Lifting & Mooring

PRODUCT GUIDE

IRIZAR FORGE

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0. WELCOME TO IRIZAR FORGE

1. CRANE HOOKS

2. CRANE BLOCKS

3. SUBSEA FORGED HOOKS

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WELCOME TO IRIZAR FORGE

The organization where **forging comes true.**

Located in the most industrial powerhouse valley in the Basque Country, IRIZAR FORGE is a **young organization only +90 years old** with a non stop investment policy in World Class facilities and human team.

4 generations accumulated experience and the young energy is the right combination to lead the **Heavy Duty Material Handling Industry.**

With activity both in the **Onshore and Offshore, where the most critical LIFTING & MOORING operations** are held:

* **Onshore target industries**: Industrial, Hydro, Steel & Aluminium**,** Paper... for outdoor & indoor cranes.
* **Shore target industries**: Port & Harbour, Shippyards, Nuclear.
* **Offshore target industries**: Oil & Gas, Renewables for top site & Subsea appliance.

Focused in **heavy duty** appliance **critical** components at **abnormal & extreme conditions** where long lifetime and high safety factors are required:

* **Hooks, rope sheaves and complete crane blocks** up **to 5.000t SWL** for lifting& mooring.
* Additionally other crane components as forged **Wheels.**
* Additionally other mooring line accesories as **Shackles, Y-H-Links, Swivels, Sockets.**

NOT LIMITED TO PRODUCTION: Engineering, Manufacturing & Inspection of crane components as well as lifting & mooring accessories is our core business.

* **DESIGN, CALCULATION & SIMULATION** of critical safety related items is the first step to start advising customers interested in **latest innovative designs or just replacing an old non forged accessory to a new forged** one complying with all relative international rules & standards.

* **PRODUCTION**: After related design approvals production begins heating selected steel.

FORGING: is the main process to achieve safety factors and reduction ratios guaranteeing the many benefits of forging against other processes. Forging facilities are divided into two shops: one for parts up to 5000kg (11.000 lbs) weight and the second for parts up to 20.000kg weight (44.000 lbs).

HEAT TREATMENT: after tensions created in the steel structure, all parts are treated to achieve its final mechanical properties and distress material having as result strong and long lifetime products.

SURFACE FREE OF DEFECTS: non just an aesthetic matter, but small unvisible indications could became a crack in the future failuring the part provocating an accident.

MACHINING & ASSEMBLY: the machining & assembly of all components comes true in our world class facilities focused in **large components processing.**

* **INSPECTION, TESTING & CERTS**: To guarantee a free of defects supply, **DT & NDT** inspections are held **before, during & after production** processes complying with international rules, standards and customer specs & requirements.
The key proof is the **overload test, having in-site several benches up to 6000t.**
The company is certified by the most popular classification societies as **LRS, DNV-GL, ABS, BV, TUV, for major approvals, type and design approvals.**

COME & DISCOVER: IN FORGE WE TRUST: your forge boutique for lifting & mooring critical components.

BRIEFING:

1. WHAT? LIFTING & MOORING SOLUTIONS

* KEY FOCUS: SAFETY RELATED CRANE COMPONENTS and SUBSEA MOORING LINE FORGED ACCESSORIES.

* TOP PRODUCTS:

FORGED HOOKS, WELD FREE SHEAVES, CRANE BLOCKS and WIDE BODY SHACKLES for LIFTING APPLIANCE.

ROV HOOKS and ROV SHACKLES for MOORING APPLIANCE.

2. WHERE? ONSHORE & OFFSHORE

* KEY FOCUS: HARSH ENVIRONMENTS.

ONSHORE (OUT & INDOOR): NUCLEAR, HYDRO, PORTS, SHIPYARDS, CIVIL CONSTRUCTION, INDUSTRIAL PROCESSING.

OFFSHORE (TOPSITE AND SUBSEA): OIL&GAS and RENEWABLES.

3. HOW? FORGED

* KEY TECHNOLOGY: FORGING and WELD FREE SOLUTIONS.

* SCOPE: DESIGN, PRODUCTION, TESTING & CERTIFICATION.

4. WHY? SAFER, LIGHTER, LONGER LIFETIME

* IRIZAR TOP KEY FACTORS:

SAFER.

LIGHTER.

LONGER LIFETIME.

CAPABILITIES:

IRIZAR FORGE

FORGING is the main process and the preferred & valued technology to produce key products described in this PRODUCT GUIDE.

Forging process is achieved in two shops:

SHOP 1: forgings up to 5.000kg single weight

Presses up to 3.000t force for close die and open die forging.

Furnaces 8m3 for heating process before forging and normalizing process after forging.

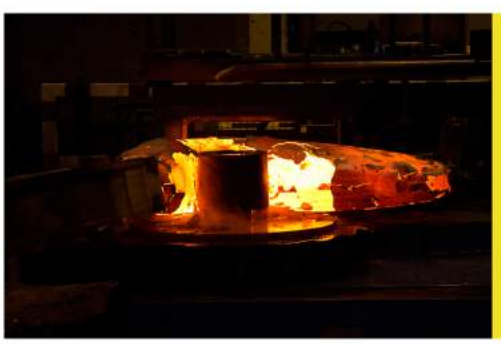
Bending machines up to 300mm.

SHOP 2: forgings up to 20.000kg single weight

Presses up to 10.000t force for close die and open die forging.

Furnaces 20m3 for heating process before forging and normalizing process after forging.

Bending machines up to 500mm.



Auxiliary processes divided in additional 5 workshops:

FLAME CUTTING technology by O2 for 500mm thickness.

SHOT BLASTING & GRINDING MACHINES to achieve smooth surfaces to guarantee free of defects forgings.

MACHINING: milling & lathes for rought & final machining.

ASSEMBLY AND PAINTING for turnkey projects and finished products as complete blocks.

IRIZAR TEST

This unit of the organization is focused on the Complete Quality Management Assurance of the Product & Organization:

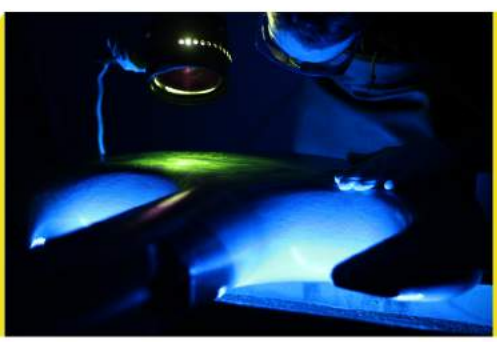
PRODUCT QUALITY ASSURANCE

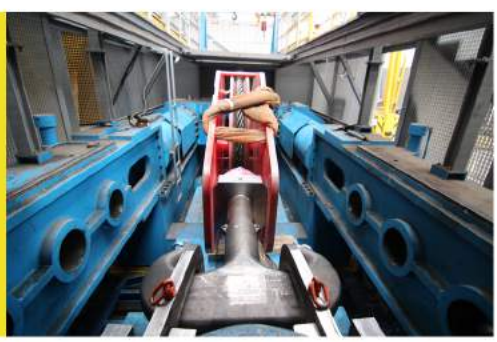
All kind of Tests & Inspections are held in order to comply with most Worldwide International Rules & Standards: DT, NDT & PTL tests are held for a full product guarantee.

PTL, Proof Test Load is the key test, where a physical over load is applied to the product following International rules & standards: three benchs are calibrated to operate this key test, being the largest one 6000t bench.

As a consequence product particular type approvals and Company certificates are kept to operate in the internal business being the most populars LRS, ABS, DNV-GL and BV.

From Company Qualitification point of view, the Company is certified additionally by TÜV for Quality (ISO9001), Environmental (ISO14001) & HSE (ISO45001) point of view.





CRANE HOOKS

1.0 INTRO

HOOK is one of the most critical safety related item of any crane, and its relative cost compared to crane complete cost, makes this component to be the **priority item from safety** point of view.

Different industrial technologies and steel grades are used worldwide but the safest and more efficient is the **FORGING technology**. This is why 100% of IRIZAR hooks are forged.

During the edition of this catalogue all European old national conflicting standards are withdrawn to be substituted by **EN13001-3-5:2016 NEW STANDARD,** as the only one harmonized crane shank hook standard in force, together with antecessor ISO17440.

Crane hooks can achieve different mechanical properties depending on the crane purpose and concept design. These **properties are divided in 5 CLASSES** depending on the achievable Yield Point and Tensile Strength as follows:

CLASS	YT (Min. Yield Stress) f_y N/mm2	US (Min. Ultimate Strength) f_u N/mm2	FS (Fatigue Strength) ▲σc N/mm2
P	315	490	195
S	390	540	210
T	490	700	250
V	620	800	275
W	770	970	310

These minimum values will be used as design values by the crane manufacturer, being chemical compositions and material grades under manufacturer responsibility to comply with these minimum values.

There are different crane hooks design concepts depending on:

- **Hook shape**: can be symmetrical or asymmetrical but always must work aligned. In case of any misaligned, technical solutions are available on request.
- **Hook section**: can be concave, convex, round or similar depending on the rigging accessories, in order to accommodate the hook seat to the below the hook item.
- **Hook body**: can be single, double/Ramshorn, triton, quadruple. Regularly depends on the loads and volumes of the load and lifting operations.
- **Hook articulation**: can be shank hook, eye hook, fork hook… Regularly shank hooks are fitted with screw nut and crosshead.

All hooks must be LOAD TESTED at the end of the process to validate the design and guarantee the general integrity. This test must be done to the sole hook as a component and/or together with the crane during the final test loading. Generally speaking, the hook tested as a component is at higher force than the one applied to the crane because the required normative safety factors.

For an unequivocal hook selection based on EN13001-3-5:2016, crane designer must fill the input form (Annex 1) and return fully filled to our Technical Department to assist in the right hook selection. The reason of this is because old Crane Drive Groups classification (Annex 2 DIN 15400 Drive Groups) considered operating times (not lifts) and new EN 13001 is based on number of work cycles, being more efficient on dynamic calculations and fatigue failures.

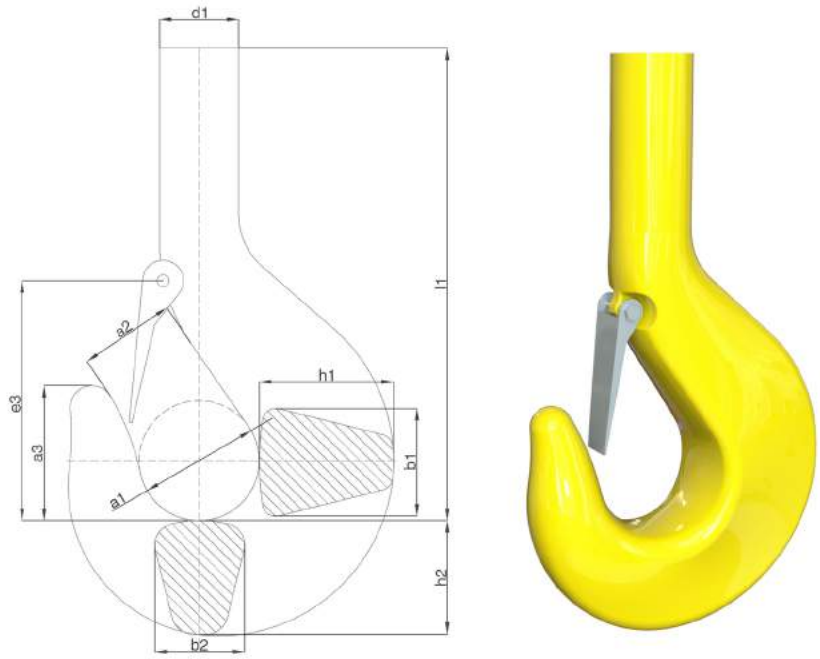
Enjoy CRANE HOOK RANGE in the following pages.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.1 SINGLE FORGED HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS

1.1.1.1 Single forged hooks based on DIN15401 design

1.1.1.1.1 Unmachined



- WLL: from 5t to 2.000t.
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED HOOKS BASED ON DIN15401 DESIGN | UNMACHINED

