. Drill collar size and I.D.
2. Type of stabilizer (string or nearbit)
3. Type of hardfacing
4. Blade type
5. Connection type and size

Stabilizer Configurations

Schoeller-Bleckmann Stabilization can be supplied to any of the configurations shown below, or to customers' specific requirements.

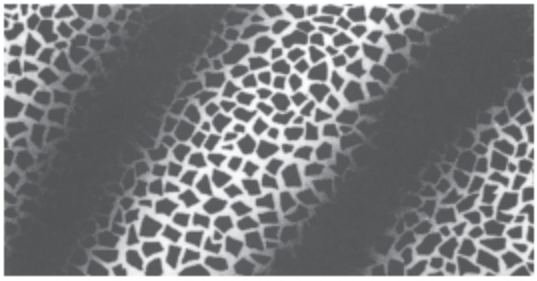


Hardfacing Types

Schoeller-Bleckmann offer a complete range of Hardfacings to suit all drilling conditions. Experience in the North Sea has assisted Schoeller-Bleckmann to develop improvements on wear characteristics and matrix hardness. Extensive research in-house has increased reliability in bonding.

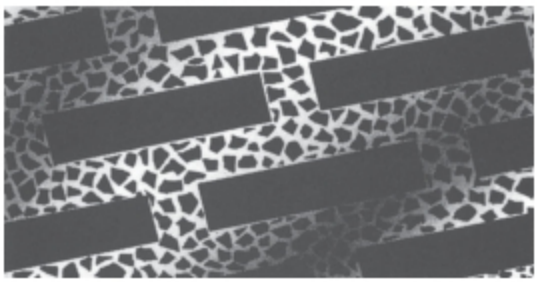
HF 1000
Crushed tungsten carbide held in a nickel bronze matrix. The 3 mm grain size ensures greater concentration of carbide which is ideal for soft formation drilling.

Sections through hardfacing.



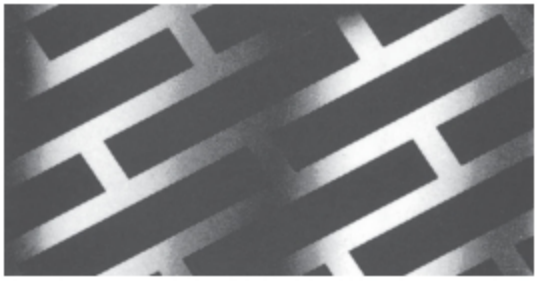
HF 2000
Trapezoidal tungsten carbide inserts held in a sintered carbide nickel bronze matrix. This will give a greater depth of carbide coverage – ideal for high deviation drilling in abrasive formations.

Sections through hardfacing.



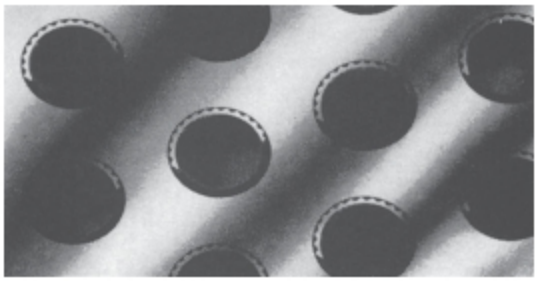
HF 3000
Tungsten carbide inserts set in a powder spray deposit ideal for abrasive formations. 97% bonding guaranteed, certified by ultrasonic report. Recommended for non- magnetic stabilizers.

Sections through hardfacing.



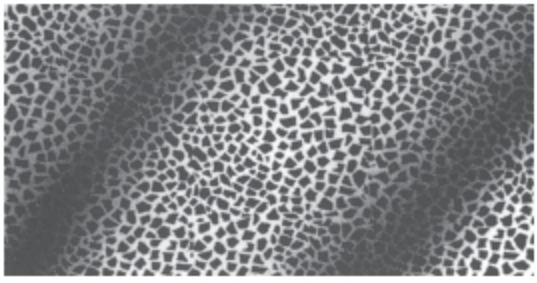
HF 4000
Tungsten carbide inserts (button type). The inserts have been developed to allow cold insertion and maintain close fit. A greater concentration of inserts on the bottom third of the blade and leading edge will increase surface contact to reduce wear in highly abrasive formations.

Sections through hardfacing.



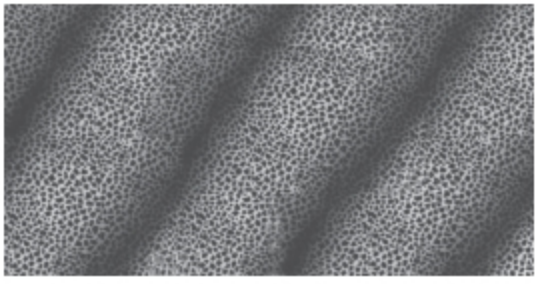
HF 5000
This oxy-acetylene process applies tough molten carbide particles of varying sizes held in a nickel chrome matrix which provides excellent bonding properties and greater surface wear characteristics are achieved. Surface hardness levels over 40 HRC. Idear for GEO-THERMAL applications over 350°

Sections through hardfacing.



HF 6000
This process is a highly automated way of applying hard face and utilizes a combined arc/plasma stream on the work piece surface. This results is low base metal dilution and a dense, uniform coating, the filling medium can be variety of hardfacing consumables.

Sections through hardfacing.



SCHOELLER-BLECKMANN

SECTION 4

HOLE OPENERS

Integral Body-Sealed Bearing – S.H.I. Series

Tool Features

Designed for the enlargement of pilot holes, directional drilling and large hole applications, the Schoeller-Bleckmann SHI series hole openers are manufactured from Chromium Molybdenum Solid Alloy Steel forgings, heat treated and conforming to the requirements of AISI 4145 H Modified.

- By design the fully integral construction of the body eliminates any requirement for welding on the body and cutter arms.
- The body and cutter arms are hardfaced for protection and cutters are available from our 3 standard designs, ST, MM and HD all of which are fully interchangeable.
- Non standard cutters can also be supplied to meet specific applications.
- The cutter assembly is a fully sealed unit incorporating ball and roller bearings providing optimum performance.
- Cutter assemblies can be easily changed out at the rig site using readily available hand tools.
- Circulation is achieved by either a 3 or 6 nozzle configuration on the body (3 in the cutter pockets and 3 in the wing areas). This is dependent on the hole opener body size.
- The body can be provided with a fully Integral Bullnose complete with reverse circulation facilities or with a rock bit connection with optional separate Bullnose.

When enquiring or ordering, please specify :

1. Hole size
2. Pilot size
3. Connection size and type
4. Cutter type
5. Circulation nozzle size and type
6. Pilot type (Rock Bit/Bullnose/Integral Bullnose)
7. If Bullnose type is selected please specify type required i.e. Plain, Side Hill or Spiral and any special circulation requirements

Note : Please state part no. from table below where possible.

STANDARD DETAILS	HOLE SIZE	PILOT SIZE	F / N LENGTH	FISHING NECK DIA	TONG NECK DIA	INSIDE DIA	TOP PIN CONN.
	8½"	5⅞"	30"	6½"	4½"	1"	4½" IF
	12¼"	8½"	30"	8"	6"	1"	6⅝" REG
	16"	12¼"	36"	9½"	8"	2¼"	7⅝" REG
	17½"	12¼"	36"	9½"	8"	2¼"	7⅝" REG

BOTTOM END OPTIONS	BIT BOX CONN.	PART NO.
	3½" REG	I 08
	4½" REG	I 12
	6⅝" REG	I 16
	6⅝" REG	I 17

INTEGRAL BULLNOSE – PART NOS		
PLAIN	SIDE HILL	SPIRAL
I 08 - A	I 08 - B	I 08 - C
I 12 - A	I 12 - B	I 12 - C
I 16 - A	I 16 - B	I 16 - C
I 17 - A	I 17 - B	I 17 - C

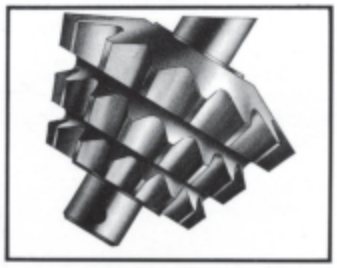
Note : 1. Standard circulation placement comprises of one central downward facing jet and three reverse circulation jets.
2. A separate Bullnose for the three types shown can be supplied.
3. Special requirements can be accommodated on request

Integral Body-Sealed Bearing – S.H.I. Series

Cutter Features

Generally the cutter assembly consists of 4 machined parts : cutter, inner bearing race, spindle and locking key – roller and ball bearings and seals completing the assembly. All machined parts are fully surface hardened. A choice of cutter types are shown below.

