ENEROIL
Offshore Drilling Ltd.

PRIMARY CEMENTING PRODUCTS

www.eneroiloffshore.com

ENEROIL BEYOND ENGINEERING EXCELLENCE

Eneroil welcomes you to its world of precision, quality and service. A world which has existed for the last two decades providing excellence in engineering and continuous improvement in quality of products and processes.

Serving the cause of the global Oil and Gas Industry Eneroil manufactures a wide range of primary cementing equipments confirming to API10D specifications under license from the American Petroleum Institute

Aligning itself with global industry requirements the company strictly adheres to ISO 9001 systems and procedures,

One of the world's leading primary cementing products manufacturer, Eneroil has a state of the art manufacturing plant spread on 150,000 square feet, equipped with fully automatic robotic welding machines, digitally controlled heat treatment facilities, a fully automatic epoxy powder coating plant, mechanical and hydraulic presses up to 300 tonnes, In house engineering design and development department with fully equipped testing facility as per API10D requirement.

We are geared to enhance quality of the products through constant technological up gradation and offering new innovative solutions for our customers' needs. As a result Eneroil has earned a solid reputation for strict adherence to highest quality and on time delivery with its customers.

Certificate of Authority to use the Official API Monogram

License Number: 10D-0009

ORIGINAL

ENEROIL OFFSHORE DRILLING LIMITED
B-20, Site IV
Sahibabad Industrial Area
Ghaziabad, Uttar Pradesh
India

API Spec 10D

10D-0009

American Petroleum Institute

The scope of this license includes the following product: Casing Centralizers

QMS Exclusions: No Exclusions Identified as Applicable

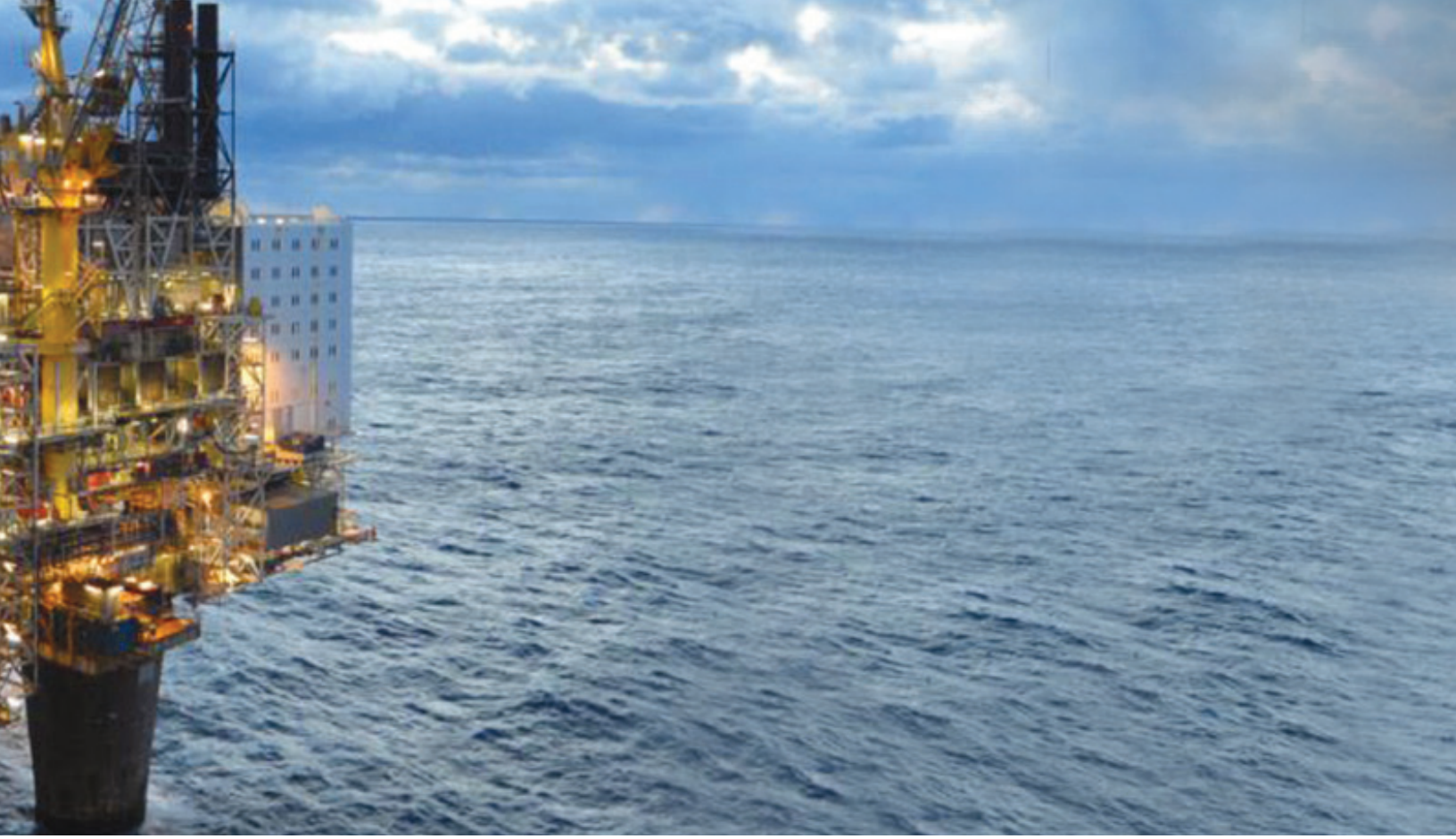
Effective Date: NOVEMBER 1, 2011
Expiration Date: NOVEMBER 1, 2014

BSCIC

QUALITY MANAGEMENT SYSTEM

ISO 9001:2008

Manufacture and Export of Centralizer, Stop Collars, Wellhead Wipers & Cement Baskets

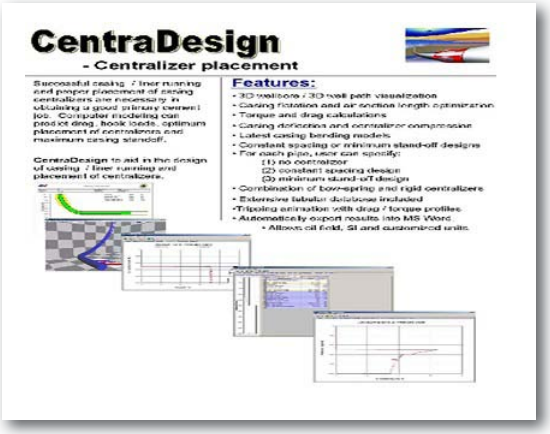


Realizing this into reality is Eneroil arsenal, a team of engineering wizards on site and plant for instant resolution of any customer concern, be it installation or manufacturing.