OVERALL DIMENSIONS (inch)											Weight
No	a1	a2	a3	b1	b2	d1	e3	h1	h2	l1	lbs
2,5	2 15/32	1 31/32	2 27/32	2 3/32	1 25/32	1 21/32	5 3/16	2 5/8	2 9/32	9 31/32	14
4	2 25/32	2 7/32	3 5/32	2 15/32	2 3/32	1 7/8	5 13/16	3 5/32	2 5/8	11 7/32	19
5	3 5/32	2 15/32	3 17/32	2 25/32	2 3/8	2 3/32	6 1/2	3 17/32	2 15/16	12 17/32	27
6	3 17/32	2 25/32	3 31/32	3 5/32	2 5/8	2 3/8	7 9/32	3 15/16	3 11/32	14 31/32	38
8	3 15/16	3 5/32	4 7/16	3 17/32	2 15/16	2 5/8	8 9/32	4 13/32	3 3/4	16 15/32	53
10	4 13/32	3 17/32	5	3 15/16	3 11/32	2 15/16	8 11/16	4 29/32	4 3/16	18 1/8	88
12	4 29/32	3 15/16	5 5/8	4 13/32	3 3/4	3 11/32	9 29/32	5 1/2	4 21/32	20 21/32	121
16	5 1/2	4 13/32	6 5/16	4 29/32	4 3/16	3 3/4	11 1/32	6 5/16	5 3/16	23 7/16	170
20	6 5/16	4 29/32	7 3/32	5 1/2	4 21/32	4 3/16	13	7 3/32	5 29/32	26 3/16	247
25	7 3/32	5 1/2	7 15/16	6 5/16	5 3/16	4 21/32	14 3/16	7 7/8	6 11/16	28 15/16	353
32	7 7/8	6 5/16	8 27/32	7 3/32	5 29/32	5 3/16	15 3/4	8 13/16	7 15/32	31 7/8	485
40	8 13/16	7 3/32	9 29/32	7 7/8	6 11/16	5 29/32	17 19/32	9 27/32	8 11/32	35 5/8	683
50	9 27/32	7 7/8	11 7/32	8 13/16	7 15/32	6 11/16	19 3/32	11 1/32	9 9/32	38 31/32	948
63	11 1/32	8 13/16	12 19/32	9 27/32	8 11/32	7 15/32	21 21/32	12 13/32	10 7/16	44 3/32	1323
80	12 13/32	9 27/32	14 3/32	11 1/32	9 9/32	8 11/32	23 17/32	13 31/32	11 13/16	50	1896
100	13 31/32	11 1/32	15 13/16	12 13/32	10 7/16	9 9/32	27 3/32	15 3/4	13 3/16	55 23/32	2690
125	15 3/4	12 13/32	17 23/32	13 31/32	11 13/16	10 7/16	29 17/32	17 23/32	14 3/4	62 19/32	3836
160	17 23/32	13 31/32	19 7/8	15 3/4	13 3/16	11 13/16	32 15/32	19 11/16	16 23/32	70 15/32	5467
200	19 11/16	15 3/4	22 1/4	17 23/32	14 3/4	13 3/16	35 7/16	22 1/16	18 11/16	80 5/8	7540
250	22 1/16	17 23/32	25	19 11/16	16 29/32	14 3/4	38 19/32	24 13/16	20 7/8	90 3/4	10582
320	24 13/16	19 11/16	28 5/32	22 1/16	18 11/16	16 23/32	42 17/32	27 15/16	22 27/32	102 9/16	14925
400	27 15/16	22 1/16	29 23/32	24 13/16	20 7/8	18 11/16	47 1/16	31 1/2	24 13/16	116 5/32	20734

Tolerances: -0/+7% forging tolerance.

Modifications: Shank length (L). Further dimensions upon request.

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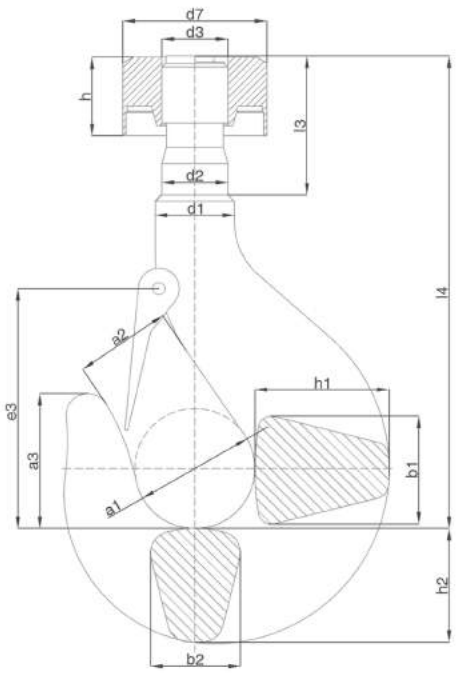
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.1 SINGLE FORGED HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS

1.1.1.1 Single forged hooks based on DIN15401 design

1.1.1.1.2 Machined fitted with nut



- WLL: from 5t to 2.000t.
- Hook and Nut FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED HOOKS BASED ON DIN15401 DESIGN | MACHINED FITTED WITH NUT

	OVERALL DIMENSIONS (inch)													DIN 15413 Nut		Weight
No	a1	a2	a3	b1	b2	d1	e3	h1	h2	d2 h11	d3	l3	l4	d7	h	lbs
2,5	2 19/32	2 1/16	2 15/16	2 3/16	1 27/32	1 23/32	5 13/32	2 3/4	2 3/8	1 15/32	M36	3 13/32	10 1/4	2 7/8	1 13/16	16
4	2 29/32	2 9/32	3 9/32	2 19/32	2 3/16	1 31/32	6 1/16	3 9/32	2 3/4	1 23/32	M42	3 13/16	11 17/32	3 9/32	2	23
5	3 9/32	2 19/32	3 11/16	2 29/32	2 15/32	2 3/16	6 3/4	3 11/16	3 1/16	1 27/32	M45	4 7/32	12 7/8	3 29/32	2 9/32	32
6	3 11/16	2 29/32	4 1/8	3 9/32	2 3/4	2 15/32	7 19/32	4 3/32	3 15/32	2 1/16	Rd50x6	4 19/32	15 3/8	4 23/32	2 15/32	46
8	4 3/32	3 9/32	4 5/8	3 11/16	3 1/16	2 3/4	8 19/32	4 19/32	3 29/32	2 9/32	Rd56x6	5	16 15/16	5 1/8	2 3/4	63
10	4 19/32	3 11/16	5 7/32	4 3/32	3 15/32	3 1/16	9 1/16	5 1/8	4 11/32	2 5/8	Rd64x8	5 17/32	18 9/32	5 15/16	3 1/8	90
12	5 1/8	4 3/32	5 7/8	4 19/32	3 29/32	3 15/32	10 5/16	5 3/4	4 27/32	2 15/16	Rd72x8	6 7/16	20 11/16	6 3/4	3 9/16	144
16	5 3/4	4 19/32	6 9/16	5 1/8	4 11/32	3 29/32	11 15/32	6 9/16	5 13/32	3 9/32	Rd80x10	6 31/32	23 19/32	7 3/16	3 23/32	198
20	6 9/16	5 1/8	7 3/8	5 3/4	4 27/32	4 11/32	13 17/32	7 3/8	6 5/32	3 11/16	Rd90x10	7 21/32	26 7/16	7 19/32	4 3/16	287
25	7 3/8	5 3/4	8 9/32	6 9/16	5 13/32	4 27/32	14 3/4	8 3/16	6 31/32	4 3/32	Rd100x12	8 15/32	29 11/32	8 13/32	4 5/8	406
32	8 3/16	6 9/16	9 7/32	7 3/8	6 5/32	5 13/32	16 13/32	9 3/16	7 25/32	4 1/2	Rd110x12	9 1/2	32 9/32	9 27/32	5 3/8	560
40	9 3/16	7 3/8	10 5/16	8 3/16	6 31/32	6 5/32	18 5/16	10 1/4	8 11/16	5 1/8	Rd125x14	10 17/32	36 9/32	11 1/16	5 29/32	796
50	10 1/4	8 3/16	11 11/16	9 3/16	7 25/32	6 31/32	19 7/8	11 15/32	9 11/16	5 3/4	Rd140x16	11 15/32	39 23/32	13 1/8	6 9/32	1107
63	11 15/32	9 3/16	13 1/8	10 1/4	8 11/16	7 25/32	22 17/32	12 29/32	10 7/8	6 9/16	Rd160x18	13 3/16	45 3/32	14 3/4	7 13/32	1543
80	12 29/32	10 1/4	14 11/16	11 15/32	9 11/16	8 11/16	24 1/2	14 9/16	12 9/32	7 3/8	Rd180x20	14 5/8	51 1/32	16 13/32	8 1/8	2220
100	14 9/16	11 15/32	16 15/32	12 29/32	14 31/32	9 11/16	28 3/16	16 13/32	13 23/32	8 3/16	Rd200x22	16 15/32	56 7/8	18 1/4	9 11/32	3124
125	16 13/32	12 29/32	18 7/16	14 9/16	12 9/32	10 7/8	30 3/4	18 7/16	15 3/8	9 7/32	Rd225x24	19 1/16	64 1/8	20 3/32	10 3/32	4467
160	18 7/16	14 9/16	20 11/16	16 13/32	13 23/32	12 9/32	33 13/16	20 1/2	17 13/32	10 1/4	Rd250x28	20 29/32	72 3/16	21 23/32	11 7/32	6274
200	20 1/2	16 13/32	23 5/32	18 7/16	15 3/8	13 23/32	36 7/8	22 15/16	19 15/32	11 15/32	Rd280x32	25 1/8	82 15/32	24 3/16	14 1/16	8514
250	22 15/16	18 7/16	26 1/32	20 1/2	17 13/32	15 3/8	40 5/32	25 13/16	21 23/32	13 1/8	Rd320x36	28 9/32	93 1/8	27 7/8	15 11/16	11929
320	25 13/16	20 1/2	29 5/16	22 15/16	19 15/32	17 13/32	44 1/4	29 3/32	23 25/32	15 5/32	Rd360x36	31 31/32	105 1/8	31 5/32	17 3/4	16799
400	29 3/32	22 15/16	30 15/16	25 13/16	21 23/32	19 15/32	48 31/32	32 25/32	25 13/16	17 /	Rd400x36	35 7/8	117 15/16	35 7/16	19 3/4	23018

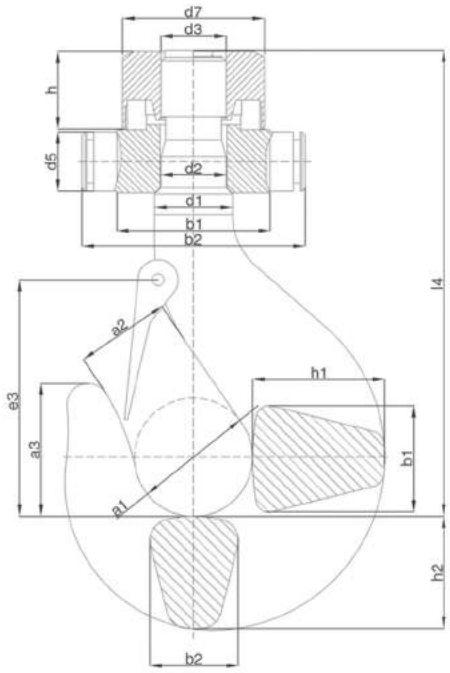
Tolerances: -0/+7% forging tolerance. Machined tolerances as per DIN15403 design.
Modifications: Shank length (L). Further dimensions upon request.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.1 SINGLE FORGED HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS

1.1.1.1 Single forged hooks based on DIN15401 design

1.1.1.1.3 Machined fitted with nut, crosshead and bearing



- WLL: from 5t to 2.000t.
- Hook, Nut and Crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED HOOKS BASED ON DIN15401 DESIGN | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