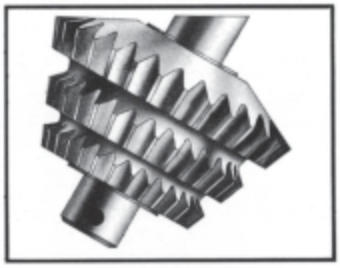
ST



FOR SOFT TO MEDIUM FORMATIONS

- Open design tooth formation
- Tooth surfaces hardfaced

MM



FOR MEDIUM TO HARD FORMATIONS

- Closed design tooth formation
- Tooth surfaces hardfaced

HD

FOR EXTRA HARD FORMATIONS

- Button type design

(Spherical T.C.I.)

BODY PART NO.	HOLE SIZE	PILOT SIZE
I 08	8½"	5⅞"
I 12	12¼"	8½"
I 16	16"	12¼"
I 17	17½"	12¼"

CUTTER TYPE PART NOS.		
ST	MM	HD
ST 82	MM 82	HD 82
ST 123	MM 123	HD 123
ST 162	MM 162	HD 162
ST 172	MM 172	HD 172

Non standard cutters can also be supplied to meet specific applications.

Sealed Bearing – SH Series

Tool Features

The Schoeller-Bleckmann Single Stage Hole Opener is a simple but rugged design. The body is machined from AISI 4145 fully heat treated alloy steel with arms welded onto the body providing location for the cutters. Arms and cutters are hardfaced for protection, the cutters are available in 3 different designs for varying conditions and rock formations (see Sheet 1a for more details). The cutter assembly is a fully sealed unit incorporating ball and roller bearings. Retaining the whole assembly is achieved by a locking pin. The design of the hole opener enables quick overhauls on the rig site. 3 or 6 replaceable nozzles are used giving optimum mud circulation around the cutters.

When enquiring or ordering, please specify :

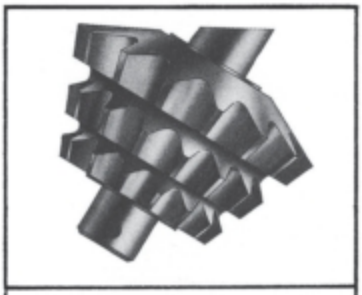
1. Hole size
2. Pilot size
3. Connection types
4. Cutter type

BODY PART NO.	HOLE SIZE	PILOT SIZE	A LENGTH	B FN LENGTH	C FISHING DIA	D TONG DIA	I.D	TOP PIN CONN.	BTM BOX CONN.	ASS. WT. (KG)
S12	12¼"	8½"	70"	28"	8"	6"	1½"	6⅝" REG	4½" REG	410
S15	14¾"	9⅝"	70"	28"	8"	7½"	1½"	6⅝" REG	6⅝" REG	460
S16	16"	12¼"	72"	28"	9½"	8"	2¼"	7⅝" REG	6⅝" REG	600
S17	17½"	12¼"	74"	28"	9½"	8"	2¼"	7⅝" REG	6⅝" REG	625
S24	24"	17½"	80"	30"	9½"	9½"	2¼"	7⅝" REG	7⅝" REG	965
S26	26"	17½"	82"	30"	9½"	9½"	3"	7⅝" REG	7⅝" REG	1010
S36	36"	26"	84"	30"	9½"	9½"	3"	7⅝" REG	7⅝" REG	1360

Sealed Bearing – SH Series

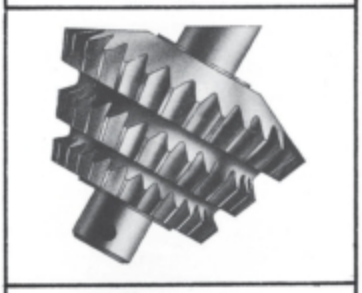
Cutter Features

Generally the cutter assembly consists of 4 machined parts : cutter, inner bearing race, spindle and locking key – roller and ball bearings and seals completing the assembly. All machined parts are fully surface hardened. A choice of cutter types are shown below.



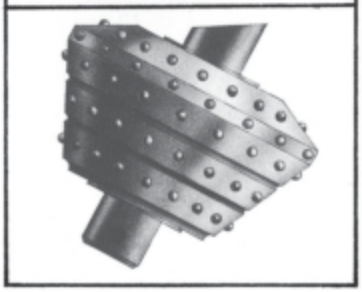
Cutter Type ST – Soft to Medium Formations

- Open design tooth formation
- Tooth surfaces hardfaced



Cutter Type MM - Medium to Hard Formations

- Closed design tooth formation
- Tooth surfaces hardfaced



Cutter Type HD - Extra Hard Formations

- Button type design (Spherical T.C.I.)

BODY PART NO.	HOLE SIZE	PILOT SIZE	*CUTTER PART NO.
S12	12¼"	8½"	123
S15	14¾"	9⅝"	151
S16	16"	12¼"	162
S17	17½"	12¼"	172
S24	24"	17½"	243
S26	26"	17½"	263
S36	36"	26"	361

*Prefix cutter Part number with Relevant cutter. Type: ST MM HD

Sealed Bearing – LHS Type

Tool Features

The Schoeller-Bleckmann Large Range of Hole Openers are designed specifically for big hole applications such as conductor holes and can open out from smaller than normal pilot holes in a single pass.

The opener is a simple but rugged design. The body is manufactured from AISI 4145 H Modified Alloy Steel, the saddles, ribs, plates etc which complete the body assembly are welded onto the body.

Saddles, ribs and other areas prone to wear are hardfaced for protection.

Excellent circulation is achieved by the strategic placement of nozzles between the cutters.

The cutter assembly is a fully sealed unit comprising of large ball and roller bearing elements that give optimum performance. The bearing race of the cutter is rotationally held by a cam lock.

Cutter assemblies are easily changed on the rig site usually readily available hand tools.

Cutter types available are :

ST Soft/Medium ***tooth*** type
MM Medium/Hard ***tooth*** type
HD Hard ***Tungsten Carbide Insert*** type

The bottom configuration can be manufactured to suit customer requirements i.e. bit box, bullnose etc.

When ordering or enquiring, please specify :

1. Hole size
2. Pilot size
3. Connection/bottom end configuration
4. Circulation nozzle opening size
5. Cutter type

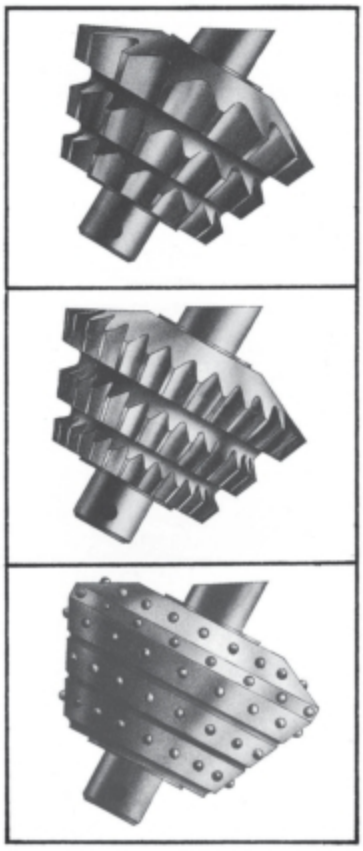
Note : Please state part number from the table where possible.