Facilitating the customer is a comprehensive global network of stockists/ distributor ensuring reliability and convenience. Eneroil clientele across the world's most demanding markets is a testimony to its expertise , knowledge, understanding and efficiency.

Eneroil Centralizer Software Programme

Cementing products installation design should be based on individual well conditions and operating objectives. Eneroil Centralizer Software programme provides optimum deployment (minimum strategic deployment for maximum output) of cementation products in the well.
The Programme works with actual well data, including well profiles and pipe data to calculate down hole forces. It then analyses actual Eneroil Centralizer performance data to determine where to place specific equipment so that a minimum stand off is maintained throughout the string.



The Programme is sophisticated enough to devise a complete equipment installation design by taking pay zone area or other specialized areas into account. While Eneroil Centralizers give perfect bore performance, the Centralizer Software Programme confirms it before application.

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S 10
NON WELD BOW CENTRALIZER

Eneroil non weld bow centralizers are used to position the casing in the centre of the well bore in vertically deviated as well as horizontal wells.

The non weld bow centralizers reduce the effect of channeling by improving cement flow. This results in a more uniform thickness between the casing and the wellbore. By reducing the pipe movement before the cement sets in, the centralizers are able to minimize gas channeling. The centralizers provide a semi rigid casing standoff.

Non weld design features self locking of lips for holding bows to end collars. Bows of special alloy steel are hot formed and tempered for optimum strength, resilience and uniformity. They are then flattened as per specifications for consistent performance.

Non weld bow centralizers are available in 2⅞" to 30"

Centralizer Bow Configuration & Standard Bow Heights

	BSTO	BST 1	BST 2	BST 3	BST4
in.	0.965	1.161	1.437	2.303	3.051
mm	24.5	29.5	36.5	58.5	77.5

Non Weld Bow Centralizer (S 10)

Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm
4½	BST - 0	6.622	168.2
	BST - 1	7.015	178.2
	BST - 2	7.566	192.2
	BST - 3	9.299	236.2
	BST - 4	10.795	274.2
5	BST - 0	7.126	181.0
	BST - 1	7.520	191.0
	BST - 2	8.071	205.0
	BST - 3	9.803	249.0
	BST - 4	11.299	287.0
5½	BST - 0	7.622	193.6
	BST - 1	8.015	203.6
	BST - 2	8.566	217.6
	BST - 3	10.299	261.6
	BST - 4	11.795	299.6
6⅝	BST - 0	8.748	222.2
	BST - 1	9.141	232.2
	BST - 2	9.692	246.2
	BST - 3	11.425	290.2
	BST - 4	12.921	328.2
7	BST - 0	9.124	231.8
	BST - 1	9.517	241.8
	BST - 2	10.068	255.8
	BST - 3	11.801	299.8
	BST - 4	13.297	337.8

Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm
7⅝	BST - 0	9.748	247.6
	BST - 1	10.141	257.6
	BST - 2	10.692	271.6
	BST - 3	12.425	315.6
	BST - 4	13.921	353.6
8⅝	BST - 0	10.748	273.0
	BST - 1	11.141	283.0
	BST - 2	11.692	297.0
	BST - 3	13.425	341.0
	BST - 4	14.921	379.0
9⅝	BST - 0	11.748	298.4
	BST - 1	12.142	308.4
	BST - 2	12.693	322.4
	BST - 3	14.425	366.4
	BST - 4	15.921	404.4
10¾	BST - 0	12.874	327.0
	BST - 1	13.267	337.0
	BST - 2	13.818	351.0
	BST - 3	15.551	395.0
	BST - 4	17.047	433.0
11¾	BST - 0	13.872	352.3
	BST - 1	14.265	362.3
	BST - 2	14.816	376.3
	BST - 3	16.549	420.3
	BST - 4	18.045	458.3

Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm
13⅜	BST - 0	15.561	395.4
	BST - 1	15.954	405.4
	BST - 2	16.505	419.4
	BST - 3	18.238	463.4
	BST - 4	19.734	501.4
16	BST - 0	18.185	461.9
	BST - 1	18.578	471.9
	BST - 2	19.129	485.9
	BST - 3	20.862	529.9
	BST - 4	22.358	567.9
18⅝	BST - 0	20.872	530.2
	BST - 1	21.265	540.2
	BST - 2	21.816	554.2
	BST - 3	23.549	598.2
	BST - 4	25.045	636.2
20	BST - 0	22.248	565.1
	BST - 1	22.642	575.1
	BST - 2	23.193	589.1
	BST - 3	24.925	633.1
	BST - 4	26.421	671.1
24	BST - 0	26.248	666.7
	BST - 1	26.642	676.7
	BST - 2	27.193	690.7
	BST - 3	28.925	734.7
	BST - 4	30.421	772.7

High restoring force combined with low starting force is achieved with all 5 bow heights. Their installation on the casing pipe is very convenient. It requires only the placement of the two assembled halves on the pipe and inserting the pin in the end collar hinge.

The centralizer when unassembled makes a compact package, greatly reducing shipping cost. Assembly at site is conveniently done.

Eneroil offers a wide range of bow heights and shapes enabling the customer to make an optimum choice matching their requirements.

STARTING FORCE TEST

A new fully assembled centralizer is installed over four equally spaced hinges (C on the inner pipe (A)) as shown in figure 1 . The test assembly is held within 5 degrees of the vertical. With the centralizer resting on the edge of the outer pipe B, load is applied on the inner pipe to pull the centralizer into the outer pipe B. Starting force equals the maximum force required to start the centralizer inside pipe B.
The starting force should be less than the weight of 40ft. (12.2 mtrs.) of medium weight casing.

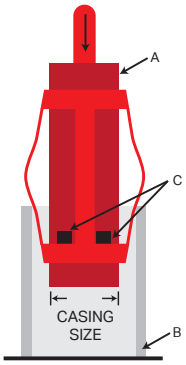

Fig. 1

RESTORING FORCE TEST

Restoring force is the force exerted by a centralizer against the casing to keep it away from the bore hole wall. The test is performed with pipe A and pipe B (Fig. 2) within 5 degrees of the horizontal. External force is applied to the outer pipe B which is transferred to the centralizer. Load is then applied and load deflection readings are recorded for 3 times when the minimum restoring force has been obtained. Each spring is tested and the final load deflection curve is prepared using the arithmetic average of the force readings at corresponding deflections. Restoring force is determined from this curve at 67% stand-off ratio. Field experience shows that stand-off values of 75-90% are adequate even in horizontal wells.