OVERALL DIMENSIONS (inch)													DIN 15412 Crosshead			DIN 15413 Nut		Weight
No	a1	a2	a3	b1	b2	d1	e3	h1	h2	d2 h11	d3	l4	b1	b2	d5 h9	d7	h	lbs
2,5	2 15/32	1 15/16	2 13/16	2 1/16	1 3/4	1 5/8	5 3/16	2 5/8	2 9/32	1 13/32	M36	9 13/16	3 1/8	4 29/32	1 5/32	2 3/4	1 23/32	20
4	2 25/32	2 3/16	3 1/8	2 15/32	2 1/16	1 7/8	5 13/16	3 1/8	2 5/8	1 5/8	M42	11 1/16	3 17/32	5 1/2	1 3/8	3 1/8	1 29/32	29
5	3 1/8	2 15/32	3 17/32	2 25/32	2 11/32	2 1/16	6 15/32	3 17/32	2 15/16	1 3/4	M45	12 3/8	3 29/32	6 3/32	1 9/16	3 23/32	2 3/16	41
6	3 17/32	2 25/32	3 31/32	3 1/8	2 5/8	2 11/32	7 9/32	3 29/32	3 11/32	1 15/16	Rd50x6	14 3/4	4 29/32	7 9/32	1 3/4	4 1/2	2 11/32	60
8	3 29/32	3 1/8	4 7/16	3 17/32	2 15/16	2 5/8	8 1/4	4 13/32	3 23/32	2 3/16	Rd56x6	16 1/4	5 1/2	8 1/4	1 15/16	4 29/32	2 5/8	84
10	4 13/32	3 17/32	5	3 29/32	3 11/32	2 15/16	8 11/16	4 29/32	4 5/32	2 1/2	Rd64x8	17 17/32	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	120
12	4 29/32	3 29/32	5 5/8	4 13/32	3 23/32	3 11/32	9 29/32	5 1/2	4 5/8	2 13/16	Rd72x8	19 27/32	7 1/16	10 13/32	2 11/32	6 15/32	3 13/32	188
16	5 1/2	4 13/32	6 9/32	4 29/32	4 5/32	3 23/32	11	6 9/32	5 3/16	3 1/8	Rd80x10	22 21/32	7 15/32	10 13/16	2 3/4	6 7/8	3 9/16	252
20	6 9/32	4 29/32	7 1/16	5 1/2	4 5/8	4 5/32	12 31/32	7 1/16	5 7/8	3 17/32	Rd90x10	25 3/8	7 27/32	11 19/32	3 1/8	7 9/32	4	349
25	7 1/16	5 1/2	7 15/16	6 9/32	5 3/16	4 5/8	14 5/32	7 27/32	6 11/16	3 29/32	Rd100x12	28 3/16	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	491
32	7 27/32	6 9/32	8 27/32	7 1/16	5 7/8	5 3/16	15 23/32	8 13/16	7 15/32	4 5/16	Rd110x12	31	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	694
40	8 13/16	7 1/16	9 29/32	7 27/32	6 11/16	5 7/8	17 19/32	9 13/16	8 11/32	4 29/32	Rd125x14	34 13/16	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	977
50	9 13/16	7 27/32	11 7/32	8 13/16	7 15/32	6 11/16	19 3/32	11	9 9/32	5 1/2	Rd140x16	38 1/8	13 3/16	18 9/32	4 29/32	12 19/32	6	1389
63	11	8 13/16	12 19/32	9 13/16	8 11/32	7 15/32	21 5/8	12 3/8	10 13/32	6 9/32	Rd160x18	43 9/32	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	1951
80	12 3/8	9 13/16	14 3/32	11	9 9/32	8 11/32	23 17/32	13 31/32	11 25/32	7 1/16	Rd180x20	49	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	2765
100	13 31/32	11	15 13/16	12 3/8	14 11/32	9 9/32	27 1/16	15 23/32	13 3/16	7 27/32	Rd200x22	54 5/8	18 1/2	25 3/8	7 1/16	17 1/2	8 31/32	3898
125	15 23/32	12 3/8	17 11/16	13 31/32	11 25/32	10 13/32	29 1/2	17 11/16	14 3/4	8 27/32	Rd225x24	61 19/32	20 1/16	26 15/16	7 27/32	19 9/32	9 21/32	5492
160	17 11/16	13 31/32	19 7/8	15 23/32	13 3/16	11 25/32	32 15/32	19 21/32	16 23/32	9 13/16	Rd250x28	69 5/16	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	7679
200	19 21/32	15 23/32	22 7/32	17 11/16	14 3/4	13 3/16	35 13/32	22 1/32	18 11/16	11	Rd280x32	79 3/16	24	31 7/8	9 7/16	23 7/32	13 1/2	10562
250	22 1/32	17 11/16	25	19 21/32	16 23/32	14 3/4	38 9/16	24 25/32	20 27/32	12 19/32	Rd320x36	89 7/16	27 17/32	36 7/32	10 7/32	26 3/4	15 1/16	14976
320	24 25/32	19 21/32	28 1/8	22 1/32	18 11/16	16 23/32	42 1/2	27 15/16	22 13/16	14 9/16	Rd360x36	100 31/32	31 3/32	40 17/32	11	29 29/32	17 1/32	20818
400	27 15/16	22 1/32	29 23/32	24 25/32	20 27/32	18 11/16	47 1/32	31 15/32	24 25/32	16 5/16	Rd400x36	113 9/32	35 7/32	45 1/16	11 25/32	34 1/32	18 31/32	29145

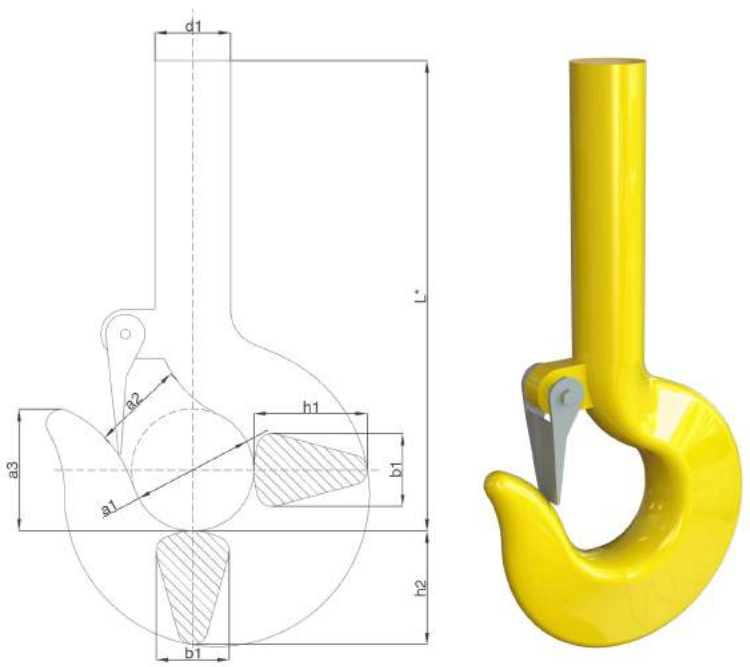
Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.1 SINGLE FORGED HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS

1.1.1.2 Single forged hooks based on BS2903:1980 design

1.1.1.2.1 Unmachined



- WLL: from 5t to 250t.
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED HOOKS BASED ON BS2903:1980 DESIGN | UNMACHINED

	OVERALL DIMENSIONS (inch)								Weight
No	a1	a2	a3	b1	d1	h1	h2	L*	lbs
B5	2 17/32	1 29/32	2 17/32	1 17/32	1 15/32	2 11/32	2 11/32	9 15/16	11
B6,3	2 27/32	2 5/32	2 27/32	1 23/32	1 23/32	2 21/32	2 21/32	11 7/32	14
B8	3 1/4	2 7/16	3 9/32	1 15/16	1 15/16	3 1/32	3 1/32	12 1/2	22
B10	3 19/32	2 11/16	3 19/32	2 5/32	2 5/32	3 3/8	3 3/8	14 15/16	31
B12,5	4 1/32	3 1/32	4 3/32	2 7/16	2 11/32	3 3/4	3 3/4	16 7/16	42
B16	4 19/32	3 7/16	4 19/32	2 3/4	2 17/32	4 9/32	4 9/32	17 25/32	60
B20	5 5/32	3 27/32	5 3/16	3 3/32	2 15/16	4 25/32	4 25/32	20 1/16	84
B25	5 23/32	4 5/16	5 23/32	3 7/16	3 11/32	5 11/32	5 11/32	22 29/32	117
B32	6 1/4	4 21/32	6 9/32	3 23/32	3 17/32	5 13/16	5 13/16	25 11/16	152
B40	6 25/32	5 3/32	6 25/32	4 3/32	4 1/8	6 5/16	6 5/16	28 1/2	201
B50	7 1/2	5 5/8	7 1/2	4 1/2	4 1/2	7	7	31 5/16	267
B63	8 1/16	6 1/16	8 1/16	4 13/16	4 29/32	7 1/2	7 1/2	31 5/16	340

Tolerances: -0/+7% forging tolerance.
Modifications: Shank length (L). Further dimensions upon request.

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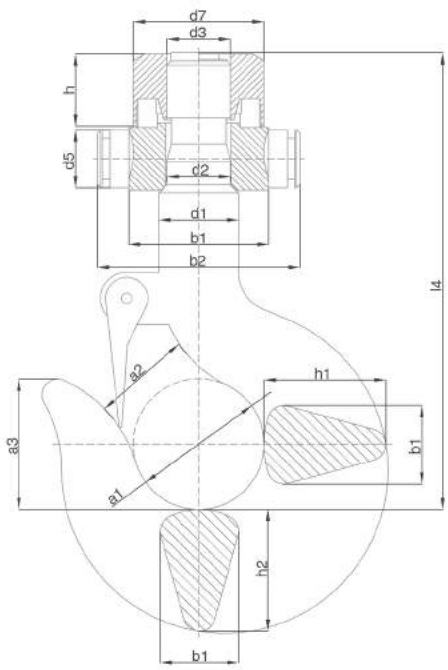
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.1 SINGLE FORGED HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS

1.1.1.2 Single forged hooks based on BS2903:1980 design

1.1.1.2.2 Machined fitted with nut, crosshead and bearing



- WLL: from 5t to 250t.
- Hook, Nut and Crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED HOOKS BASED ON DIN15401 DESIGN | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

OVERALL DIMENSIONS (inch)											DIN 15412 Crosshead			DIN 15413 Nut		Weight
No	a1	a2	a3	b1	d1	h1	h2	d2 h11	d3	l4	b1	b2	d5 h9	d7	h	lbs
B5	2 17/32	1 29/32	2 17/32	1 17/32	1 15/32	2 11/32	2 11/32	1 5/32	M30	8 11/16	2 17/32	3 29/32	3 1/2	2 11/32	1 15/32	13
B6,3	2 27/32	2 5/32	2 27/32	1 23/32	1 23/32	2 21/32	2 21/32	1 13/32	M36	9 13/16	3 1/8	4 29/32	1 5/32	2 3/4	1 23/32	19
B8	3 1/4	2 7/16	3 9/32	1 15/16	1 15/16	3 1/32	3 1/32	1 5/8	M42	11 1/16	3 17/32	5 1/2	1 3/8	3 1/8	1 29/32	28
B10	3 19/32	2 11/16	3 19/32	2 5/32	2 5/32	3 3/8	3 3/8	1 3/4	M45	12 3/8	3 29/32	6 3/32	1 9/16	3 23/32	2 3/16	39
B12,5	4 1/32	3 1/32	4 3/32	2 7/16	2 11/32	3 3/4	3 3/4	1 15/16	Rd50x6	14 3/4	4 29/32	7 9/32	1 3/4	4 1/2	2 11/32	55
B16	4 19/32	3 7/16	4 19/32	2 3/4	2 17/32	4 9/32	4 9/32	1 15/16	Rd50x6	14 3/4	4 29/32	7 9/32	1 3/4	4 1/2	2 11/32	73
B20	5 5/32	3 27/32	5 3/16	3 3/32	2 15/16	4 25/32	4 25/32	2 1/2	Rd64x8	17 17/32	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	110
B25	5 23/32	4 5/16	5 23/32	3 7/16	3 11/32	5 11/32	5 11/32	2 13/16	Rd72x8	19 27/32	7 1/16	10 13/32	2 11/32	6 15/32	3 13/32	157
B32	6 1/4	4 21/32	6 9/32	3 23/32	3 17/32	5 13/16	5 13/16	2 13/16	Rd72x8	19 27/32	7 1/16	10 13/32	2 11/32	6 15/32	3 13/32	192
B40	6 25/32	5 3/32	6 25/32	4 3/32	4 1/8	6 5/16	6 5/16	3 1/8	Rd80x10	22 21/32	7 15/32	10 13/16	2 3/4	6 7/8	3 9/16	249
B50	7 1/2	5 5/8	7 1/2	4 1/2	4 1/2	7	7	3 17/32	Rd90x10	25 3/8	7 27/32	11 19/32	3 1/8	7 9/32	4	324
B63	8 1/16	6 1/16	8 1/16	4 13/16	4 29/32	7 1/2	7 1/2	3 29/32	Rd100x12	28 3/16	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	417