HOLE SIZE	PILOT SIZE	FISHING NECK DIA.	FISHING LENGTH	I.D.	TOP PIN CONN.	BODY PART NO.	NO. OF CUTTERS
26"	15½"	9½"	42"	3"	7⅝ REG	LHS 2600	3
28"	17½"	9½"	42"	3"	7⅝ REG	LHS 2800	3
30"	19½"	9½"	42"	3"	7⅝ REG	LHS 3000	3
36"	17½"	9½"	42"	3"	7⅝ REG	LHS 3600	4
42"	23½"	9½"	42"	3"	7⅝ REG	LHS 4200	4

Sealed Bearing – LHS Series

Cutter Features

Generally the cutter assembly consists of 4 machined parts : cutter, inner bearing race, spindle and locking key – roller and ball bearings and seals completing the assembly. All machined parts are fully surface hardened. A choice of cutter types are shown below.



Cutter Type ST – Soft to Medium Formations

- Open design tooth formation
- Tooth surfaces hardfaced

Cutter Type MM - Medium to Hard Formations

- Closed design tooth formation
- Tooth surfaces hardfaced

Cutter Type HD - Extra Hard Formations

- Button type design (Spherical T.C.I.)

BODY PART NO.	HOLE SIZE	PILOT SIZE	CUTTER PART NO.		
			ST	MM	HD
LHS 2600	26"	15½"	SCYC260051	SCYC260050	SCYC260052
LHS 2800	28"	17½"	SCYC280051	SCYC280050	SCYC280052
LHS 3000	30"	19½"	SCYC300051	SCYC300050	SCYC300052
LHS 3600	36"	17½"	SCYC360051	SCYC360050	SCYC360052
LHS 4200	42"	23½"	SCYC420051	SCYC420050	SCYC420052

SCHOELLER-BLECKMANN

SECTION 5

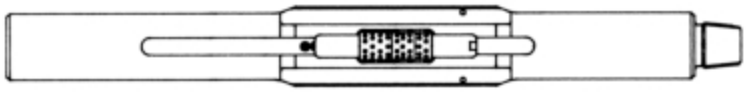
ROLLER REAMERS

DRS Series

Introduction

The DRS Series Reamer is designed to give maximum rotating hours downhole with minimum rig time in change overs of assemblies. This is achieved by rugged but simple construction techniques and the addition of a lubricated and sealed system that is rechargeable.

Tool Options Available

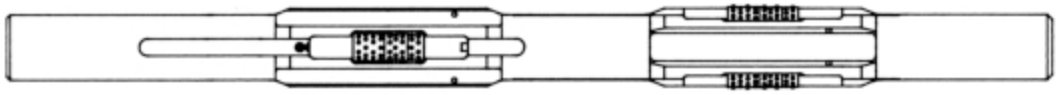


3 Point String

Run in the string to maintain a straight and true well bore and to ream through faults such as key seats and ledges.

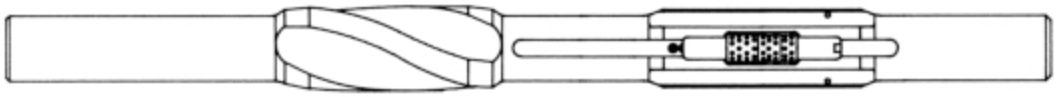
3 Point Nearbit

Run directly above the bit to ensure improved stability of the bit, giving faster penetration rates.



6 Point Nearbit

Run directly above the bit primarily in badly formed, crooked holes.
The six cutters provide the greatest reaming capability available.



Combination Tool

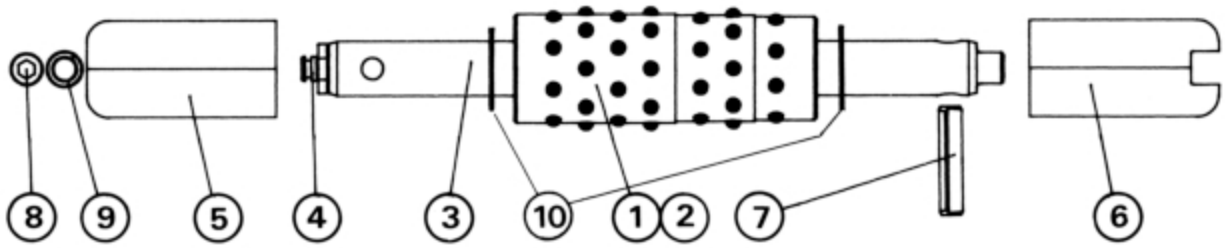
Run directly above the bit primarily in badly formed, crooked holes.
The combination of three cutters and a full coverage specially designed stabilizer section, provide a tool giving both reaming and stabilizing functions resulting in maximum directional control.

Tool Features

1. A completely integral (weld free) body ensures uniformity of strength.
2. A hardfacing area is applied on both leading and trailing edges to reduce wear.
3. With the exception of the cutters, all parts of the reamer are flush to the body to maximise tool life by reducing areas of potential wear.
4. Flutes milled in the body allow maximum fluid circulation.
5. The grease reservoir is charged after assembly, the design allowing subsequent re-charge. A high temperature sealed bearing lubricated assembly is actuated by a spring loaded piston in the spindle.
6. Different gauge sizes are achieved by using interchangeable blocks, or cutters depending on hole size. (See parts list on Sheet 1a)

DRS Series

Cutter Assembly



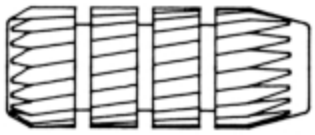
Parts and quantities per assembled unit

① 1 Cutter
② 2 Cutter seal
③ 1 Spindle
④ 1 Greasing facility
⑤ 1 Upper block

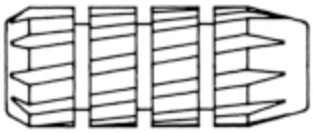
Parts

⑥ 1 Lower block
⑦ 1 Retaining pin
⑧ 1 Retaining bolt
⑨ 1 Spring washer
⑩ 2 Thrust washers

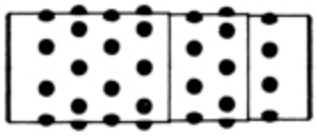
Cutter Types



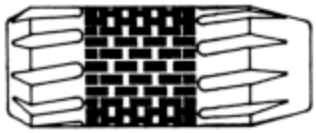
Type A
For use in soft formation.



Type B
For use in medium to hard formations.



Type C
For use in hard and abrasive formations.



Type D
Low torque cutter giving both stabilization and reduced vibration.