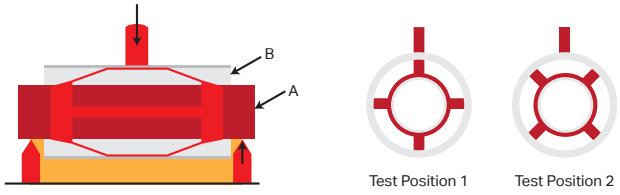

Fig. 2

Bow-spring Selection Guide Non-weld Centralizers

Casing Size in.	Bow Type	Preferred Hole Size Combination in.	Casing Size in.	Bow Type	Preferred Hole Size Combination in.
4½	BST-0	6, 6⅛, 6¼	9⅝	BST-0	-
	BST-1	-		BST-1	11⅜
	BST-2	-		BST-2	11⅜
	BST-3	7⅞,8½		BST-3	11¾, 12¼, 12½, 12⅝
	BST-4	-		BST-4	-
5	BST-0	6¼	10¾	BST-0	-
	BST-1	6¾		BST-1	12¼
	BST-2	-		BST-2	12¼,12 ½, 12⅝,13½
	BST-3	8½,		BST-3	-
	BST-4	12¼		BST-4	14¾
5½	BST-0	6⅝	11¾	BST-0	-
	BST-1	-		BST-1	-
	BST-2	7⅞		BST-2	-
	BST-3	8⅜, 8½, 8¾		BST-3	-
	BST-4	-		BST-4	-
6⅝	BST-0	7⅞	13⅜	BST-0	-
	BST-1	8½, 8⅝		BST-1	14¾
	BST-2	8⅝, 8¾		BST-2	-
	BST-3	-		BST-3	15½,16
	BST-4	-		BST-4	17½
7	BST-0	8⅜, 8½	16	BST-0	-
	BST-1	8½, 8⅝, 8¾		BST-1	17½
	BST-2	8½, 8⅝, 8¾		BST-2	18½
	BST-3	9⅞		BST-3	18½
	BST-4	12¼		BST-4	20, 22
7⅝	BST-0	-	18⅝	BST-0	-
	BST-1	9½		BST-1	-
	BST-2	-		BST-2	-
	BST-3	-		BST-3	22
	BST-4	-		BST-4	24
8⅝	BST-0	9¾	20	BST-0	-
	BST-1	-		BST-1	-
	BST-2	-		BST-2	-
	BST-3	12¼		BST-3	-
	BST-4	-		BST-4	24

Performance requirement
As per API specification 10D

Force in lbs

Casing Size in (inches)	API Non-weld Centralizer	
	Starting Force (max.)	Restoring Force (min.)
4½	464	464
5	520	520
5½	620	620
6⅝	960	960
7	1040	1040
7⅝	1056	1056
8⅝	1440	1440
9⅝	1600	1600
10¾	2040	1020
11¾	2160	1080
13⅜	2440	1220
16	2600	1300
18⅝	3500	1750
20	3760	1880

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S 11
WELDED STRAIGHT BLADE CENTRALIZER

Eneroil welded straight blade centralizers are high quality welded product which meet or exceed API 10 D specifications. The centralizers have bow springs strongly welded to the end collars under required temperature conditions with correct grade electrode.

Integral hinges folded on the inside stay intact even under extreme stress. The end collars are available in latch-on design with high strength steel locking pin for maximum structural toughness. With a choice of six different bow heights the right combination for casing / open hole configuration can be achieved.
The welded straight blade centralizers are available in 2⅞" to 30"

Welded Straight Blade Centralizer (S 11)

Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm	Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm	Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm	Casing Size in.	Bow Type	Max. O.D. Size in.	Max. O.D. Size mm
	WST-00	6.240	158.5		WST-00	8.740	222.0		WST-00	12.488	317.2		WST-00	20.492	520.5
	WST-0	7.362	187.0		WST-0	9.862	250.5		WST-0	13.610	345.7		WST-0	21.614	549.0
	WST-1	7.736	196.5		WST-1	10.236	260.0		WST-1	13.984	355.2		WST-1	21.988	558.5
4½	WST-2	8.110	206.0	7	WST-2	10.610	269.5	10¾	WST-2	14.358	364.7	18⅝	WST-2	22.362	568.0
	WST-3	9.232	234.5		WST-3	11.732	298.0		WST-3	15.480	393.2		WST-3	23.484	596.5
	WST-4	11.476	291.5		WST-4	13.976	355.0		WST-4	17.724	450.2		WST-4	25.728	653.5
	WST-5	14.488	368.0		WST-5	16.988	431.5		WST-5	20.736	526.7		WST-5	28.740	730.0
	WST-00	6.740	171.2		WST-00	9.366	237.9		WST-00	13.488	342.6		WST-00	21.866	555.4
	WST-0	7.862	199.7		WST-0	10.488	266.4		WST-0	14.610	371.1		WST-0	22.988	583.9
	WST-1	8.236	209.2		WST-1	10.862	275.9		WST-1	14.984	380.6		WST-1	23.362	593.4
5	WST-2	8.610	218.7	7⅝	WST-2	11.236	285.4	11¾	WST-2	15.358	390.1	20	WST-2	23.736	602.9
	WST-3	9.732	247.2		WST-3	12.358	313.9		WST-3	16.480	418.6		WST-3	24.858	631.4
	WST-4	11.976	304.2		WST-4	14.602	370.9		WST-4	18.724	475.6		WST-4	27.102	688.4
	WST-5	14.988	380.7		WST-5	17.614	447.4		WST-5	21.736	552.1		WST-5	30.114	764.9
	WST-00	7.240	183.9		WST-00	10.366	263.3		WST-00	15.177	385.5		WST-00	25.866	657.0
	WST-0	8.362	212.4		WST-0	11.488	291.8		WST-0	16.299	414.0		WST-0	26.988	685.5
	WST-1	8.736	221.9		WST-1	11.862	301.3		WST-1	16.673	423.5		WST-1	27.362	695.0
5½	WST-2	9.110	231.4	8⅝	WST-2	12.236	310.8	13⅜	WST-2	17.047	433.0	24	WST-2	27.736	704.5
	WST-3	10.232	259.9		WST-3	13.358	339.3		WST-3	18.169	461.5		WST-3	28.858	733.0
	WST-4	12.476	316.9		WST-4	15.602	396.3		WST-4	20.413	518.5		WST-4	31.102	790.0
	WST-5	15.488	393.4		WST-5	18.614	472.8		WST-5	23.425	595.0		WST-5	34.114	866.5
	WST-00	8.366	212.5		WST-00	11.366	288.7		WST-00	17.803	452.2		WST-00	31.866	809.4
	WST-0	9.488	241.0		WST-0	12.488	317.2		WST-0	18.925	480.7		WST-0	22.988	583.9
	WST-1	9.862	250.5		WST-1	12.862	326.7		WST-1	19.299	490.2		WST-1	23.362	593.4
6⅝	WST-2	10.236	260.0	9⅝	WST-2	13.236	336.2	16	WST-2	19.673	499.7	30	WST-2	23.736	602.9
	WST-3	11.358	288.5		WST-3	14.358	364.7		WST-3	20.795	528.2		WST-3	24.858	631.4
	WST-4	13.602	345.5		WST-4	16.602	421.7		WST-4	23.039	585.2		WST-4	27.102	688.4
	WST-5	16.614	422.0		WST-5	19.614	498.2		WST-5	26.051	661.7		WST-5	30.114	764.9

S 12
SINGLE PIECE GLIDER CENTRALIZER

Eneroil offshore has developed its single piece glider centralizer (S12) model to meet growing demands worldwide for a Centralizer which can perform satisfactorily in Open hole as well as Cased hole.