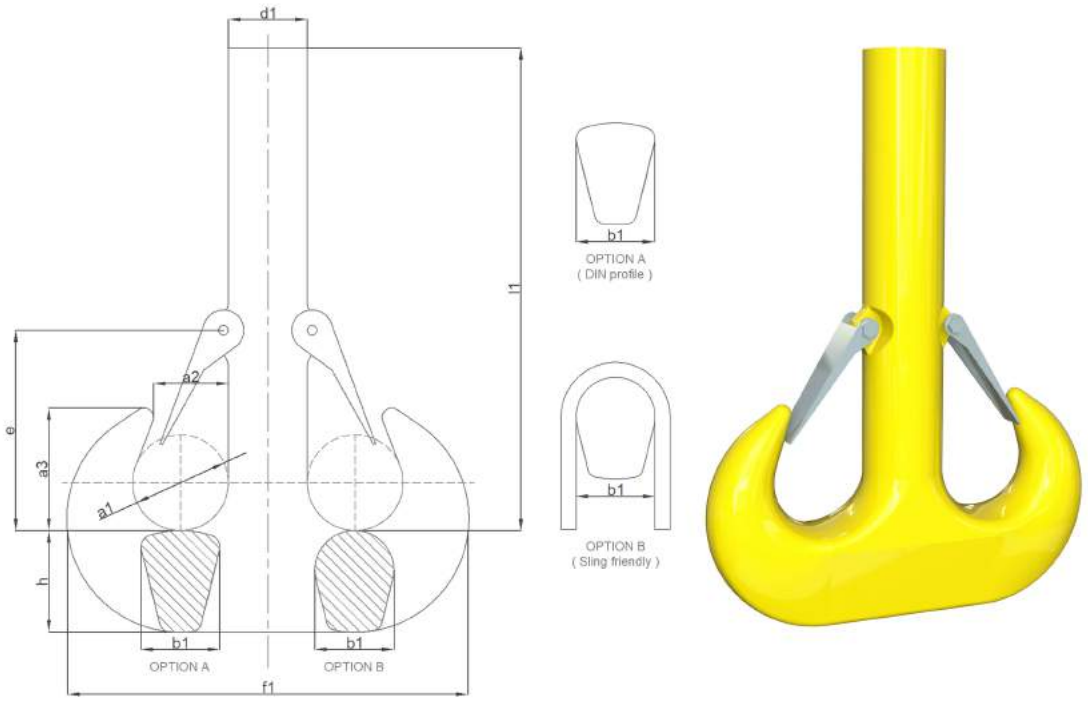
Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403 design.
Modifications: Shank length (L). Further dimensions upon request.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.1 Ramshorn forged hooks based on DIN15402 design

1.1.2.1.1 Unmachined



- WLL: from 5t to 2.000t.
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON DIN15402 DESIGN | UNMACHINED

	OVERALL DIMENSIONS (inch)									Weight
No	a1	a2	a3	b1	d1	e	f1	h	l1	lbs
2,5	1 15/16	1 9/16	2 17/32	1 9/16	1 5/8	4 13/32	8 3/16	1 15/16	9 13/16	15
4	2 3/16	1 3/4	2 27/32	1 7/8	1 7/8	4 7/8	9 11/32	2 11/32	11	21
5	2 15/32	1 15/16	3 7/32	2 1/16	2 1/16	5 5/8	10 15/32	2 5/8	12 9/32	30
6	2 25/32	2 3/16	3 19/32	2 11/32	2 11/32	6 9/32	11 27/32	2 15/16	14 3/4	37
8	3 1/16	2 15/32	4 1/32	2 5/8	2 5/8	7 5/32	13 1/4	3 11/32	16 5/16	56
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	7 17/32	14 13/16	3 23/32	17 11/16	80
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	8 1/4	16 9/16	4 5/32	20 1/16	111
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	9 5/16	18 17/32	4 5/8	22 13/16	157
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	10 13/32	20 7/8	5 3/16	25 9/16	219
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	12 3/8	23 17/32	5 7/8	28 1/8	304
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	13 3/16	26 7/16	6 11/16	31 3/32	434
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	14 3/4	29 21/32	7 15/32	34 13/16	631
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	16 17/32	33 1/8	8 11/32	37 31/32	869
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	18 3/32	37 5/32	9 9/32	42 25/32	1206
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	20 1/4	41 25/32	10 13/32	48 19/32	1673
100	11	8 13/16	14 5/16	9 9/32	9 9/32	22 5/8	46 11/16	11 25/32	54 1/8	2337
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	25 3/8	52 11/32	13 5/16	61	3287
160	13 31/32	11	18 1/32	11 25/32	11 25/32	28 17/32	59 1/4	14 3/4	68 11/16	4663
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	31 15/32	66 5/16	16 25/32	78 21/32	6647
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	34 7/16	74 3/16	18 11/16	88 9/16	9409
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	37 3/8	83 21/32	20 27/32	100 3/8	13267
400	22 1/32	17 11/16	28 23/32	18 11/16	18 11/16	41 1/8	93 1/2	23 19/32	113 31/32	18907

Tolerances: -0/+7% forging tolerance.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: RSN up to No 10 and greater sizes RFN. For the largest hooks, other sections b1xH can be design.

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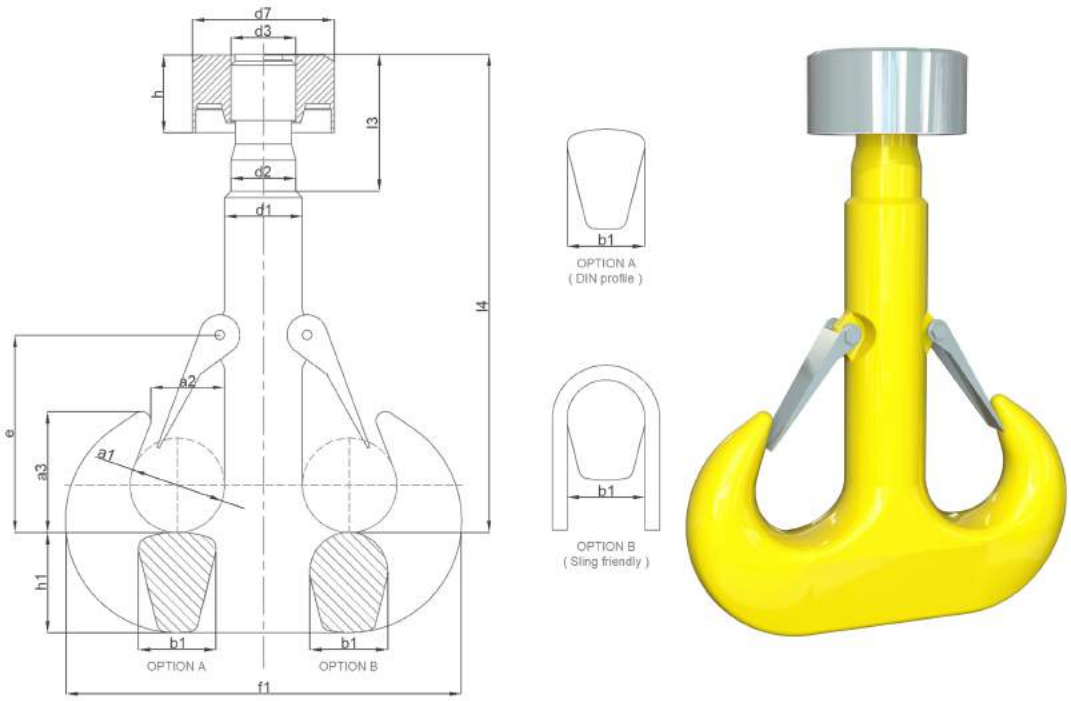
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.1 Ramshorn forged hooks based on DIN15402 design

1.1.2.1.2 Machined fitted with nut



- WLL: from 5t to 2.000t.
- Hook and Nut FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON DIN15402 | MACHINED FITTED WITH NUT

OVERALL DIMENSIONS (inch)													DIN 15413 Nut		Weight
No	a1	a2	a3	b1	d1	e	f1	h1	d2 h11	d3	l3	l4	d7	h	lbs
2,5	1 15/16	1 9/16	2 17/32	1 9/16	1 5/8	4 13/32	8 3/16	1 15/16	1 13/32	M36	3 1/4	9 9/16	2 3/4	1 23/32	17
4	2 3/16	1 3/4	2 27/32	1 7/8	1 7/8	4 7/8	9 11/32	2 11/32	1 5/8	M42	3 21/32	10 25/32	3 1/8	1 29/32	23
5	2 15/32	1 15/16	3 7/32	2 1/16	2 1/16	5 5/8	10 15/32	2 5/8	1 3/4	M45	4 1/32	12 1/32	3 23/32	2 3/16	32
6	2 25/32	2 3/16	3 19/32	2 11/32	2 11/32	6 9/32	11 27/32	2 15/16	1 15/16	Rd50x6	4 13/32	14 3/8	4 1/2	2 11/32	45
8	3 1/8	2 15/32	4 1/32	2 5/8	2 5/8	7 5/32	13 1/4	3 11/32	2 3/16	Rd56x6	4 25/32	15 27/32	4 29/32	2 5/8	67
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	7 17/32	14 13/16	3 23/32	2 1/2	Rd64x8	5 5/16	17 1/8	5 11/16	2 31/32	95
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	8 1/4	16 9/16	4 5/32	2 13/16	Rd72x8	6 5/32	19 11/32	6 15/32	3 13/32	134
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	9 5/16	18 17/32	4 5/8	3 1/8	Rd80x10	6 11/16	22 1/8	6 7/8	3 9/16	185
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	10 13/32	20 7/8	5 3/16	3 17/32	Rd90x10	7 11/32	24 23/32	7 9/32	4	258
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	12 3/8	23 17/32	5 7/8	3 29/32	Rd100x12	8 1/8	27 3/8	8 1/16	4 7/16	355
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	13 3/16	26 7/16	6 11/16	4 5/16	Rd110x12	9 1/8	30 7/32	9 7/16	5 5/32	507
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	14 3/4	29 21/32	7 15/32	4 29/32	Rd125x14	10 3/32	33 31/32	10 5/8	5 21/32	741
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	16 17/32	33 1/8	8 11/32	5 1/2	Rd140x16	11	37 5/32	12 19/32	6	1023
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	18 3/32	37 9/32	9 3/32	6 3/32	Rd160x18	12 21/32	42 3/16	14 5/32	7 1/8	1420
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	20 1/4	41 25/32	10 13/32	7 1/16	Rd180x20	14 1/32	47 11/16	15 23/32	7 25/32	1986
100	11	8 13/16	14 5/16	9 9/32	9 9/32	22 5/8	46 11/16	11 25/32	7 27/32	Rd200x22	15 13/16	53 3/16	17 1/2	8 31/32	2754
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	25 3/8	52 11/32	13 3/16	8 27/32	Rd225x24	18 9/32	59 29/32	19 9/32	9 21/32	3891
160	13 31/32	11	18 1/32	11 25/32	11 25/32	28 17/32	59 1/4	14 3/4	9 13/16	Rd250x28	20 1/16	67 15/32	20 27/32	10 25/32	5430
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	31 15/32	66 5/16	16 23/32	11	Rd280x32	24 1/8	77 7/32	23 7/32	13 1/2	7577
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	34 7/16	74 3/16	18 11/16	12 19/32	Rd320x36	27 5/32	87 9/32	26 3/4	15 1/16	10697
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	37 3/8	83 21/32	20 27/32	14 9/16	Rd360x36	30 11/16	98 19/32	29 29/32	17 1/32	14870
400	22 1/32	17 11/16	28 23/32	18 11/16	18 11/16	41 1/8	93 1/2	23 19/32	16 5/16	Rd400x36	34 7/16	111	34 1/32	18 31/32	20973