Parts List

*Suffix Part No. with Cutter Type Letter

HOLE SIZE	3 POINT NEARBIT BODY	3 POINT STRING BODY	6 POINT NEARBIT BODY	COMB TOOL BODY	* CUTTER	CUTTER SEALS	SPINDLE	BEARING BLOCK		RET. PIN	RET. BOLT	WASHER	THRUST WASHER
								UPPER	LOWER				
5⅞" 6" 6⅛"	10DRSN	10DRSS	10DRSN6	10DRSCO	10DRS10	10DRS15	10DRS20	10DRSOM30 10DRSOM31 10DRSOM32	10DRSOM40 10DRSOM41 10DRSOM42	10DRS50	10DRS55	10DRS60	10DRSOM70S
8¾" 8½"	20DRSN	20DRSS	20DRSN6	20DRSCO	20DRS13 20DRS10	20DRS15	20DRS20	20DRSOM31	20DRSOM41	20DRS50	20DRS55	20DRS60	20DRSOM70S
9⅝" 9¾" 9⅞"	25DRSN	25DRSS	25DRSN6	25DRSCO	25DRS13 25DRS14 25DRS10	25DRS15	25DRS20	25DRSOM31	25DRSOM41	20DRS50	20DRS55	20DRS60	25DRSOM70S
12" 12⅛" 12¼"	30DRSN	30DRSS	30DRSN6	30DRSCO	30DRS13 30DRS14 30DRS10	30DRS15	30DRS20	30DRSOM32	30DRSOM42	30DRS50	30DRS55	30DRS60	30DRSOM70S
14¾" 14⅞" 15"	35DRSN	35DRSS	35DRSN6	35DRSCO	30DRS10	30DRS15	30DRS20	30DRSOM32 30DRSOM31 30DRSOM30	30DRSOM42 30DRSOM41 30DRSOM40	30DRS50	30DRS55	30DRS60	30DRSOM70S
17½"	40DRSN	40DRSS	40DRSN6	40DRSCO	40DRS10	40DRS15	40DRS20	40DRSOM30	40DRSOM40	40DRS50	40DRS55	30DRS60	40DRSOM70S
26"	50DRSN	50DRSS	50DRSN6	50DRSCO	50DRS10	50DRS15	50DRS20	50DRSOM30	50DRSOM40	40DRS50	50DRS55	30DRS60	50DRSOM70S
34"	60DRSN	60DRSS	60DRSN6	60DRSCO	60DRS10	60DRS15	60DRS20	60DRSOM30	60DRSOM40	60DRS50	60DRS55	60DRS60	60DRSOM70S

DR Model 60 Reamers

(i) **6 Point** Near Bit

(ii) **3 Point** Near Bit

(iii) **3 Point** String

Tools Types

1. **6 Point Nearbit**
   Run directly above the bit primarily in badly formed, crooked holes. The six cutters provide the greatest reaming capability and stabilization characteristics available.

2. **3 Point Nearbit**
   Run directly above the bit to ensure improved stability of the bit, giving faster penetration rates.

3. **3 Point String**
   Run in the drill collar string to maintain a straight and true well bore and to ream through faults such as key-seats and ledges.

Tool Features

1. A completely integral (weld free) body ensures uniformity of strength.
2. A hardfacing area is applied on both the leading and trailing edges to reduce wear.
3. With the exception of the cutters, all parts of the reamer assembly are flush to the body to maximise tool life by reducing areas of potential wear.
4. Circulation passages milled in the body allow maximum fluid circulation
5. Blocks, cutters and spindles are manufactured from high grade alloy steels and finally carburised and hardened for greater wear resistance.
6. Different gauge sizes are achieved by using interchangeable blocks or cutters depending on the hole size.
7. Bearing block design provides an interference and keyed fit between body and block to ensure safe retention.
8. Simple design ensures assembly/disassembly procedures are easily completed on the rig side.

DR Model 60 Reamers

Part Numbers

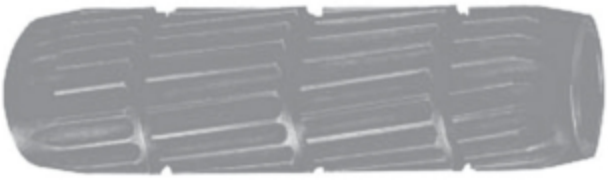
HOLE SIZE	6 POINT BODY	NEAR BIT BODY	STRING BODY	HARD CUTTER	MEDIUM CUTTER	SOFT CUTTER	SPINDLE	BEARING BLOCK		RET. PIN	RET. BOLT	SPRING WASHER
								UPPER	LOWER			
5 7/8"	D06-6N	D06-N	D06-S	D06-30	D06-20	D06-10	D06-40	D06-50B	D06-50A	D06-70	D06-80A	D06-80B
6"				D06-30	D06-20	D06-10	D06-40	D06-50B	D06-50A	D06-70	D06-80A	D06-80B
8 3/8"	D08-6N	D08-N	D08-S	D08-35	D08-25	D08-15	D08-40	D08-50B	D08-50A	D08-70	D08-80A	D08-80B
8 1/2"				D08-30	D08-20	D08-10	D08-40	D08-50B	D08-50A	D08-70	D08-80A	D08-80B
12"	D12-6N	D12-N	D12-S	D12-30	D12-20	D12-10	D12-40	D12-50B	D12-50A	D12-70	D12-80A	D12-80B
12 1/4"				D12-30	D12-20	D12-10	D12-40	D12-60B	D12-60A	D12-70	D12-80A	D12-80B
14 3/4"	D14-6N	D14-N	D14-S									
16"	D16-6N	D16-N	D16-S	D17-30	D17-20	D17-10	D17-40	D17-50B	D17-50A	D26-70	D26-80A	D26-80B
17"	D17-6N	D17-N	D17-S									
17 1/2"				D17-30	D17-20	D17-10	D17-40	D17-60B	D17-60A	D26-70	D26-80A	D26-80B
24"	D26-6N	D26-N	D26-S	D26-30	D26-20	D26-10	D26-40	D24-55B	D24-55A	D26-70	D26-80A	D26-80B
26"				D26-30	D26-20	D26-10	D26-40	D26-50B	D26-50A	D26-70	D26-80A	D26-80B
34"	D34-6N	D34-N	D34-S	D34-30	D34-20	D34-10	D34-40	D34-50B	D34-50A	D34-70	D34-80A	D34-80B

Note : Customer special requirements can be accommodated

When ordering, please specify :

1. Hole size and type of body
2. Connection / Fishing neck detail
3. Cutter type

Cutter Types



Type A : Sharp Cutter

For use in soft limestone and shale formations. The teeth are carburized for maximum file.

Type B : Half Flat Cutter

Used in medium/hard formation. The teeth are carburised, hardfaced and ground to gauge.

Type C : Button Cutter

For use in hard and abrasive formations such as chert or granite. The cutter features tungsten carbide inserts which act as teeth to fracture the formation.

SECTION 6

LIFTING BAILS AND

THREAD PROTECTORS

Cast Steel Lifting Bails

BOX LIFT BAIL

PIN LIFT BAIL

Schoeller-Bleckmann Cast Steel Lifting Balls are fitted to Drill Collars to :

Protect threads during transit and storage.
Provide lifting points when the Drill Collars require picking up or laying down.

The normal lift capacity of the Protectors is 1½ times the Drill Collar weight.

When ordering or enquiring, please specify :

1. Connection type, size and if pin or box protector is required

The table below gives a range of thread configurations available. Others are available on request.

OD Range	Connection Size & Type	Pin Protector Wt. Each (lb)	Box Protector Wt. Each (lb)	Wt. Per Set (lb)
3⅛ – 3½	N.C. 23	6	6	12
	2⅜ REG.	6	6	12
	N.C. 26	6	6	12
	2⅜ I.F.	6	6	12
	2⅜ PAC	6	6	12
4 – 4⅜	2⅞ I.F.	9	8	17
	2⅞ X.H.	9	8	17
	N.C. 31	9	8	17
	3½ REG.	9	8	17
4½ – 5⅛	N.C. 35	12	10	22
	3½ X.H.	12	10	22
	N.C. 38	12	10	22
	3½ I.F.	12	10	22
5 – 5¾	N.C. 40	15	14	29
	4 F.H.	15	14	29
5¾ – 6¼	4½ REG.	21	19	40
	4½ F.H.	21	19	40
6¼ – 6¾	4 I.F.	20	18	38
	N.C. 46	20	18	38
	4½ H-90	20	18	38
6¾ – 7½	5½ REG.	23	20	43
	5½ H-90	23	20	43
	N.C. 50	23	20	43
	4½ I.F.	23	20	43
7¼ – 8¼	5½ F.H.	33	30	63
	6⅝ REG.	33	30	63
	6⅝ H-90	33	30	63
8¼ – 9	N.C.61	32	32	64
9 – 10	7⅝ REG.	66	62	128
10 – 11	8⅝ REG.	77	73	150

Note: 1. All dimensions are given in inches, unless otherwise stated.
2. Pin protectors listed are for standard length pins only.