These are high quality product, developed to meet and exceed API 10D specifications for use in highly demanding downhole conditions like ERD wells.

Eneroil's single piece glider centralizer (S 12) combines the highest restoring force with zero starting force and zero running force thus minimising drag during running of the casing. S 12 centralizer is used to position the casing in the centre of the wellbore in vertical deviated and horizontal wells.

S12 Centralizers reduce the effect of channeling by improving the cement flow, this results in more uniform cement thickness in the wellbore. By reducing the pipe movement before cement sets in S12 Centralizers are able to minimize gas channeling.

Eneroil's S12 Centrailizers are one piece construction in special high strength steel which imparts excellent hardness and spring action ensuring an unmatched ability to come back to its original shape after undergoing rigorous stress loads conditions, these centralizers can pass through highly constricted space and then again regain their original shape without any deformity to give excellent standoff in open hole area.

Its bow spring design makes it highly flexible and its single piece construction makes it structurally robust and gives extra strength to withstand high stress conditions in demanding downhole situations making it the most preferred choice of cementers.

Single Piece Glider Centralizer (S 12)

Casing Size	Hole Size	ID in inches	ID in mm	OD in inches	OD in mm	Height in mm	Number of Bow	Starting Force (max.) As per API-10D	Starting Force Observed	Restoring Force (min.) As per API-10D	Restoring Force Observed
4½"	6"	4⅝"	117.5	6"	152.4	317.5	4	211 Kgf. (464 lbf.)	0	211 Kgf. (464 lbf.)	1972 lbf.
5½"	8½"	5⅝"	142.9	8½"	215.9	317.5	6	281 Kgf. (620 lbf.)	0	281 Kgf. (620 lbf.)	1568 lbf.
7"	8½"	7⅛"	181.0	8 ½"	215.9	368.3	6	472 Kgf. (1040 lbf.)	0	472 Kgf. (1040 lbf.)	1727 lbf.
7⅝"	8½"	7¾"	196.9	8 ½"	215.9	368.3	6	479.4 Kgf. (1056 lbf.)	0	479.4 Kgf. (1056 lbf.)	1856 lbf.
9⅝"	12¼"	9¾"	247.7	12¼"	311.2	457.2	6	726 Kgf. (1600 lbf.)	0	726 Kgf. (1600 lbf.)	2946 lbf.
13⅜"	17½"	13⁹⁄₁₆"	344.5	17½"	444.5	457.2	8	1107 Kgf. (2440lbf.)	0	553.5 Kgf. (1220 lbf.)	2140 lbf.

S 20
NON WELD POSITIVE CENTRALIZER

Available in the size range 4½" to 20", these centralizers are uniquely designed with flat bottom U profile of different depths permitting maximum fluid passage.

Available with straight bows for casing operations, this device provides nearly 100% stand-off (Concentricity) when run inside a case hole. The self locking design ensures firm hold. Its non-welded structure, eliminates brittle spots and enhances durability.

Eneroil non weld positive centralizer significantly reduce frictional drag while being used in deviated holes. They are supplied ¼"/6mm less than the inside diameter of the casing or hole size in which the centralizer is to be run.

Non Weld Positive Centralizer (S 20)

Casing size	BOW TYPE / MAXIMUM O.D																			
	P-1		P-2		P-3		P-4		P-5		P-6		P-7		P-8		P-9		P-10	
in.	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
4½	5.874	149.2	6.252	158.8	6.626	168.3	6.875	174.6	7.213	183.2	7.606	193.2	8.000	203.2	8.394	213.2	9.575	243.2	10.992	279.2
5	6.374	161.9	6.768	171.9	7.161	181.9	7.398	187.9	7.713	195.9	8.106	205.9	8.500	215.9	8.894	225.9	10.075	255.9	11.492	291.9
5½	6.874	174.6	7.252	184.2	7.661	194.6	7.898	200.6	8.213	208.6	8.606	218.6	9.000	228.6	9.394	238.6	10.575	268.6	11.992	304.6
6⅝	8.000	203.2	8.394	213.2	8.787	223.2	9.024	229.2	9.339	237.2	9.732	247.2	10.126	257.2	10.520	267.2	11.701	297.2	13.118	333.2
7	8.374	212.7	8.768	222.7	9.161	232.7	9.398	238.7	9.713	246.7	10.106	256.7	10.500	266.7	10.894	276.7	12.075	306.7	13.492	342.7
7⅝	9.000	228.6	9.394	238.6	9.787	248.6	10.024	254.6	10.339	262.6	10.732	272.6	11.126	282.6	11.520	292.6	12.701	322.6	14.118	358.6
8⅝	10.000	254.0	10.394	264.0	10.787	274.0	11.024	280.0	11.339	288.0	11.732	298.0	12.126	308.0	12.520	318.0	13.701	348.0	15.118	384.0
9⅝	11.000	279.4	11.394	289.4	11.787	299.4	12.024	305.4	12.339	313.4	12.732	323.4	13.126	333.4	13.520	343.4	14.701	373.4	16.118	409.4
10¾	12.126	308.0	12.520	318.0	12.913	328.0	13.150	334.0	13.465	342.0	13.858	352.0	14.252	362.0	14.646	372.0	15.827	402.0	17.244	438.0
11¾	13.126	333.4	13.520	343.4	13.913	353.4	14.150	359.4	14.465	367.4	14.858	377.4	15.252	387.4	15.646	397.4	16.827	427.4	18.244	463.4
13⅜	14.811	376.2	15.205	386.2	15.598	396.2	15.835	402.2	16.150	410.2	16.543	420.2	16.937	430.2	17.331	440.2	18.512	470.2	19.929	506.2
16	17.437	442.9	17.831	452.9	18.224	462.9	18.461	468.9	18.776	476.9	19.169	486.9	19.563	496.9	19.957	506.9	21.138	536.9	22.555	572.9
18⅝	20.126	511.2	20.520	521.2	20.913	531.2	21.150	537.2	21.465	545.2	21.858	555.2	22.252	565.2	22.646	575.2	23.827	605.2	25.244	641.2
20	21.500	546.1	21.894	556.1	22.287	566.1	22.524	572.1	22.839	580.1	23.232	590.1	23.626	600.1	24.020	610.1	25.201	640.1	26.618	676.1
24	25.500	647.7	25.894	657.7	26.287	667.7	26.524	673.7	26.839	681.7	27.232	691.7	27.626	701.7	28.020	711.7	29.201	741.7	30.618	777.7