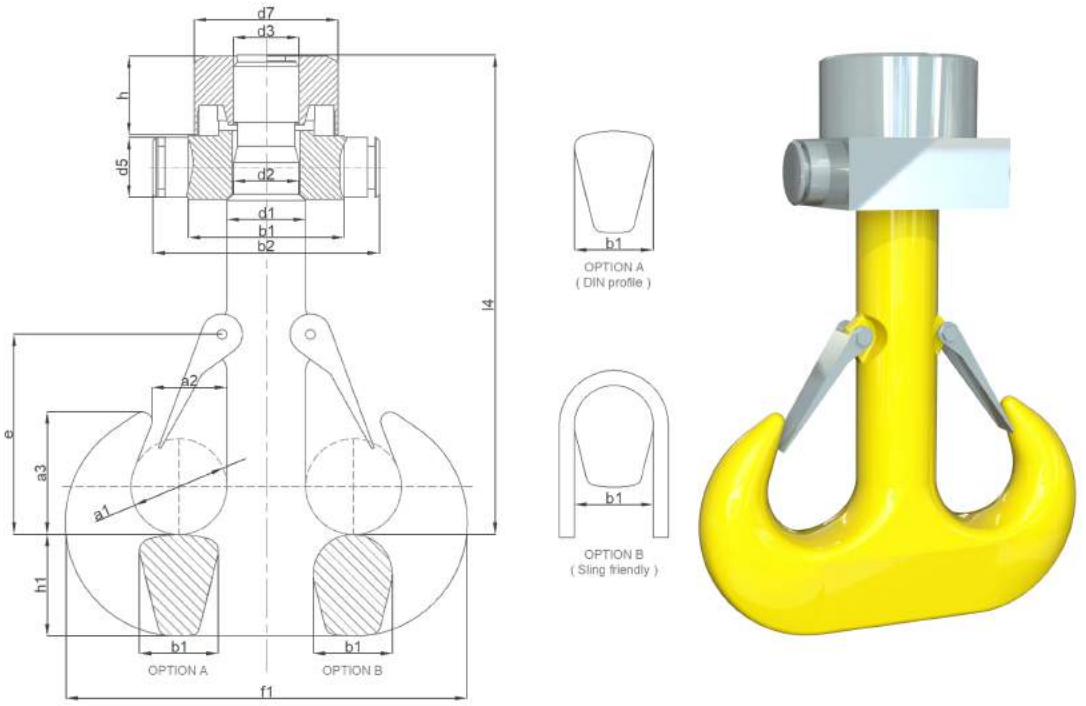
Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403
Modifications: Shank length (L). Further dimensions upon request.
Hook section: RSN up to No 10 and greater sizes RFN. For the largest hooks, other sections b1xH can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.1 Ramshorn forged hooks based on DIN15402 design

1.1.2.1.3 Machined fitted with nut, crosshead and bearing



- WLL: from 5t to 2.000t.
- Hook, Nut and Crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON BS3017:1980 | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

OVERALL DIMENSIONS (inch)												DIN 15412 Crosshead		DIN 15413 Nut		Weight
No	a1	a2	a3	b1	d1	e	f1	h1	d2 h11	d3	l4	b1	b2	d5 h9	d7	h	lbs
2,5	1 15/16	1 9/16	2 17/32	1 9/16	1 5/8	4 13/32	8 3/16	1 15/16	1 13/32	M36	9 9/16	3 1/8	4 29/32	1 5/32	2 3/4	1 23/32	21
4	2 3/16	1 3/4	2 27/32	1 7/8	1 7/8	4 7/8	9 11/32	2 11/32	1 5/8	M42	10 25/32	3 17/32	5 1/2	1 3/8	3 1/8	1 29/32	30
5	2 15/32	1 15/16	3 7/32	2 1/16	2 1/16	5 5/8	10 15/32	2 5/8	1 3/4	M45	12 1/32	3 29/32	6 3/32	1 9/16	3 23/32	2 3/16	45
6	2 25/32	2 3/16	3 19/32	2 11/32	2 11/32	6 9/32	11 27/32	2 15/16	1 15/16	Rd50x6	14 3/8	4 29/32	7 9/32	1 3/4	4 1/2	2 11/32	60
8	3 1/8	2 15/32	4 1/32	2 5/8	2 5/8	7 5/32	13 1/4	3 11/32	2 3/16	Rd56x6	15 27/32	5 1/2	8 1/4	1 15/16	4 29/32	2 5/8	87
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	7 17/32	14 13/16	3 23/32	2 1/2	Rd64x8	17 1/8	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	126
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	8 1/4	16 9/16	4 5/32	2 13/16	Rd72x8	19 11/32	7 1/16	10 13/32	2 11/32	6 15/32	3 13/32	179
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	9 5/16	18 17/32	4 5/8	3 1/8	Rd80x10	22 1/8	7 15/32	10 13/16	2 3/4	6 7/8	3 9/16	238
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	10 13/32	20 7/8	5 3/16	3 17/32	Rd90x10	24 23/32	7 27/32	11 19/32	3 1/8	7 9/32	4	321
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	12 3/8	23 17/32	5 7/8	3 29/32	Rd100x12	27 3/8	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	440
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	13 3/16	26 7/16	6 11/16	4 5/16	Rd110x12	30 7/32	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	642
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	14 3/4	29 21/32	7 15/32	4 29/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	922
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	16 17/32	33 1/8	8 11/32	5 1/2	Rd140x16	37 5/32	13 3/16	18 9/32	4 29/32	12 19/32	6	1305
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	18 3/32	37 5/32	9 9/32	6 9/32	Rd160x18	42 3/16	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	1830
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	20 1/4	41 25/32	10 13/32	7 1/16	Rd180x20	47 11/16	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	2531
100	11	8 13/16	14 5/16	9 9/32	9 9/32	22 5/8	46 11/16	11 25/32	7 27/32	Rd200x22	53 3/16	18 1/2	25 3/8	7 1/16	17 1/2	8 31/32	3527
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	25 3/8	52 11/32	13 3/16	8 27/32	Rd225x24	59 29/32	20 1/16	26 15/16	7 27/32	19 9/32	9 21/32	4916
160	13 31/32	11	18 1/32	11 25/32	11 25/32	28 17/32	59 1/4	14 3/4	9 13/16	Rd250x28	67 15/32	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	6834
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	31 15/32	66 5/16	16 23/32	11	Rd280x32	77 7/32	24	31 7/8	9 7/16	23 7/32	13 1/2	9625
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	34 7/16	74 3/16	18 11/16	12 19/32	Rd320x36	87 9/32	27 17/32	36 7/32	10 7/32	26 3/4	15 1/16	13744
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	37 3/8	83 21/32	20 27/32	14 9/16	Rd360x36	98 19/32	31 3/32	40 17/32	11	29 29/32	17 1/32	19381
400	22 1/32	17 11/16	28 23/32	18 11/16	18 11/16	41 1/8	93 1/2	23 19/32	16 5/16	Rd400x36	111	35 7/32	45 1/16	11 25/32	34 1/32	18 31/32	26940

Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403
Modifications: Shank length (L). Further dimensions upon request.
Hook section: RSN up to Num.10 and greater sizes RFN. For the largest hooks, other sections b1xH can be design.

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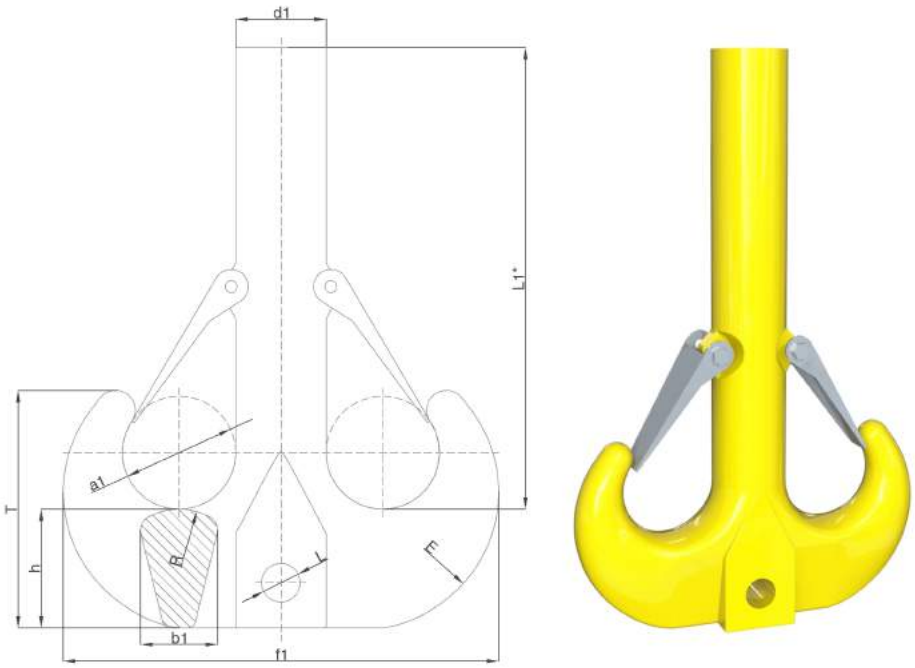
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.2 Ramshorn forged hooks based on BS3017:1980 design

1.1.2.2.1 Unmachined



- WLL: from 5t to 1.000t (bottom hole excluded).
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON BS3017:1980 | UNMACHINED

	OVERALL DIMENSIONS (inch)										Weight
No	a1	E	d1	h	L	b1	L1*	R	T	f1	lbs
B10	3 23/32	4 15/32	2 31/32	3 29/32	1 9/32	2 17/32	20 1/16	1/6	7 27/32	14 13/32	88
B15	4 1/4	5 1/16	3 1/4	4 1/4	1 9/16	2 3/4	22 13/16	1/6	8 19/32	16 7/32	110
B20	4 23/32	5 5/8	4	4 5/8	1 13/16	3	25 9/16	2 15/32	9 3/8	18 1/32	139
B25	5 1/4	6 5/32	4 1/2	5 5/32	1 13/16	3 11/32	28 1/8	2 25/32	10 1/2	20 1/16	174
B30	5 11/16	6 13/16	4 3/4	5 21/32	2 5/32	3 11/16	28 1/8	3 1/16	11 13/32	21 7/8	214
B35	6 1/32	7 1/4	5	6 1/8	2 5/32	3 31/32	31 3/32	3 9/32	12 5/16	22 31/32	260
B40	6 3/8	7 5/8	5 1/4	6 3/8	2 5/16	4 1/8	31 3/32	3 7/16	12 29/32	24 1/4	315
B45	6 11/16	8	5 1/2	6 7/8	2 5/16	4 15/32	34 13/16	3 11/16	13 13/16	25 23/32	386
B50	7	8 1/4	5 3/4	7 1/8	2 9/16	4 5/8	34 13/16	3 27/32	14 3/8	26 29/32	472
B60	7 1/2	9	6	7 7/8	2 9/16	5 3/32	37 31/32	4 1/4	15 3/4	28 13/16	578
B70	7 15/16	9 1/2	6 1/4	8 1/4	2 29/32	5 11/32	37 31/32	4 7/16	16 3/4	31 5/32	694
B80	8 5/16	10 1/4	6 1/2	8 7/8	2 29/32	5 3/4	42 29/32	4 25/32	17 13/16	31 15/16	827
B100	9	11 3/8	7	9 7/8	3 5/16	6 13/32	42 29/32	5 5/16	19 5/8	34 23/32	996
B120	9 1/2	12 1/4	7 1/2	10 3/4	3 9/16	6 31/32	48 19/32	5 25/32	21 1/4	37 7/32	1202
B140	10 1/32	12 7/8	8	11 3/8	3 13/16	7 3/8	48 19/32	6 1/8	22 5/8	39 1/2	1444
B160	10 15/32	13 5/8	8 1/2	12 1/8	4 5/32	7 7/8	48 19/32	6 17/32	24	41 15/32	1720
B180	11	14 3/8	9	12 7/8	4 13/32	8 11/32	54 1/8	6 15/16	25 1/4	44	2061
B200	11 5/16	15 1/8	9 1/2	13 5/8	4 9/16	8 27/32	54 1/8	7 11/32	26 3/4	49 29/32	2445
B250	12 15/32	17	10 31/32	15 15/16	5 5/16	10 11/32	61	8 19/32	30	51 15/32	2943
B300	13 1/2	17 31/32	12	16 19/32	5 17/32	10 25/32	68 11/16	8 31/32	31 5/8	54 15/16	3549
B350	14	19	12 1/2	17 3/4	5 31/32	11 17/32	68 11/16	9 9/16	33 1/4	58 1/32	4222
B400	15	20 3/8	13 1/2	18 27/32	6 5/16	12 7/32	78 21/32	10 5/32	35 3/8	61 25/32	5071