Steel Thread Protectors

Schoeller-Bleckmann Heavy Duty Steel Thread Protectors are fitted to Drill Pipe and other Products to protect threads during transit and storage.

When ordering or enquiring, please specify :

1. Connection type, size and if pin or box protector is required

BOX PROTECTOR

The table below gives a range of thread configurations available. Others are available on request

OD Range	Connection Size & Type	Pin Protector Wt. Each (lb)	Box Protector Wt. Each (lb)	Wt. Per Set (lb)
3⅛ – 3½	2⅜ REG.	½	½	1
	N.C. 26	1	¾	1¾
	2⅜ I.F.	1	¾	1¾
4 – 4⅛	2⅞ I.F.	1½	1¼	2¾
	N.C. 31	1½	1¼	2¾
	2⅞ REG.	1¼	1¼	2½
	3½ REG.	1½	1	2½
4½ – 5⅛	3½ X.H.	1½	1¼	2¾
	N.C. 38	2¼	1¾	4
	3½ I.F.	2¼	1¾	4
5 – 5¾	3½ F.H.	2	1½	3½
	N.C. 40	1¾	1½	3¼
	4 F.H.	2¼	2¼	4½
5¾ – 6¼	4½ REG.	2½	1½	4
	4½ F.H.	2½	1½	4
6¼ – 6¾	4 I.F.	3	1¾	4¾
	N.C. 46	3	1¾	4¾
	4½ X.H.	3	1¾	4¾
	4½ H-90	3	2	5
6¾ – 7½	5½ REG.	3¼	2	5¼
	N.C. 50	3¼	2	5¼
	4½ I.F.	3½	2	5½
	5 X.H.	3	2	5
7¼ – 8¼	5½ F.H.	3¾	2¾	6½
	6⅝ REG.	6¾	2¾	9½
	6⅝ H-90	4¼	2¼	6½
8¼ – 9	6⅝ F.H.	6½	5	11½
9 – 10	7⅝ REG.	7¾	3½	11¼

PIN PROTECTOR

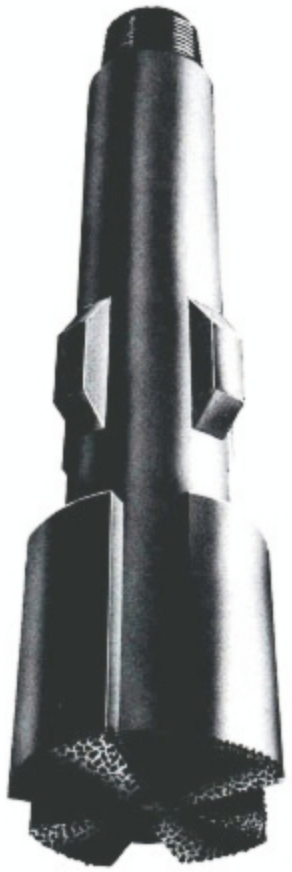
Note: 1. All dimensions are given in inches, unless otherwise stated.
2. Pin protectors listed are for standard length pins only.

SCHOELLER-BLECKMANN

SECTION 7

FISHING, REMEDIAL TOOLS

Junk Mills



Schoeller-Bleckmann Junk Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Manufactured in 'standard' and 'heavy duty' configurations.

Schoeller-Bleckmann Junk Mills are dressed with carefully graded sintered tungsten carbide chips for optimum milling rates.

Prepared for open or cased holes, Schoeller-Bleckmann Junk Mills can be supplied with a flat or concave face.

NOTE:
Schoeller-Bleckmann Junk Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill, or hole size
2. Size and weight of casing to be run through if applicable
3. Connection size and type
4. Mill type required

DRESSED DIAMETER	TOP PIN CONN. A.P.I. REG.	OVERALL LENGTH		FISHING NECK LENGTH	FISHING NECK DIAMETER	WEIGHT (LBS) APPROX.
		STANDARD	HEAVY DUTY			
3½ - 4¼	2⅜	20	20	12	3⅛	45
4½ - 5½	2⅞	21	21	12	3¾	62
5½ - 5⅝	3½	23	21	12	4¼	95
5¾ - 7½	3½	23	21	12	4¾	105
7½ - 9	4½	27	27	12	5¾	180
9½ - 12¼	6⅝	29	29	12	7¾	350
13 – 15	6⅝ or 7⅝	30	30	12	7¾ or 9½	500
17 – 17½	6⅝ or 7⅝	33	33	12	7¾ or 9½	625
18½ - 26	6⅝ or 7⅝	37	37	18	7¾ or 9½	1200

All dimensions are shown in inches

Super Crusher Mills

Schoeller-Bleckmann Super Crusher Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Schoeller-Bleckmann Super Crusher Mills are designed to destroy cutters, rock bits and large pieces of debris from downhole.

Super Crusher Mills are dressed with carefully graded sintered tungsten carbide chips which allow for heavy weights to be applied to the mill. A high mud flow is achieved on the cutting face of the mill to accommodate the removal of cuttings. Additional stabilizer pads provide extra stability when cutting.

Super Crusher Mills are designed to be run in casing or an open hole.

NOTE:
Schoeller-Bleckmann Super Crusher Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill, or hole size
2. Size and weight of casing to be run through if applicable
3. Connection size and type

DRESSED DIAMETER	TOP PIN CONN A.P.I. REG	OVERALL LENGTH	FISHING NECK LENGTH	FISHING NECK DIAMETER	WEIGHT (LB) APPROX
3½ - 4¼	2⅜	20	12	3⅛	45
4½ - 5½	2⅞	21	12	3¾	62
5½ - 5⅝	3½	23	12	4¼	95
5¾ - 7½	3½	23	12	4¾	105
7½ - 9	4½	27	12	5¾	180
9½ - 12¼	6⅝	29	12	7¾	350
13 – 15	6⅝ or 7⅝	30	12	7¾ or 9½	500
17 – 17½	6⅝ or 7⅝	33	12	7¾ or 9½	625
18½ - 26	6⅝ or 7⅝	37	18	7¾ or 9½	1200

All dimensions are shown in inches

T.C.I. Heavy Duty Junk Mills

Schoeller-Bleckmann T.C.I. (Tungsten Carbide Insert) Heavy Duty Junk Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Schoeller-Bleckmann T.C.I. Heavy Duty Junk Mills are designed to mill away stuck fish such as cemented Drill Collars, Pipe and Tubing. Penetration rates are high and smaller cuttings normally result.

T.C.I. Heavy Duty Junk Mills are dressed with a leading edge matrix of Round Tungsten Carbide Inserts that are held in position by wear carbide. Behind this T.C.I. matrix is the deposit of traditional high quality cutting carbide. If the first T.C.I. row becomes worn away and ineffective, the mill will start to work as a traditional Junk Mill dressed with cutting carbide until the next new row of T.C.I. are exposed.

A high mud flow is achieved on the cutting face of the mill to accommodate the removal of cuttings. Additional stabilizer pads provide extra stability when cutting.

T.C.I. Heavy Duty Junk Mills are designed to be run in casing or an open hole.