S 29
SEMI-RIGID BOW CENTRALIZER

Available in the size range 2⅞" to 20", this device ensures high efficiency in casing jobs on deviated and horizontal wells. Combining the features of a standard spring bow and rigid centralizer, it has bows manufactured from alloy steel tempered for exact hardness and a non-weld design to eliminate brittle spots.

The spring characteristics of its double crested profile permit compression to facilitate movement through tight spots and dog legs. Compared to other Spring Bow Centralizers this device attains higher stand-off because of its higher restoring force.

S 32
NON-WELD CENTRALIZER WITH TURBO FINS

Available in the size range 4½" to 20", this sturdy non-weld device induces a spiral flow pattern in the slurry thereby increasing displacement efficiency. Fitted with specially designed multi-direction turbo fins made of alloy steel in annealed state this device improves the cleaning action of drilling fluids, distributes the cement slurry into wellbore irregularities and minimizes channeling.

Installation of Non weld Centralizer with Turbofin on the casing pipe is very convenient. It requires only the placement of two assembled halves on the pipe and inserting the pin in the end collar hinge.

S 24 / S 26 / S 28
STRAIGHT BLADE SOLID CENTRALIZER

Eneroil straight blade solid centralizers provide the right features for getting a good primary cementing job with maximum casing/ wellbore stand off. Eneroil straight blade solid centralizers are constructed of one piece steel alloy (S 24) high strength corrosion resistant cast aluminium (S 28) and also non sparking zinc alloy (S26). Eneroil straight blade solid centralizers provide ultimate drag and torque reduction with maximum fluid bypass. With low friction factor Eneroil straight blade solid centralizers withstand high wellbore temperatures while providing maximum horizontal standoff.

Eneroil centralizers are wellhead friendly and have high impact with shock resistance, along with optimum tensile and yield strength.

S 23 / S 25 / S 27
SPIRAL BLADE SOLID CENTRALIZER

Eneroil Spiral Blade Solid Centralizers were developed in response to the need for better cementing in highly deviated and horizontal wells. Eneroil Spiral Blade Solid Centralizers are designed to provide optimum flow area. The 360 degrees overlapping solid vane provide maximum wall contact and fluid swirl. Reduced flow area between the spiral blades produces a vortex motion of the fluids for more fluid velocity with direction.

Eneroil Spiral blade Solid Centralizer is made of steel (S 23), high strength corrosion resistant cast aluminium (S 27) and also non sparking zinc alloy (S 25). The 30° slope of the vane end reduce drag and aids the casing in reaching TD. This gentle flow from the body to the height of the vane will eliminate scraping, gouging or digging into the formation and consequently reduce balling between the vanes. Eneroil Spiral Blade Solid Centralizer has high impact and shock resistance combined with tensile and yield strength as well as resists corrosion.

Straight / Spiral Blade Centralizer (S 23 - S28)

Casing Size	Hole Size	Nominal OD	Height (Straight)	Height (Spiral)	Number of Vanes
in	in	in	in	in	
3½	4½	4¼	6	6	4
4½	6¼	6	6	6	4
5	6⅛	5⅞	8	8	4
5	8½	8 ¼	8	8	4
5½	6½	6¼	8	8	4
5½	8½	8¼	8	8	4
7	8½	8¼	8	8	6
7⅝	9⅞	9⅝	8	8	6
9⅝	12¼	12	10	10	6
10¾	14¾	14½	10	10	8
11¾	14¾	14½	10	10	8
13⅜	17½	17¼	10	10	8

Available in Left or Right Hand Spirals

S 36
SPIRASLIDER

Eneroil Spiraslider is designed specifically for highly deviated or horizontal wells. The steel construction ensures extra strength and superior toughness. The design of the blades provide minimum friction reducing drag forces while running in the pipe.

The Spirasliders are available in spiral and straight blades which resist high side loads. While giving maximum standoff the blades create vortex flow to optimize mud displacement. The centralizers are available in 4½" to 13⅜".

S 38
HEAVY DUTY SPIRASLIDER

Eneroil Heavy Duty Spiraslider Centralizer (S 38) is designed to allow for optimal mud displacement for vertical, inclined and horizontal wells. The complete system consists of heavy duty spiraslider and two beveled stop collars shaped to minimize running resistance. Heavy duty spiraslider has special rounded blades which reduce sliding friction of the casing while the special stop collar performs as a positioning device.

Heavy duty spirasliders are recommended when extremely high axial loads are anticipated. Heavy duty spiraslider design provides a bearing surface for lower drag forces, which requires less rotating torque than conventional centralizers enhancing rotation and running efficiency. Specially designed spiral blades minimize drag forces while running of the casing.

These fins glide smoothly in the low side of the borehole wall. Wide symmetrical fins, beveled smooth at both ends, glide easily over restrictions. Heavy duty spiraslider are manufactured using laser cutting of the fins and advanced robotic welding which ensures that each centralizers gives extremely robust performance under the most demanding well conditions,

Heavy duty spiraslider has unique spiral blade shape which allows for optimal mud displacement during the cementing process.

Spiraslider (S 36)

Casing Size	Hole Size	Nominal Outer Diameter		Height	Number of Vanes
in	in	mm	in	in	
4½	6	146.1	5.750	12	4
4½	8½	206.4	8.125	12	4
4½	8⅜	209.6	8.250	12	4
5	6	146.1	5.750	12	4
5½	8½	206.4	8.125	12	4
5½	8⅜	209.6	8.250	12	4
7	8½	206.4	8.125	12	6
7	8⅜	209.6	8.250	12	6
9⅝	12¼	304.8	12.000	12	7
13⅜	16	400.1	15.750	12	8
13⅜	17½	438.2	17.250	12	8

Heavy Duty Spiraslider (S 38)

Casing Size	Hole Size	Nominal Outer Diameter		Height	Number of Vanes
in	in	mm	in	in	
4½	6	146.1	5.750	12	4
4½	8½	206.4	8.125	12	4
4½	8⅜	209.6	8.250	12	4
5	6	146.1	5.750	12	4
5½	8½	206.4	8.125	12	4
5½	8⅜	209.6	8.250	12	4
7	8½	206.4	8.125	12	6
7	8⅜	209.6	8.250	12	6
9⅝	12¼	304.8	12.000	12	7
13⅜	16	400.1	15.750	12	8
13⅜	17½	438.2	17.250	12	8

S 60
HINGED BOLTED STOP COLLAR

An economical collar suitable for subcritical annular tolerances. Available in the size range 3½ " to 20", it has a cross bolt design which makes it an efficient and user friendly device.