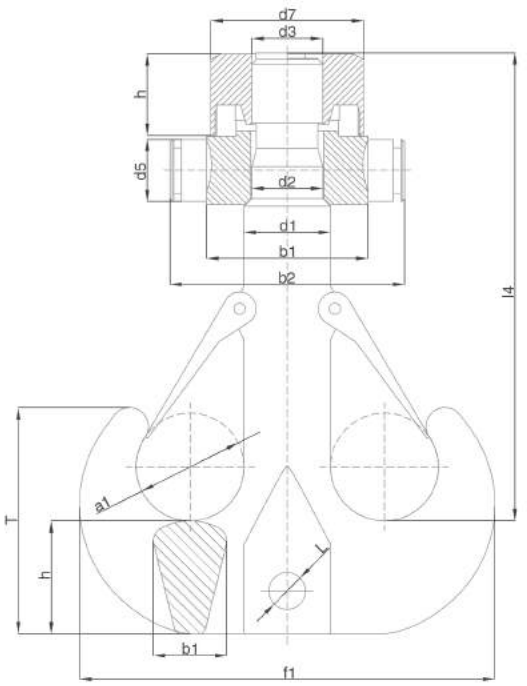
Tolerances: -0/+7% forging tolerance.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.2 Ramshorn forged hooks based on BS3017:1980 design

1.1.2.2.2 Machined fitted with nut, crosshead and bearing



- WLL: from 5t to 1.000t (bottom hole excluded).
- Hook and Nut and Crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON BS3017:1980 | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

OVERALL DIMENSIONS (inch)											DIN 15412 Crosshead			DIN 15413 Nut		Weight
No	a1	d1	h	L	b1	T	f1	d2 h11	d3	l4	b1	b2	d5 h9	d7	h	lbs
B10	3 23/32	2 31/32	3 29/32	1 9/32	2 17/32	7 27/32	14 13/32	2 1/2	Rd64x8	17 1/8	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	101
B15	4 1/4	3 1/4	4 1/4	1 9/16	2 3/4	8 19/32	16 7/32	2 1/2	Rd64x8	17 1/8	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	128
B20	4 23/32	4	4 5/8	1 13/16	3	9 3/8	18 1/32	3 1/8	Rd80x10	22 1/8	7 15/32	10 13/16	2 3/4	6 7/8	3 9/16	161
B25	5 1/4	4 1/2	5 5/32	1 13/16	3 11/32	10 1/2	20 1/16	3 17/32	Rd90x10	24 23/32	7 27/32	11 19/32	3 1/8	7 9/32	4	201
B30	5 11/16	4 3/4	5 21/32	2 5/32	3 11/16	11 13/32	21 7/8	3 29/32	Rd100x12	27 3/8	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	247
B35	6 1/32	5	6 1/8	2 5/32	3 31/32	12 5/16	22 31/32	3 29/32	Rd100x12	27 3/8	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	298
B40	6 3/8	5 1/4	6 3/8	2 5/16	4 1/8	12 29/32	24 1/4	4 5/16	Rd110x12	30 7/32	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	364
B45	6 11/16	5 1/2	6 7/8	2 5/16	4 15/32	13 13/16	25 23/32	4 5/16	Rd110x12	30 7/32	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	448
B50	7	5 3/4	7 1/8	2 9/16	4 5/8	14 3/8	26 29/32	4 5/16	Rd110x12	30 7/32	10 7/32	14 1/8	3 29/32	9 7/16	5 5/32	542
B60	7 1/2	6	7 7/8	2 9/16	5 3/32	15 3/4	28 13/16	4 29/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	664
B70	7 15/16	6 1/4	8 1/4	2 29/32	5 11/32	16 3/4	31 5/32	4 29/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	798
B80	8 5/16	6 1/2	8 7/8	2 29/32	5 3/4	17 13/16	31 15/16	4 29/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	959
B100	9	7	9 1/8	3 5/16	6 13/32	19 5/8	34 23/32	5 1/2	Rd140x16	37 5/32	13 3/16	18 9/32	4 29/32	12 19/32	6	1155
B120	9 1/2	7 1/2	10 3/4	3 9/16	6 31/32	21 1/4	37 7/32	6 9/32	Rd160x18	42 3/16	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	1380
B140	10 1/32	8	11 3/8	3 13/16	7 3/8	22 5/8	39 1/2	6 9/32	Rd160x18	42 3/16	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	1660
B160	10 15/32	8 1/2	12 1/8	4 5/32	7 7/8	24	41 15/32	7 1/16	Rd180x20	47 11/16	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	1978
B180	11	9	12 7/8	4 13/32	8 1/32	25 1/4	44	7 1/16	Rd180x20	47 11/16	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	2392
B200	11 5/16	9 1/2	13 5/8	4 9/16	8 27/32	26 3/4	49 29/32	7 27/32	Rd200x22	53 3/16	18 1/2	25 3/8	7 1/16	17 1/2	8 31/32	2811
B250	12 15/32	10 31/32	15 15/16	5 5/16	10 11/32	30 /	51 15/32	8 27/32	Rd225x24	59 29/32	20 1/16	26 15/16	7 27/32	19 9/32	9 21/32	3417
B300	13 1/2	12 /	16 19/32	5 17/32	10 25/32	31 5/8	54 15/16	9 13/16	Rd250x28	67 15/32	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	4079
B350	14	12 1/2	17 3/4	5 31/32	11 17/32	33 1/4	58 1/32	9 13/16	Rd250x28	67 15/32	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	4896
B400	15	13 1/2	18 27/32	6 5/16	12 7/32	35 3/8	61 25/32	11	Rd280x32	77 7/32	24 /	31 7/8	9 7/16	23 7/32	13 1/2	5882

Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

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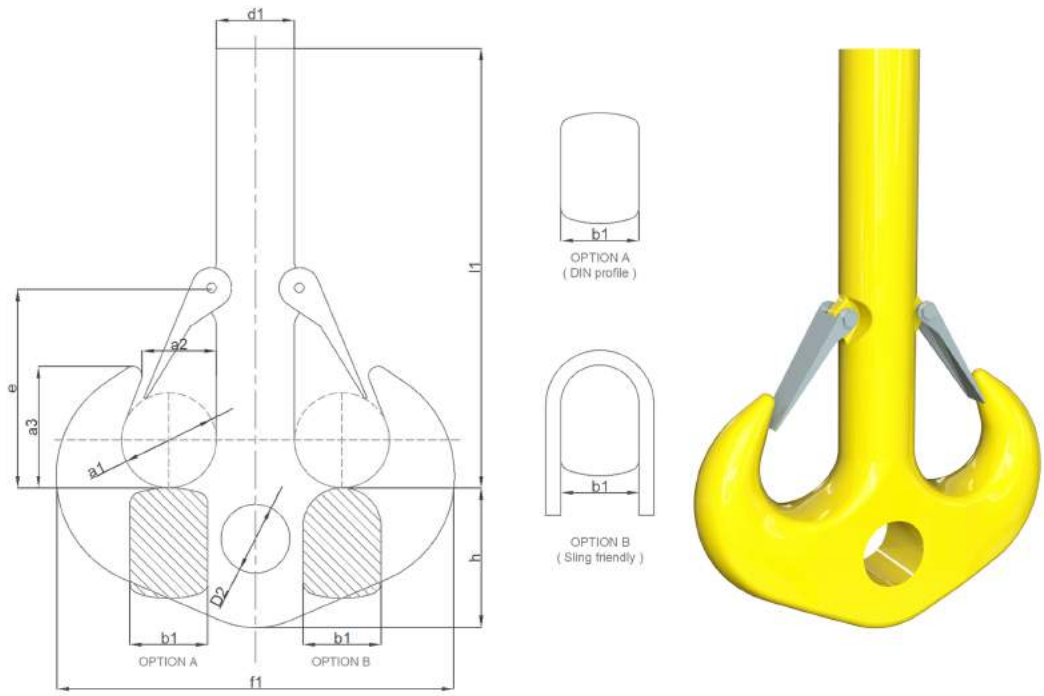
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.3 Ramshorn forged hooks based on DIN15402-B design

1.1.2.3.1 Unmachined



- WLL: from 10t to 2.000t (bottom hole included).
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON DIN15402-B DESIGN | UNMACHINED

OVERALL DIMENSIONS (inch)											Weight
No	a1	a2	a3	b1	d1	D2 H15	e	f1	h	l1	lbs
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	2 29/32	7 17/32	14 13/16	5 3/32	17 11/16	90
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	3 1/16	8 1/4	16 9/16	5 7/8	20 1/16	126
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	3 3/8	9 5/16	18 17/32	6 11/16	22 13/16	181
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	3 3/4	10 13/32	20 7/8	7 15/32	25 9/16	254
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	4 5/32	12 3/8	23 17/32	8 11/32	28 1/8	353
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	4 9/16	13 3/16	26 7/16	9 9/32	31 3/32	505
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	5 5/32	14 3/4	29 21/32	10 13/32	34 13/16	728
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	5 23/32	16 17/32	33 1/8	11 25/32	37 31/32	1010
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	6 19/32	18 3/32	37 5/32	13 3/16	42 29/32	1407
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	7 3/8	20 1/4	41 25/32	14 3/4	48 19/32	1967
100	11	8 13/16	14 5/16	9 9/32	9 9/32	8 3/16	22 5/8	46 11/16	16 23/32	54 1/8	2751
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	9 1/4	25 3/8	52 11/32	18 11/16	61	3874
160	13 31/32	11	18 1/32	11 25/32	11 25/32	10 7/32	28 17/32	59 1/4	20 27/32	68 11/16	5512
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	11 3/32	31 15/32	66 5/16	23 19/32	77 5/32	7848
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	12 9/32	34 7/16	74 3/16	26 3/8	87	11096
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	13 3/8	37 3/8	83 21/32	29 1/2	99	15642
400	22 1/32	17 11/16	28 23/32	18 11/16	18 11/16	14 7/8	41 1/8	93 1/2	33 1/16	111 13/32	22068

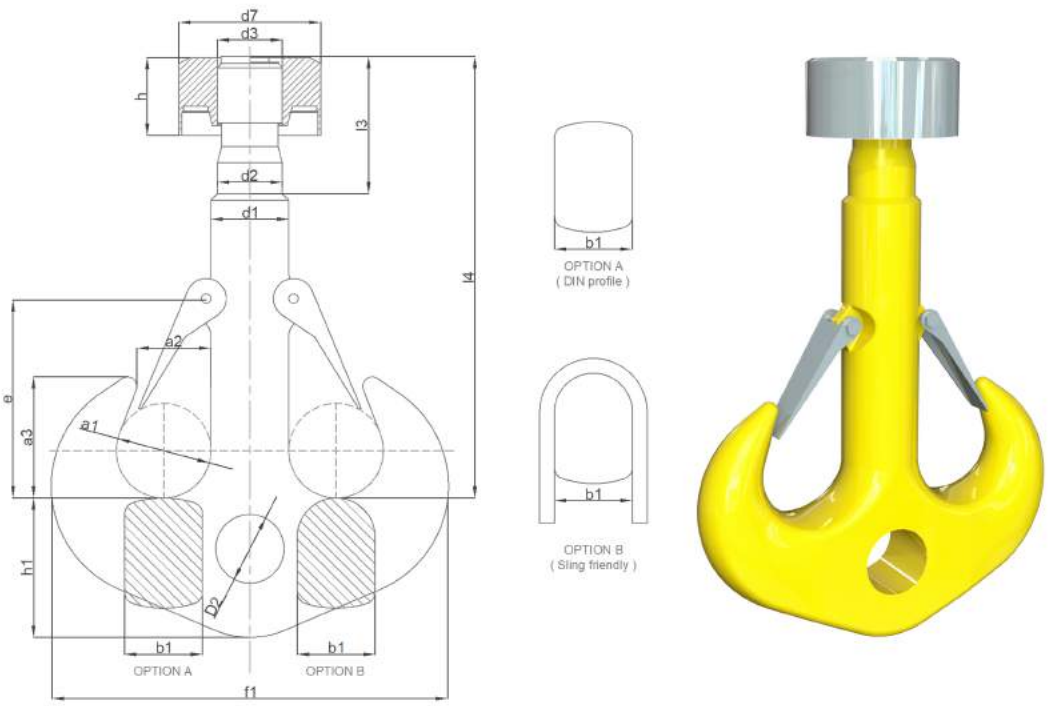
Tolerances: -0/+7% forging tolerance.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.3 Ramshorn forged hooks based on DIN15402-B design