NOTE:
Schoeller-Bleckmann T.C.I. Heavy Duty Junk Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill, or hole size
2. Size and weight of casing to be run through if applicable
3. Connection size and type

DRESSED DIAMETER	TOP PIN CONN A.P.I. REG	OVERALL LENGTH	FISHING NECK LENGTH	FISHING NECK DIAMETER	WEIGHT (LB) APPROX
3½ - 4¼	2⅜	24	16	3⅛	50
4½ - 5½	2⅞	25	16	3¾	70
5½ - 5⅝	3½	27	16	4¼	105
5¾ - 7½	3½	27	16	4¾	118
7½ - 9	4½	31	16	5¾	202
9½ - 12¼	6⅝	33	16	7¾	385
13 – 15	6⅝ or 7⅝	34	16	7¾ or 9½	535
17 – 17½	6⅝ or 7⅝	37	16	7¾ or 9½	660
18½ - 26	6⅝ or 7⅝	37	18	7¾ or 9½	1200

All dimensions are shown in inches

ECO Mills

Schoeller-Bleckmann ECO Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Manufactured in standard and heavy duty configurations, Schoeller-Bleckmannn ECO Mills are dressed with carefully graded sintered tungsten carbide chips for optimum milling rates and provide a low cost alternative for light milling applications.

Prepared for open or cased holes, Schoeller-Bleckmannn ECO Mills can be supplied with a flat or concave mill face.

NOTE:
Schoeller-Bleckmann ECO Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill or hole size
2. Size and weight of casing to be run through, if applicable
3. Connection size and type
4. Mill type required

ECO MILL SPECIFICATION

TOOL SERIES	DRESSED DIAMETER (INS)	TOP PIN CONN A.P.I. REG	OVERALL LENGTH (INS)	WEIGHT (LB) APPROX
3000	3¼ - 4⅜	2⅜	7⅝	17
4000	4½ - 5⅜	2⅞	8⅝	26
5000	5½ - 7⅜	3½	9	40
7000	7½ - 8¾	4½	11½	76
10000	10¼ - 12¼	6⅝	16½	125

All dimensions are shown in inches

Skirted Junk Mills

Schoeller-Bleckmann Skirted Junk Mills are a three piece construction consisting of a Top Sub, ECO Mill and Washover Shoe.

The Schoeller-Bleckmann Skirted Junk Mills can be used to mill over deformed and split pipe. The design of the mill allows the Washover Shoe to slip over the damaged pipeand thus prevents damage to the casing. The ECO Mill sited within the Washover Shoe then performs the milling operation to remove the damaged section of the fish.

Skirted Junk Mills are available with any combination of ECO Mills and Washover Shoes (see individual sheets for further details).

ECO Mills can be dressed with carefully graded sintered tungsten carbide chips or in a heavy duty form where the blades are dressed with rows of round tungsten carbide inserts (T.C.I.) held in position with wear carbide. Jetting holes are provided within the ECO Mills to accommodate the removal of cuttings from the mill and the Washover Shoe.

Washover Shoes are dressed with carefully graded sintered tungsten carbide chips.

When enquiring or ordering, please specify :

1. Washover Shoe O. diameter and type
2. ECO Mill type {Standard or Heavy Duty (T.C.I.)}
3. Top pin connection size and style

W.SHOE O.DIA	W.SHOE I.DIA	TOP PIN CONN A.P.I. REG	FISHING NECK DIAMETER	OVERALL LENGTH	WEIGHT (LB) APPROX
3 1/2	2 7/8	2 3/8	3 1/8	46	45
4	3 7/16	2 7/8	3 3/4	46	70
4 1/2	3 ¾	2 7/8	3 3/4	46	80
5 3/4	5	3 1/2	4 3/4	47	110
7	5 ¾	4 1/2	5 3/4	47	165
7 3/4	6 ½	4 1/2	5 3/4	47	220
10 3/4	9 3/8	6 5/8	7 3/4	59	366
11 3/4	10 3/8	6 5/8	7 3/4	59	417

All dimensions are shown in inches

Taper Mills

Schoeller-Bleckmann Taper Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Typically used to ream partially collapsed or damaged casing and liners and for deburring whipstock windows, Schoeller-Bleckmann Taper Mills are available in either TML or TMX configurations.

Schoeller-Bleckmann Taper Mills are dressed with carefully graded sintered tungsten carbide chips for optimum milling rates.

TMX : A low torque mill with a blunt nose for tough milling applications

TML : Spiral blades and a pointed nose make this mill ideal for reaming through restrictions.

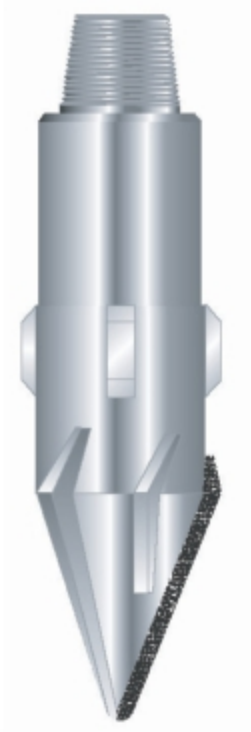
NOTE:
Schoeller-Bleckmann Taper Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill
2. Size and weight of casing to be run through if applicable
3. Connection size and type
4. Mill type required

DRESSED DIAMETER	PIN CONNECTION A.P.I. REG	OVERALL LENGTH		FISHING NECK LENGTH	FISHING NECK DIAMETER	WEIGHT (LB) APPROX	
		TML	TMX			TML	TMX
3¼ - 3⅞	2⅜	34	30	10	3	80	60
4 – 4⅜	2⅜	34	30	10	3⅛	90	70
4½ - 5⅜	2⅞	38	31	10	3¾	106	75
5½ - 5⅝	3½	42	32	13	4¼	155	115
5¾ - 6⅜	3½	44	32	13	4¾	160	120
6½ - 7⅜	3½	46	34	13	4¾	170	130
7½ - 7⅞	4½	54	36	13	5¾	250	185
8⅜ - 9½	4½	54	36	14	5¾	280	220
9⅜ - 9⅞	4½ or 6⅝	54	36	14	5¾ or 7¾	345	280
10⅜ - 11	6⅝	57	38	14	7¾	415	355
11½ - 12¼	6⅝	60	40	14	7¾	455	390
14¾ - 15	6⅝	70	60	18	7¾	525	460
17 – 17½	6⅝	70	60	18	7¾	595	530
20 - 26	6⅝ or 7⅝	76	66	18	7¾ or 9½	1250	1125

Heavy Duty Taper Mills



Schoeller-Bleckmann Heavy Duty Taper Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130

Typically used to ream partially collapsed or damaged casing and liners or deburring whipstock windows.

Schoeller-Bleckmann Heavy Duty Taper Mills can be dressed with either :

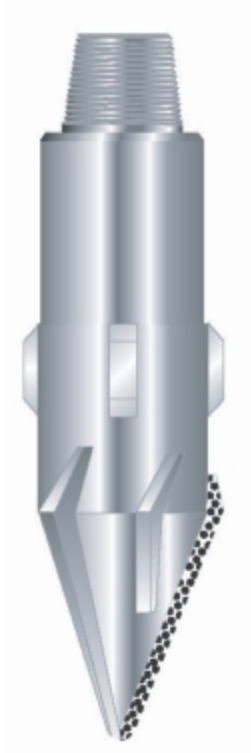
Carefully graded sintered tungsten carbide chips for optimum milling rates or
Rows of round tungsten carbide inserts held in place by wear carbide

Hardfaced wear pads are provided on all Heavy Duty Taper Mills to improve stability whilst down hole.