S 61
HINGED SPIRAL NAIL STOP COLLAR

Available in the size range 3½" to 13⅜", this device can be used in both upset and non-upset casing to provide maximum clearance during rotation.

It has a groove in the middle into which a spiral nail can be driven for improved grip on the casing. The broader band firmly grips the collar into position around the casing.

S 62
HINGED SPIRAL NAIL STOP COLLAR

Available in the size range 3½" to 20", this device can be used in both upset and non-upset casing to provide maximum clearance during rotation. It has a groove in the middle into which a spiral nail can be driven for improved grip on the casing.

S 63
STOP COLLAR WITH SET SCREW

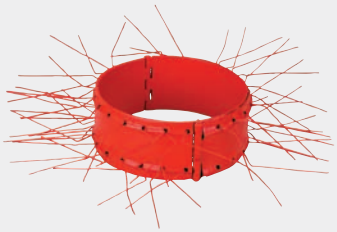
Available in the size range 3½ " to 20", this device has a high cost-utility ratio. This hinged collar with a row of set screws positions easily and firmly around the casing.

S 40
SLIP-ON STAND-OFF BAND

Stand off band is designed specifically for highly deviated or horizontal wells. Blades are formed by pressing on the sleeve. The steel construction ensures extra strength and superior toughness.

The stand off bands are available in 4½" to 13⅜". The Stand off band are available in straight / spiral blades which resist high side loads and increases flow to optimize mud displacement.

S 70
WIRE BRISTLE SCRATCHER



Consists of a hinged collar radiating into bristles. Each bristle is made of hardened & tempered wire with two scratching elements.

Available in the size range 4½" to 20" these scratchers improve the cement bond between the casing and porous formations while reinforcing the cement column.

S 65

SLIP-ON STOP COLLAR WITH SET SCREWS ON ONE SIDE BEVELED

This slip-on set screw device is recommended for small hole operations. Available in size 3½" to 20" beveled one side, and is gripped by a row of screws. This is a heavy duty device.

Stop Collars (S 60, S 61, S 62, S 63, S 65)

Size	Hinged Bolted		Hinged Spiral		Hinged Set. Screw		Slip on with set screw	
	S-60		S-61/S-62		S-63		S-65	
	Max. O.D.		Max. O.D.		Max. O.D.		Max. O.D.	
in.	in	mm	in	mm	in	mm	in	mm
3 ½	4.843	123	4.803	122	4.882	124	4.213	107
4½	5.827	148	5.827	148	5.866	149	5.217	132
5	6.339	161	6.378	162	6.339	161	5.717	145
5½	6.890	175	6.850	174	6.850	174	6.217	157
6⅝	7.953	202	7.992	203	7.992	203	7.343	186
7	8.425	214	8.425	214	8.425	214	7.717	196
7⅝	8.976	228	9.094	231	8.976	228	8.343	211
8⅝	9.961	253	10.000	254	10.000	254	9.343	237

Size	Hinged Bolted		Hinged Spiral		Hinged Set. Screw		Slip on with set screw	
	S-60		S-61/S-62		S-63		S-65	
	Max. O.D.		Max. O.D.		Max. O.D.		Max. O.D.	
in.	in	mm	in	mm	in	mm	in	mm
9⅝	10.945	278	11.102	282	11.024	280	10.343	262
10¾	12.087	307	12.165	309	12.126	308	11.469	291
11¾	13.071	332	13.189	335	13.110	333	12.469	316
13⅜	14.803	376	14.961	380	14.843	377	14.091	357
13⅝	17.441	443	17.480	444	17.441	443	14.406	365
18⅝	20.079	510	20.118	511	20.118	511	19.469	494
20	21.457	545	21.496	546	21.496	546	20.843	529

S 80

WELLBORE WIPER

Consisting of loop wire cables of tempered steel laced into a collar, these wipers clean the well bore efficiently by permitting removed filter cake to pass, there by providing excellent reinforcement to the cement column especially under close spacing. Available in size range 4½" to 20"

S 90

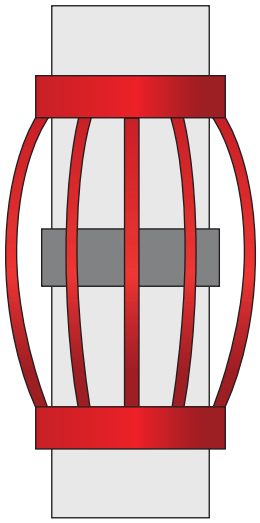
CEMENT BASKET

Available in the size range 4½' to 30", this device consists of flexible steel spring bows welded to slip-on collars. Bows are hardened and tempered for maximum strength and uniformity.

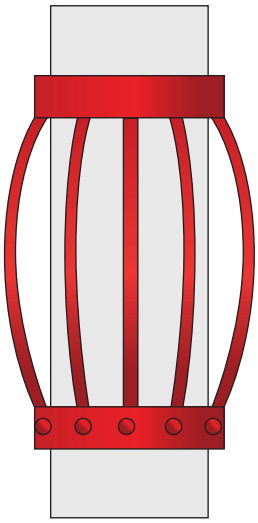
It is run on casing or liners above weak or porous formations to provide protection from hydrostatic pressure generated by the cement column. Its overlapping metal fins provide flexibility and fluid passage while maintaining optimum support characteristics.

INSTALLATION PROCEDURE

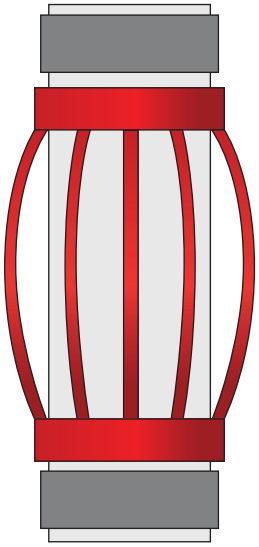
The four methods of Centralizer installation are illustrated below



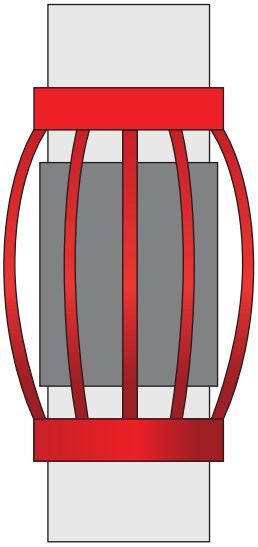
Over Stop Collar



Intergral Stop
(Set Crews)



Between Stop Collar



Over Casing Coupling

CASING TABLE

Casing Outside Diameter		Nominal Weight		Wall Thickness		Inside Diameter		Coupling Outside Diameter	
in	mm	lb/ft	kg/m	in	mm	in	mm	in	mm
4½	114.30	9.50	14.14	.205	5.20	4.090	103.88	5.000	127.00
4½	114.30	10.50	15.63	.224	5.69	4.052	102.92	5.000	127.00
4½	114.30	11.60	17.26	.250	6.35	4.000	101.60	5.000	12700
4½	114.30	13.50	20.09	.290	7.37	3.920	99.56	5.000	127.00
4½	114.30	15.10	22.47	.337	8.56	3.826	97.18	5.000	12700
5	12700	11.50	17.11	.220	5.59	4.560	115.82	5.563	141.30
5	12700	13.00	19.35	.253	6.43	4.494	114.14	5.563	14130
5	127.00	15.00	22.32	.296	7.52	4.408	111.96	5.563	141.30
5	127.00	18.00	26.79	.362	9.19	4.276	108.62	5.563	141.30
5	127.00	21.40	31.85	.437	11.10	4.126	104.80	5.563	14130
5	127.00	23.20	34.53	.478	12.14	4.044	102.72	5.563	141.30
5	127.00	24.10	35.86	.500	12.70	4.000	101.60	5.563	141.30
5½	139.70	14.00	20.83	.224	5.69	5.052	127.32	6.050	153.67
5½	139.70	15.50	23.07	.275	6.99	4.950	125.72	6050	153.67
5½	139.70	17.00	25.30	.304	7.72	4.892	124.26	6.050	153.67
5½	139.70	20.00	29.76	.361	9.17	4778	121.36	6.050	153.67
5½	139.70	23.00	34.23	.415	10.54	4.670	118.62	6.050	153.67
5½	139.70	26.80	39.88	.500	12.70	4.500	114.30	6050	153.67
5½	139.70	29.70	44.20	.562	14.27	4.376	111.16	6.050	153.67
5½	139.70	32.60	48.51	.625	15.88	4.250	107.94	6.050	153.67
5½	139.70	35.30	52.53	.687	17.45	4.126	104.80	6.050	153.67
5½	139.70	38.00	56.55	.750	19.05	4.000	101.60	6.050	153.67
5½	139.70	40.50	60.27	.812	20.62	3.876	98.46	6.050	153.67
5½	139.70	43.10	64.14	.875	22.23	3.750	95.24	6.050	153.67
5¾	146.05	18.00	26.79	.303	7.70	5.144	130.65	6.535	166.00
5¾	146.05	19.70	29.32	.335	8.50	5.081	129.05	6.535	166.00
5¾	146.05	21.90	32.59	.374	9.50	5.002	12705	6.535	166.00
5¾	146.05	24.40	36.31	.421	10.70	4.907	124.65	6.535	166.00
6⅝	168.28	17.00	25.30	.245	6.22	6.135	155.84	7.390	187.71
6⅝	168.28	20.00	29.76	.288	7.32	6.049	153.64	7.390	187.71
6⅝	168.28	24.00	35.72	.352	8.94	5.921	150.40	7.390	187.71
6⅝	168.28	28.00	41.67	.417	10.59	5.791	147.10	7.390	187.71
6⅝	168.28	32.00	47.62	.475	12.07	5.675	144.14	7.390	187.71
7	177.80	17.00	25.30	.231	5.87	6538	166.06	7.656	194.46
7	177.80	20.00	29.76	.272	6.91	6.456	163.98	7.656	194.46
7	177.80	23.00	34.23	.317	805	6.366	161.70	7.656	194.46
7	177.80	26.00	38.69	.362	9.19	6.276	159.42	7.656	194.46
7	177.80	29.00	43.16	.408	10.36	6.184	157.08	7.656	194.46
7	177.80	32.00	47.62	.453	11.51	6.094	154.78	7.656	194.46
7	177.80	35.00	52.09	498	12.65	6.004	152.50	7.656	194.46
7	177.80	38.00	56.55	.540	13.72	5.920	150.36	7.656	194.46
7	177.80	42.70	63.54	.626	15.90	5.748	146.00	7.656	194.46
7	177.80	46.60	69.35	.687	17.45	5.626	142.90	7.656	194.46
7	177.80	50.10	74.56	.750	19.05	5.500	139.70	7.656	194.46
7	177.80	53.60	79.77	.812	20.62	5.376	136.56	7.656	194.46
7	177.80	57.10	84.97	.875	22.23	5.250	133.34	7.656	194.46
7⅝	193.68	20.00	29.76	.250	6.35	7.125	180.98	8.500	21590
7⅝	193.68	24.00	35.72	.300	7.62	7.025	178.44	8.500	215.90
7⅝	193.68	26.40	39.29	328	8.33	6.969	177.02	8.500	215.90
7⅝	193.68	29.70	44.20	.375	9.53	6.875	174.62	8.500	215.90
7⅝	193.68	33.70	50.15	.430	10.92	6.765	171.84	8.500	215.90
7⅝	193.68	39.00	5804	.500	12.70	6.625	168.28	8.500	215.90
7⅝	193.68	42.80	63.69	.562	14.27	6.501	165.14	8.500	215.90
7⅝	19368	45.30	67.41	595	15.11	6435	163.46	8.500	215.90
7⅝	193.68	47.10	70.09	.625	15.88	6.375	161.92	8.500	215.90
7⅝	193.68	5120	76.19	.687	17.47	6.251	158.78	8.500	215.90
7⅝	193.68	55.30	82.30	.750	19.05	6.125	155.58	8.500	215.90
7¾	196.85	46.10	68.60	.595	15.11	6.560	166.63	-	-
8⅝	219.08	24.00	35.72	.264	6.71	8.097	205.66	9.625	9.625
8⅝	219.08	28.00	41.67	.304	7.72	8.017	203.64	9.625	9.625
8⅝	219.08	32.00	47.62	.352	8.94	7.921	201.20	9.625	9.625
8⅝	219.08	36.00	53.57	.400	10.16	7.925	198.76	9.625	9.625
8⅝	219.08	40.00	59.53	.450	11.43	7.725	196.22	9.625	9.625
8⅝	219.08	44.00	65.48	.500	12.70	7.625	193.68	9.625	9.625
8⅝	219.08	49.00	72.92	.557	14.15	7.511	19018	9.625	9.625