NOTE:
Schoeller-Bleckmann Heavy Duty Taper Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill
2. Size and weight of casing to be run through if applicable
3. Connection size and type
4. Hardfacing type



DRESSED DIAMETER	TOP PIN CONN A.P.I. REG	OVERALL LENGTH	FISHING NECK LENGTH	FISHING NECK DIAMETER	WEIGHT (LB) APPROX
3½ - 4¼	2⅜	44	16	3⅛	95
4½ - 5½	2⅞	44	16	3¾	170
5½ - 5⅝	3½	48	16	4¼	250
5¾ - 7½	3½	52	16	4¾	310
7½ - 9	4½	52	16	5¾	400
9½ - 12¼	6⅝	60	16	7¾	545
13 - 15	6⅝ or 7⅝	70	16	7¾ or 9½	620
17 - 17½	6⅝ or 7⅝	70	16	7¾ or 9½	700
18½ - 26	6⅝ or 7⅝	76	18	7¾ or 9½	1200

All dimensions are shown in inches

Pilot Mills

Schoeller-Bleckmann Pilot Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Schoeller-Bleckmann Pilot Mills are designed to mill stuck washover pipe, casing and liners.

Pilot Mills have a traditionally dressed tapered pilot nose which centralises the tool in the casing prior to milling.

The cutting blades are dressed with carefully graded sintered tungsten carbide chips for optimum milling rates.

Jetting holes are positioned on the tapered nose of the mill to accommodate the removal of cuttings.

NOTE:
Schoeller-Bleckmann Pilot Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Casing size and weight
2. Connection size and type

CASING SIZE	BLADE DIAMETER	TOP PIN CONN A.P.I. REG	OVERALL LENGTH	FISHING NECK LENGTH	FISHING NECK DIAMETER
4½	5½	2⅜	42	16	3⅛
5	6	2⅞	42	16	3¾
5½	6½	3½	42	16	4¼
7	8⅛	4½	44	16	5¾
7⅝	8⅞	4½	44	16	5¾
9⅝	11	6⅝	48	16	7¾
10¾	12¼	6⅝	52	16	7¾
11¾	13¼	6⅝	52	16	7¾
13⅜	15	6⅝	52	16	7¾

All dimensions are shown in inches

T.C.I. Heavy Duty Pilot Mills

Schoeller-Bleckmann T.C.I. (Tungsten Carbide Insert) Heavy Duty Pilot Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Schoeller-Bleckmann T.C.I. Heavy Duty Pilot Mills are designed to mill stuck washover pipe, casing and liners.

Penetration rates are high and smaller cuttings normally result.

T.C.I. Heavy Duty Pilot Mills have a traditionally dressed tapered pilot nose which centralises the tool in the casing prior to milling.

The cutting blades are dressed with a leading edge matrix of Round Tungsten Carbide Inserts that are held in position by wear carbide.

Jetting holes are positioned on the tapered nose of the mill to accommodate the removal of cuttings.

NOTE:
Schoeller-Bleckmann T.C.I. Heavy Duty Pilot Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Casing size and weight
2. Connection size and type

CASING SIZE	BLADE DIAMETER	TOP PIN CONN A.P.I. REG	OVERALL LENGTH	FISHING NECK LENGTH	FISHING NECK DIAMETER
4½	5½	2⅜	42	16	3⅛
5	6	2⅞	42	16	3¾
5½	6½	3½	42	16	4¼
7	8⅛	4½	44	16	5¾
7⅝	8⅞	4½	44	16	5¾
9⅝	11	6⅝	48	16	7¾
10¾	12¼	6⅝	52	16	7¾
11¾	13¼	6⅝	52	16	7¾
13⅜	15	6⅝	52	16	7¾

All dimensions are shown in inches

Watermelon Mills

Schoeller-Bleckmann Watermelon Mills are manufactured from Chromium Molybdenum Alloy Steel heat treated and conforming to the requirements of AISI 4130.

Schoeller-Bleckmann Watermelon Mills are dressed with carefully graded sintered tungsten carbide chips held in a nickel bronze matrix for maximum efficiency and milling rates.

The mill blades form a left hand spiral configuration to give a full 360 degrees coverage to maximize contact area.

Watermelon Mills are normally used in association with a sidetracking system to fully clean and deburr a window in the cut section of casing. The mill should be run through the casing window several times to ensure maximum cleaning. Watermelon Mills may also be used to mill out tight spots in casing in normal drilling operations.

NOTE:
Schoeller-Bleckmann Watermelon Mills can be manufactured to accommodate any specific customer requirements.

When enquiring or ordering, please specify :

1. Dressed diameter of mill
2. Size and weight of casing to be run through
3. Connection size and type
4. Overall length to be specified

DRESSED DIAMETER	FISHING NECK DIAMETER	FISHING NECK LENGTH	OVERALL LENGTH	PIN x BOX CONNECTIONS
4 1/8	3 3/8	12	48	2 3/8 REG
5 1/2	4 1/8	12	48	2 7/8 REG
6	4 3/4	12	48	3 1/2 REG
8 1/2	6 1/2	12	48	4 1/2 REG
12 1/4	8	12	48	6 5/8 REG

All dimensions are shown in inches

Junk Subs

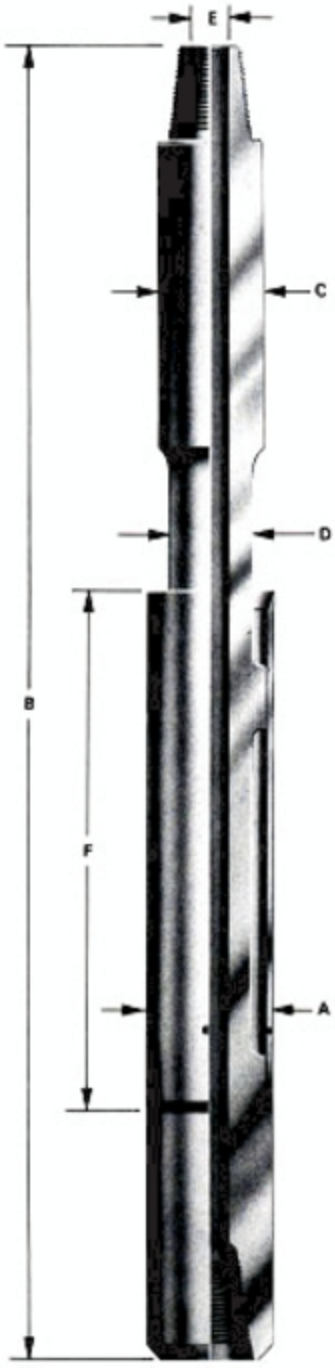
Used above the bit, mill or scraper the Schoeller-Bleckmann Junk Subs are used to catch and retain objects too heavy to be circulated out of the hole.

Like Drill Collars the Junk Sub body is produced from material to specification AISI 4145 H Modified, fully heat treated in accordance with A.P.I. Specification 7.

Stress relieved after the skirt has been welded to the body and featuring fully integral rib guides the Schoeller-Bleckmann Junk Sub provides optimum performance in difficult situations.

In addition to the Standard Junk Subs mentioned below Schoeller-Bleckmann can produce Junk Subs to meet your specific requirements.

All connections are cold rolled and phosphate coated to prevent galling during initial make up.