Casing Outside Diameter		Nominal Weight		Wall Thickness		Inside Diameter		Coupling Outside Diameter	
in	mm	lb/ft	kg/m	in	mm	in	mm	in	mm
9⅝	244.48	29.30	43.60	.281	7.14	9.063	230.20	10.625	269.88
9⅝	244.48	32.30	48.07	.312	7.92	9.001	228.64	10.625	269.88
9⅝	244.48	36.00	53.57	352	8.94	8.921	226.60	10.625	269.88
9⅝	244.48	40.00	59.53	.395	1003	8.835	224.42	10.625	269.88
9⅝	244.48	43.50	64.74	.435	11.05	8.755	222.38	10.625	269.88
9⅝	244.48	47.00	69.94	.472	11.99	8.681	220.50	10.625	269.88
9⅝	244.48	53.50	79.62	.545	13.84	8.535	216.80	10.625	269.88
9⅝	244.48	58.40	86.91	.595	15.11	8.435	214.26	10.625	269.88
9⅝	244.48	59.40	88.40	.609	15.47	8.407	213.54	10.625	269.88
9⅝	244.48	64.90	96.58	.672	17.07	8.281	210.34	10.625	269.88
9⅝	244.48	70.30	104.62	.734	18.64	8.157	207.20	10.625	269.88
9⅝	244.48	75.60	112.51	.797	20.24	8.031	204.00	10.625	269.88
10¾	273.05	32.75	48.74	.279	7.09	10.192	258.87	11.750	298.45
10¾	273.05	40.50	60.27	.350	8.89	10.050	255.27	11.750	298.45
10¾	273.05	45.50	67.71	.400	10.16	9.950	252.73	11.750	298.45
10¾	273.05	51.00	75.90	.450	11.43	9.850	250.19	11.750	298.45
10¾	273.05	55.50	82.59	.495	12.57	9.760	247.91	11.750	298.45
10¾	273.05	60.70	90.33	.545	13.84	9.660	245.37	11.750	298.45
10¾	273.05	65.70	97.77	.595	15.11	9.560	242.83	11.750	298.45
10¾	273.05	73.20	108.93	.672	17.07	9.406	238.91	11.750	298.45
10¾	273.05	79.20	117.86	.734	18.64	9.282	235.77	11.750	298.45
10¾	273.05	85.30	126.94	.797	20.24	9.156	232.57	11.750	298.45
11¾	298.45	38.00	56.55	.300	7.62	11.150	283.21	12.750	323.85
11¾	298.45	42.00	62.50	.333	8.46	11.084	281.53	12.750	323.85
11¾	298.45	47.00	69.94	.375	9.53	11.000	279.39	12.750	323.85
11¾	298.45	54.00	80.36	.435	11.05	10.880	276.35	12.750	323.85
11¾	298.45	60.00	89.29	.489	12.42	10.772	273.61	12.750	323.85
11¾	298.45	65.00	96.73	.534	13.56	10.682	271.33	12.750	323.85
11¾	298.45	71.00	105.66	.582	14.78	10.586	26889	12.750	323.85
12¾	323.85	45.20	67.27	.335	8.50	12.081	306.85	13.819	351.00
12¾	323.85	50.40	75.00	.374	9.50	12.002	304.85	13.819	351.00
12¾	323.85	58.60	87.21	.437	11.10	11.876	301.65	13.819	351.00
12¾	323.85	65.20	97.03	.488	12.40	11.774	299.05	13.819	351.00
12¾	323.85	77.20	111.89	.583	14.80	11.585	294.25	13.819	351.00
13⅜	339.73	48.20	71.43	.330	8.38	12.715	322.97	14.375	365.13
13⅜	339.73	54.50	81.10	.380	9.65	12.615	320.43	14.375	365.13
13⅜	339.73	61.00	90.78	.430	10.92	12.515	317.89	14.375	365.13
13⅜	339.73	68.00	10120	.480	12.19	12.415	315.35	14.375	365.13
13⅜	339.73	72.00	107.15	.514	13.06	12.347	313.61	14.375	365.13
16	406.40	55.00	81.85	.313	7.95	15.374	390.50	17.00	431.80
16	406.40	65.00	96.73	.375	9.53	15.250	387.34	17.00	431.80
16	406.40	75.00	111.61	.438	11.13	15.124	384.14	17.00	431.80
16	406.40	84.00	125.01	.495	12.57	15.010	381.26	17.00	431.80
16	406.40	109.00	162.21	.656	16.66	14.688	373.08	17.00	431.80
16¾	425.45	70.10	104.32	.394	10.00	15.963	405.45	17.756	451.00
16¾	425.45	76.90	114.44	.433	11.00	15.884	403.45	17.756	451.00
16¾	425.45	83.70	124.56	.472	12.00	15.805	401.45	17.756	451.00
18⅝	473.08	87.50	130.21	.435	11.05	17.755	450.98	20.000	508.00
20	508.00	94.00	139.89	.438	11.13	19.124	485.74	21.000	533.40
20	508.00	106.50	158.49	.500	12.70	19.000	482.60	21.000	533.40
20	508.00	133.00	197.93	.635	16.13	18730	475.74	21.000	533.40
24	609.60	125.50	186.76	.500	12.70	23.000	584.20	N/A	N/A
24	609.60	158.50	235.87	.635	16.13	22.730	577.34	N/A	N/A
24	609.60	176.40	262.51	.709	18.01	22.582	573.58	N/A	N/A
24	609.60	201.10	299.27	.812	20.62	22.376	568.36	N/A	N/A
26	660.40	202.30	301.06	.750	19.05	24.500	622.30	N/A	N/A
26	660.40	267.00	397.34	.812	20.62	24.376	619.16	N/A	N/A
26	660.40	182.70	271.89	.866	22.00	24.268	616.40	N/A	N/A
26	660.40	267.00	397.34	1.000	25.40	24.000	609.60	N/A	N/A
28	711.20	182.70	271.89	.625	15.88	26.750	679.44	N/A	N/A
28	711.20	218.30	324.87	.750	19.05	26.500	673.10	N/A	N/A
30	76200	196.10	291.83	.625	15.88	28.750	730.24	N/A	N/A
30	76200	234.30	348.68	150	19.05	28.500	723.90	N/A	N/A
30	762.00	309.70	460.88	1.000	25.40	28.000	711.20	N/A	N/A
30	762.00	0.00	0.00	0.00	0.00	30.000	762.00	N/A	N/A

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