When ordering Schoeller-Bleckmann Junk Subs, please specify :

1. Sleeve diameter 'A'
2. Top and bottom connections
3. Drill Collar diameter 'C'

JUNK SUB DIMENSIONS

HOLE SIZE	SLEEVE DIA (A)	TOP AND BOTTOM CONNS (REG)	OVERALL LENGTH (B)	FISHING NECK DIA (C)	BODY DIA UNDER SLEEVE (D)	BORE DIA (E)	SLEEVE LENGTH (F)	WEIGHT LB (APPROX)
4¼ - 4⅝	3⅝	2⅜	37	$3^{1}/_{16}$	2	1	12	65
4⅝ - 4⅞	4	2⅞	38	$3^{7}/_{16}$	2⅝	1¼	12	85
5⅛ - 5⅞	4¾	3½	38	$4^{3}/_{16}$	3¼	1½	12	125
6 - 6⅜	5	3½	38	4⅜	3¼	1½	12	135
6½ - 7½	5½	3½	38	4⅜	3¼	1½	12	150
7½ - 8½	6⅝	4½	41	5¾	4½	2¼	15	260
8⅝ - 9⅝	7	4½	41	6	4½	2¼	15	280
9⅝ - 11⅜	8⅝	6⅝	42	7½	5¾	$2^{13}/_{16}$	15	450
11½ - 13	9⅝	6⅝	42	8½	5¾	$2^{13}/_{16}$	15	540
12¼ - 14¾	10¾	7⅝	42	9	7⅝	3	15	680
14¾-17½	12¾	7⅝	42	10	7⅝	3	15	800

All dimensions are shown in inches

Washover Shoes

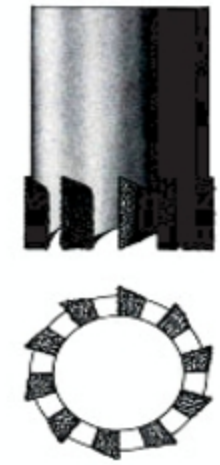
TYPE 1 ROTARY SHOE

Schoeller-Bleckmann manufacture a full range of Washover Shoes and accessories.

Schoeller-Bleckmann Rotary Washover Shoes are produced from carefully selected heat treated alloy steels which are dressed with premium quality crushed sintered tungsten carbide particles.

Shown left are two types of Washover Shoes.

Illustrations showing various milling structures can be seen on Sheet 1a. These structures are typically standard but we are able to manufacture Washover Shoes to suit customers' specific requirements.



TYPE 9 ROTARY SHOE

When ordering or requesting quotations for Schoeller-Bleckmann Washover Shoes, please specify :

1. Thread type
2. Connection size
3. Connection type
4. Connection weight per foot
5. Shoe type or specific milling structure required
6. Outside diameter of body
7. Inside diameter of body
8. Outside diameter of milling structure
9. Inside diameter of milling structure

Washover Shoes

TYPE 1 ROTARY SHOE

The Type 1 Rotary Shoe is used for washing over and cutting formation. Mill tooth design with side wings allows maximum circulation. This Shoe cuts on the outside and bottom only.

TYPE 6 ROTARY SHOE

The Type 6 Rotary Shoe cuts on the outside, inside and bottom. It is used for washing over and cutting the formation and the fish at the same time.

TYPE 2 ROTARY SHOE

The Type 2 Rotary Shoe is used for washing over and cutting formation. Mill tooth design permits maximum circulation consistent with limited clearances. This Shoe cuts on the bottom only.

TYPE 7 ROTARY SHOE

The Type 7 Rotary Shoe is used to wash over fish and cut metal, formation or cement in the open hole with limited clearance. Cuts on the outside and bottom. Does not cut on the inside.

TYPE 3 ROTARY SHOE

The Type 3 Rotary Shoe is used to cut metal on the fish where clearances are small. It cuts on the inside and bottom only.

TYPE 8 ROTARY SHOE

The Type 8 Rotary Shoe is used to mill away jagged edges from small junk or bit cones so that the junk will pass into a junk basket to be retrieved or to cut formation for small cores.

TYPE 4 ROTARY SHOE

Similar to Type 3, the Type 4 Rotary Shoe has an internal upset for use where clearance permits. This Shoe cuts on the inside and bottom only.

TYPE 9 ROTARY SHOE

The Type 9 Rotary Shoe (Scallop Bottom) cuts on the inside, outside and bottom face. It will mill over packers and provide ample clearance.

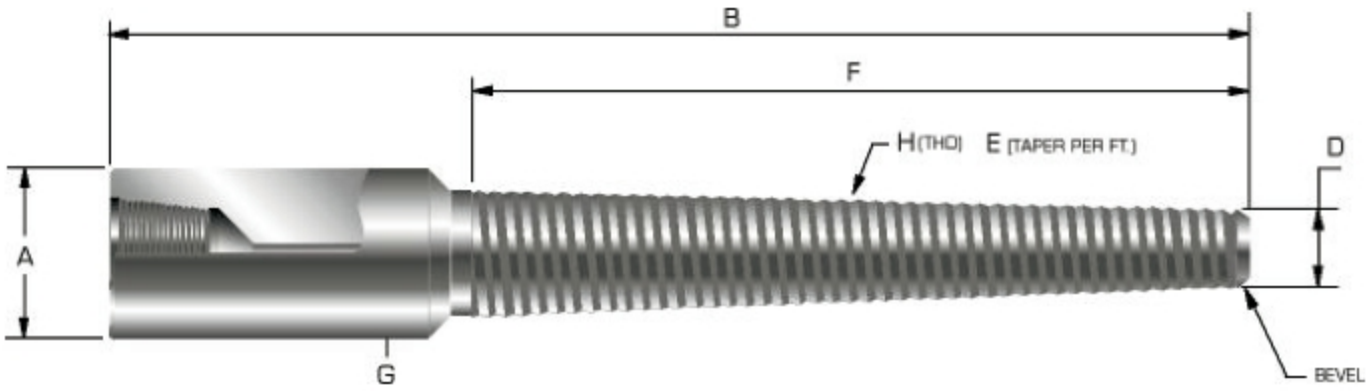
TYPE 5 ROTARY SHOE

The Type 5 Rotary Shoe is used for washing over a fish in the open hole. It cuts on the outside and bottom only.

TYPE 10 ROTARY SHOE

The Type 10 Rotary Shoe (Scallop Bottom) is used to wash over and cut on the bottom face only. Does not cut on the inside or the outside. Useful to mill over packers.

Taper Taps



Standard Taper Tap Configurations

Schoeller-Bleckmann Die Collars (Box Taps)

A	B	C	D	E	F	G	H	CONN.
3-3/8	36	3-3/8	1-7/8	3/4	24	1	6	2-3/8 API-IF
3-3/8	36	3	1-1/2	3/4	24	3/4	6	2-3/8 API-IF
3-1/2	36	3-1/2	2	3/4	24	1	6	2-3/8 API-IF
3-1/2	44	3-3/8	1-3/8	3/4	32	3/4	6	2-3/8 API-IF
3-3/4	44	3-3/4	1-3/4	3/4	32	3/4	6	2-3/8 API-IF
3-7/8	44	3-7/8	1-7/8	3/4	32	1	6	2-3/8 API-IF
4	44	4	2	3/4	32	1	6	2-3/8 API-IF
4	44	3-5/8	1-5/8	3/4	32	3/4	6	2-3/8 API-IF
4-1/8	44	3-7/8	1-7/8	3/4	32	1	6	2-7/8 API-IF
4-1/8	48	4-1/8	1-7/8	3/4	36	1	6	2-7/8 API-IF
4-3/4	48	3-3/4	1-1/2	3/4	36	3/4	6	3-1/2 API-IF
4-3/4	48	4-3/8	2-1/8	3/4	36	1	6	3-1/2 API-IF
4-3/4	48	4-3/4	2-1/2	3/4	36	1	6	3-1/2 API-IF
4-5/8	48	3-3/4	1-1/2	3/4	36	5/8	6	3-1/2 API-IF
4-5/8	48	4-1/2	2-1/4	3/4	36	3/4	6	3-1/2 API-FH
5-3/4	48	5-1/2	3-1/4	3/4	36	1	6	4 API-IF
5-3/4	48	3-3/4	1-1/2	3/4	36	5/8	6	4-1/2 API-FH
5-3/4	48	4	1-3/4	3/4	36	1	6	4-1/2 API-FH
5-3/4	48	4-3/4	2-1/2	3/4	36	3/4	6	4-1/2 API-FH
6-1/8	48	5-7/8	3-5/8	3/4	36	1	6	4-1/2 API-IF
6-1/8	48	6-1/8	3-7/8	3/4	36	1	6	4-1/2 API-IF

Other sizes can be made to order

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