1.1.2.3.2 Machined fitted with nut



- WLL: from 10t to 2.000t (bottom hole included).
- Hook and Nut FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON DIN15402-B DESIGN | MACHINED FITTED WITH NUT

OVERALL DIMENSIONS (inch)														DIN 15413 Nut		Weight
No	a1	a2	a3	b1	d1	e	f1	D2 H15	h1	d2 h11	d3	l3	l4	d7	h	lbs
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	7 17/32	14 13/16	2 29/32	5 3/32	2 1/2	Rd64x8	5 5/16	17 1/8	5 11/16	2 31/32	104
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	8 1/4	16 9/16	3 1/16	5 7/8	2 13/16	Rd72x8	6 5/32	19 11/32	6 15/32	3 13/32	144
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	9 5/16	18 17/32	3 3/8	6 11/16	3 1/8	Rd80x10	6 11/16	22 1/8	6 7/8	3 9/16	203
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	10 13/32	20 7/8	3 3/4	7 15/32	3 17/32	Rd90x10	7 11/32	24 23/32	7 9/32	4	282
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	12 3/8	23 17/32	4 5/32	8 11/32	3 29/32	Rd100x12	8 1/8	27 3/8	8 1/16	4 7/16	390
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	13 3/16	26 7/16	4 9/16	9 9/32	4 5/16	Rd110x12	9 1/8	30 7/32	9 7/16	5 5/32	560
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	14 3/4	29 21/32	5 5/32	10 13/32	4 29/32	Rd125x14	10 3/32	33 31/32	10 5/8	5 21/32	811
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	16 17/32	33 1/8	5 23/32	11 25/32	5 1/2	Rd140x16	11	37 5/32	12 19/32	6	1131
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	18 3/32	37 5/32	6 19/32	13 3/16	6 9/32	Rd160x18	12 21/32	42 3/16	14 5/32	7 1/8	1583
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	20 1/4	41 25/32	7 3/8	14 3/4	7 1/16	Rd180x20	14 1/32	47 11/16	15 23/32	7 25/32	2209
100	11	8 13/16	14 5/16	9 9/32	9 9/32	22 5/8	46 11/16	8 3/16	16 23/32	7 27/32	Rd200x22	15 13/16	53 3/16	17 1/2	8 31/32	3082
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	25 3/8	52 11/32	9 1/4	18 11/16	8 27/32	Rd225x24	18 9/32	59 29/32	19 9/32	9 21/32	4336
160	13 31/32	11	18 1/32	11 25/32	11 25/32	28 17/32	59 1/4	10 7/32	20 27/32	9 13/16	Rd250x28	20 1/16	67 15/32	20 27/32	10 25/32	6107
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	31 15/32	66 5/16	11 3/32	23 19/32	11	Rd280x32	24 1/8	77 7/32	23 7/32	13 1/2	8664
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	34 7/16	74 3/16	12 9/32	26 3/8	12 19/32	Rd320x36	27 5/32	87 9/32	26 3/4	15 1/16	12467
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	37 3/8	83 21/32	13 3/8	29 1/2	14 9/16	Rd360x36	30 11/16	98 19/32	29 29/32	17 1/32	16760
400	22 1/32	17 11/16	28 23/32	18 11/16	18 11/16	41 1/8	93 1/2	14 7/8	33 1/16	16 5/16	Rd400x36	34 7/16	111	34 1/32	18 31/32	23600

Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

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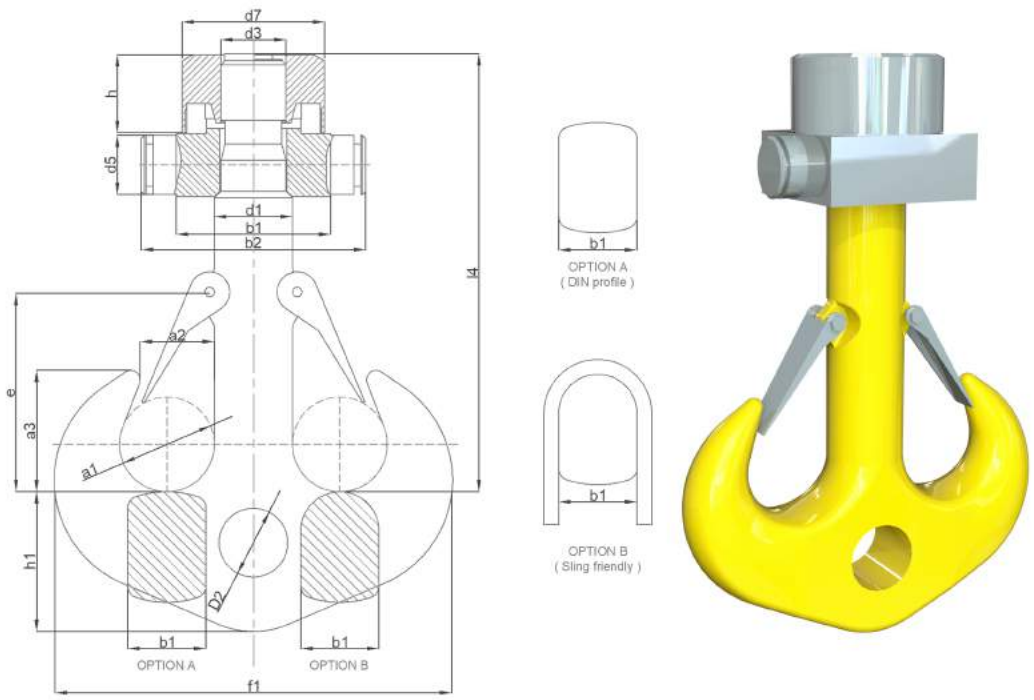
1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.2 RAMSHORN FORGED HOOKS BASED ON RECOGNIZED EUROPEAN STANDARDS

1.1.2.3 Ramshorn forged hooks based on DIN15402-B design

1.1.2.3.3 Machined fitted with nut, crosshead and bearing



- WLL: from 10t to 2.000t (bottom hole included).
- Hook, Nut and crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, S, T, V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

RAMSHORN FORGED HOOKS BASED ON DIN15402-B DESIGN | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

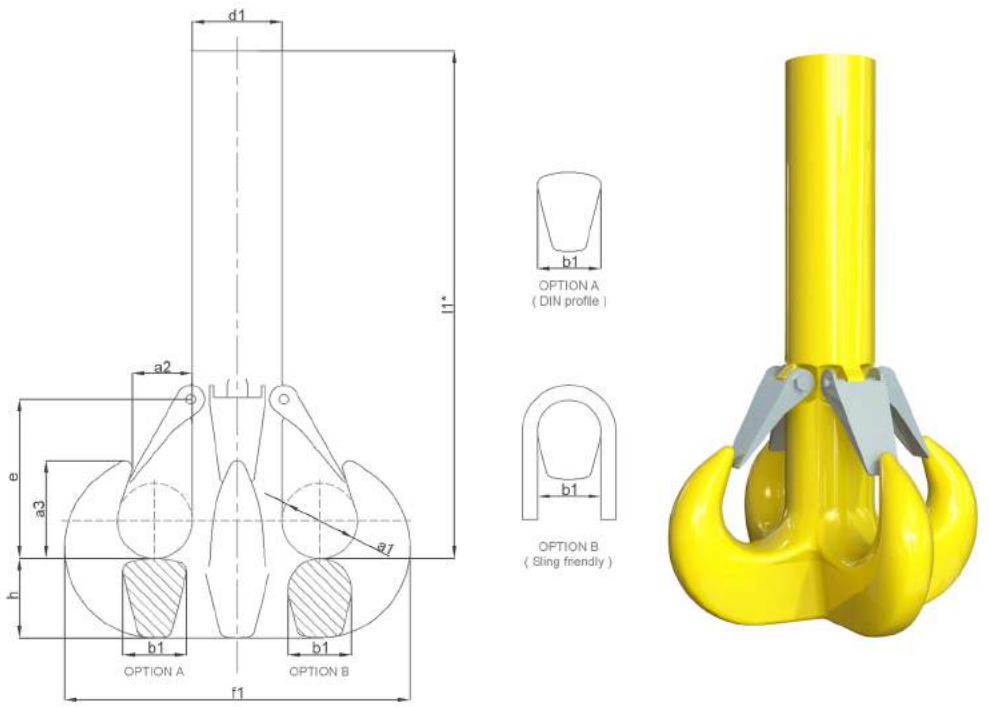
OVERALL DIMENSIONS (inch)												DIN 15412 Crosshead			DIN 15413 Nut		Weight
No	a1	a2	a3	b1	d1	e	f1	D2 H15	h1	d3	l4	b1	b2	d5 h9	d7	h	lbs
10	3 17/32	2 25/32	4 9/16	2 15/16	2 15/16	7 17/32	14 13/16	2 29/32	5 3/32	Rd64x8	17 1/8	6 9/32	9 1/32	2 5/32	5 11/16	2 31/32	136
12	3 29/32	3 1/8	5 3/32	3 11/32	3 11/32	8 1/4	16 9/16	3 1/16	5 7/8	Rd72x8	19 11/32	7 1/16	10 13/32	2 11/32	6 15/32	3 13/32	193
16	4 13/32	3 17/32	5 23/32	3 23/32	3 23/32	9 5/16	18 17/32	3 3/8	6 11/16	Rd80x10	22 1/8	7 15/32	10 13/16	2 3/4	6 7/8	3 9/16	262
20	4 29/32	3 29/32	6 13/32	4 5/32	4 5/32	10 13/32	20 7/8	3 3/4	7 15/32	Rd90x10	24 23/32	7 27/32	11 19/32	3 1/8	7 9/32	4	355
25	5 1/2	4 13/32	7 5/32	4 5/8	4 5/8	12 3/8	23 17/32	4 5/32	8 11/32	Rd100x12	27 3/8	8 21/32	12 1/2	3 17/32	8 1/16	4 7/16	488
32	6 9/32	4 29/32	8 1/16	5 3/16	5 3/16	13 3/16	26 7/16	4 9/16	9 9/32	Rd110x12	30 7/32	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	712
40	7 1/16	5 1/2	9 1/32	5 7/8	5 7/8	14 3/4	29 21/32	5 5/32	10 13/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	1019
50	7 27/32	6 9/32	10 7/32	6 11/16	6 11/16	16 17/32	33 1/8	5 23/32	11 25/32	Rd140x16	37 5/32	13 3/16	18 9/32	4 29/32	12 19/32	6	1446
63	8 13/16	7 1/16	11 15/32	7 15/32	7 15/32	18 3/32	37 5/32	6 19/32	13 3/16	Rd160x18	42 3/16	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	2030
80	9 13/16	7 27/32	12 25/32	8 11/32	8 11/32	20 1/4	41 25/32	7 3/8	14 3/4	Rd180x20	47 11/16	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	2824
100	11	8 13/16	14 5/16	9 9/32	9 9/32	22 5/8	46 11/16	8 3/16	16 23/32	Rd200x22	53 3/16	18 1/2	25 3/8	7 1/16	17 1/2	8 31/32	3942
125	12 3/8	9 13/16	16 1/16	10 13/32	10 13/32	25 3/8	52 11/32	9 1/4	18 11/16	Rd225x24	59 29/32	20 1/16	26 15/16	7 27/32	19 9/32	9 21/32	5503
160	13 31/32	11	18 1/32	11 25/32	11 25/32	28 17/32	59 1/4	10 7/32	20 27/32	Rd250x28	67 15/32	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	7683
200	15 23/32	12 3/8	20 1/4	13 3/16	13 3/16	31 15/32	66 5/16	11 3/32	23 19/32	Rd280x32	77 7/32	24	31 7/8	9 7/16	23 7/32	13 1/2	10827
250	17 11/16	13 31/32	22 13/16	14 3/4	14 3/4	34 7/16	74 5/16	12 9/32	26 3/8	Rd320x36	87 9/32	27 17/32	36 7/32	10 7/32	26 3/4	15 1/16	15514
320	19 21/32	15 23/32	25 9/16	16 23/32	16 23/32	37 3/8	83 21/32	13 3/8	29 1/2	Rd360x36	98 19/32	31 3/32	40 17/32	11	29 29/32	17 1/32	20507
400	22 1/32	17 1/16	28 23/32	18 11/16	18 1/16	41 1/8	93 1/2	14 7/8	33 1/16	Rd400x36	111	35 7/32	45 1/16	11 25/32	34 1/32	18 31/32	28953

Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.3 QUAD FORGED HOOKS BASED ON DIN15402-C DESIGN

1.1.3.1 Unmachined



- WLL: from 160t to 4.000t with equal load on 4 prongs/horns.
- Hook FORGED and HEAT TREATED. Machining recommended to perform by manufacturer.
- Material: super alloys.
- Mechanical properties: V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended after machining.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

QUAD FORGED HOOKS BASED ON DIN15402-C | UNMACHINED

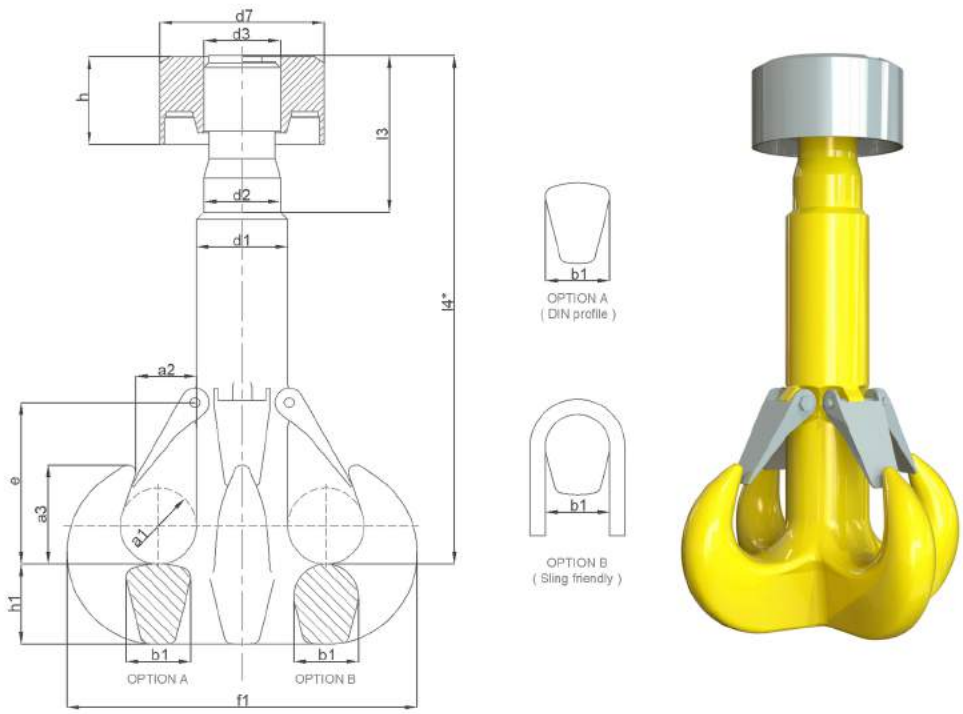
	OVERALL DIMENSIONS (inch)										Weight
No	WLL	a1	a2	a3	b1	d1	e	f1	h	l1*	lbs
16	160t	4 13/32	3 17/32	5 23/32	3 23/32	5 3/16	9 5/16	20 /	4 5/8	31 3/32	340
20	200t	4 29/32	3 29/32	6 13/32	4 5/32	5 7/8	10 13/32	22 5/8	5 3/16	34 13/16	487
25	250t	5 1/2	4 13/32	7 5/32	4 5/8	6 11/16	12 3/8	25 9/16	5 7/8	37 31/32	688
32	320t	6 9/32	4 29/32	8 1/16	5 3/16	7 15/32	13 3/16	28 23/32	6 11/16	42 29/32	970
40	400t	7 1/16	5 1/2	9 1/32	5 7/8	8 11/32	14 3/4	32 1/8	7 15/32	48 19/32	1376
50	500t	7 27/32	6 9/32	10 7/32	6 11/16	9 9/32	16 17/32	35 23/32	8 11/32	54 1/8	1914
63	640t	8 13/16	7 1/16	11 15/32	7 15/32	10 13/32	18 3/32	40 3/32	9 9/32	61	2714
80	800t	9 13/16	7 27/32	12 25/32	8 11/32	11 25/32	20 1/4	45 1/4	10 13/32	68 11/16	3860
100	1000t	11	8 13/16	14 5/16	9 9/32	13 3/16	22 5/8	50 9/16	11 25/32	78 21/32	5461
125	1260t	12 3/8	9 13/16	16 1/16	10 13/32	14 3/4	25 3/8	56 11/16	13 3/16	88 9/16	7694
160	1600t	13 31/32	11	18 1/32	11 25/32	16 23/32	28 17/32	64 5/32	14 3/4	100 3/8	11292
200	2000t	15 23/32	12 3/8	20 1/4	13 3/16	18 11/16	31 15/32	71 27/32	16 23/32	113 31/32	15781
250	2600t	17 11/16	13 31/32	22 13/16	14 3/4	21 5/8	34 7/16	82 21/32	18 11/16	128 23/32	22178
320	3200t	19 21/32	15 23/32	25 9/16	16 23/32	24 19/32	37 3/8	94 3/32	20 27/32	145 15/32	31173
400	4000t	22 1/32	17 11/16	28 23/32	18 11/16	28 17/32	41 1/8	109 1/4	23 19/32	164 9/16	45084

WLL based on V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.3 QUAD FORGED HOOKS BASED ON DIN15402-C DESIGN

1.1.3.2 Machined fitted with nut



- WLL: from 160t to 4.000t with equal load on 4 prongs/horns.
- Hook and Nut FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: super alloys.
- Mechanical properties: V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

QUAD FORGED HOOKS BASED ON DIN15402-C | MACHINED FITTED WITH NUT

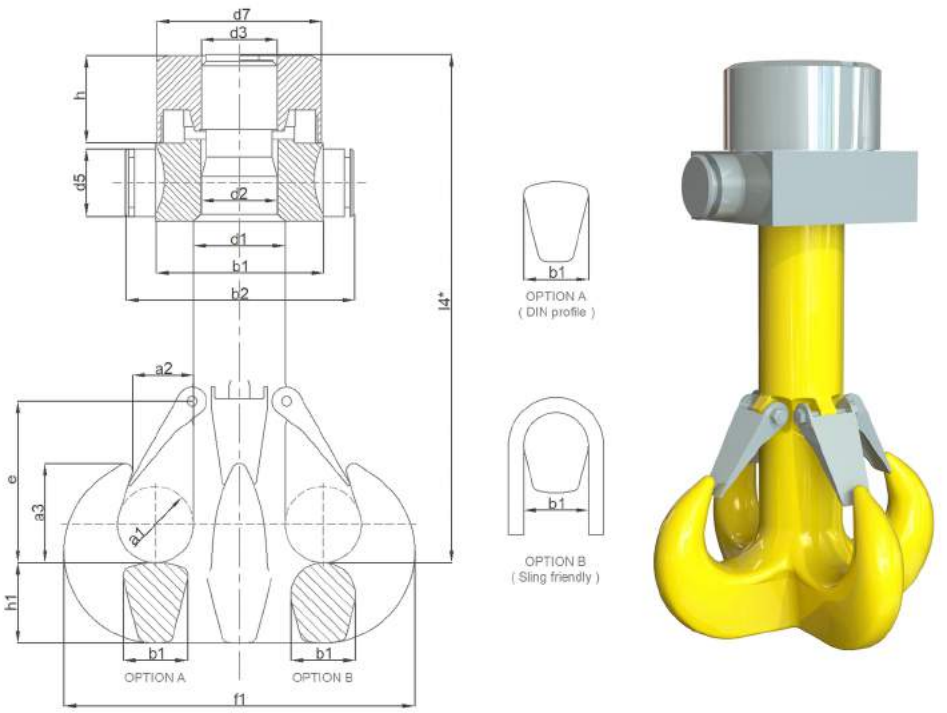
OVERALL DIMENSIONS (inch)														DIN 15413 Nut		Weight
No	WLL	a1	a2	a3	b1	d1	e	f1	h1	d2 h11	d3	l3	l4*	d7	h	lbs
16	160t	4 13/32	3 17/32	5 23/32	3 23/32	5 3/16	9 5/16	20 /	4 5/8	4 5/16	Rd110x12	9 1/8	30 7/32	9 7/16	5 5/32	370
20	200t	4 29/32	3 29/32	6 13/32	4 5/32	5 7/8	10 13/32	22 5/8	5 3/16	4 29/32	Rd125x14	10 3/32	33 31/32	10 5/8	5 21/32	531
25	250t	5 1/2	4 13/32	7 5/32	4 5/8	6 11/16	12 3/8	25 9/16	5 7/8	5 1/2	Rd140x16	11	37 5/32	12 19/32	6	754
32	320t	6 9/32	4 29/32	8 1/16	5 3/16	7 15/32	13 3/16	28 23/32	6 11/16	6 9/32	Rd160x18	12 21/32	42 3/16	14 5/32	7 1/8	1080
40	400t	7 1/16	5 1/2	9 1/32	5 7/8	8 11/32	14 3/4	32 1/8	7 15/32	7 1/16	Rd180x20	14 1/32	47 11/16	15 23/32	7 25/32	1638
50	500t	7 27/32	6 9/32	10 7/32	6 11/16	9 9/32	16 17/32	35 23/32	8 11/32	7 27/32	Rd200x22	15 13/16	53 3/16	17 1/2	8 31/32	2112
63	640t	8 13/16	7 1/16	11 15/32	7 15/32	10 13/32	18 3/32	40 3/32	9 9/32	8 27/32	Rd225x24	18 9/32	59 29/32	19 9/32	9 21/32	2972
80	800t	9 13/16	7 27/32	12 25/32	8 11/32	11 25/32	20 1/4	45 1/4	10 13/32	9 13/16	Rd250x28	20 1/16	67 15/32	20 27/32	10 25/32	4142
100	1000t	11	8 13/16	14 5/16	9 9/32	13 3/16	22 5/8	50 9/16	11 25/32	11	Rd280x32	24 1/8	77 7/32	23 7/32	13 1/2	5838
125	1260t	12 3/8	9 13/16	16 1/16	10 13/32	14 3/4	25 3/8	56 1/16	13 3/16	12 19/32	Rd320x36	27 5/32	87 9/32	26 3/4	15 1/16	8212
160	1600t	13 31/32	11	18 1/32	11 25/32	16 23/32	28 17/32	64 5/32	14 3/4	14 9/16	Rd360x36	30 11/16	98 19/32	29 29/32	17 1/32	11526
200	2000t	15 23/32	12 3/8	20 1/4	13 3/16	18 11/16	31 15/32	71 27/32	16 23/32	16 5/16	Rd400x36	34 7/16	111	34 1/32	18 31/32	16358
250	2600t	17 11/16	13 31/32	22 13/16	14 3/4	21 5/8	34 7/16	82 21/32	18 11/16	18 7/8	Rd480x36	38 3/4	125	38 3/8	21 1/4	23071
320	3200t	19 21/32	15 23/32	25 9/16	16 23/32	24 19/32	37 3/8	94 3/32	20 27/32	21 5/8	Rd550x36	43 11/16	140 17/32	42 29/32	23 19/32	32606
400	4000t	22 1/32	17 11/16	28 23/32	18 11/16	28 17/32	41 1/8	109 1/4	23 19/32	25 3/16	Rd640x36	49 3/16	158 1/4	48 1/32	26 3/8	46826

WLL based on V material grade.
Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.3 QUAD FORGED HOOKS BASED ON DIN15402-C DESIGN

1.1.3.2 Machined fitted with nut, crosshead and bearing



- WLL: from 160t to 4.000t with equal load on 4 prongs/horns.
- Hook, nut and crosshead FORGED, HEAT TREATED and thread fully MACHINED as per DIN15403 design.
- Material: super alloys.
- Mechanical properties: V, W.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

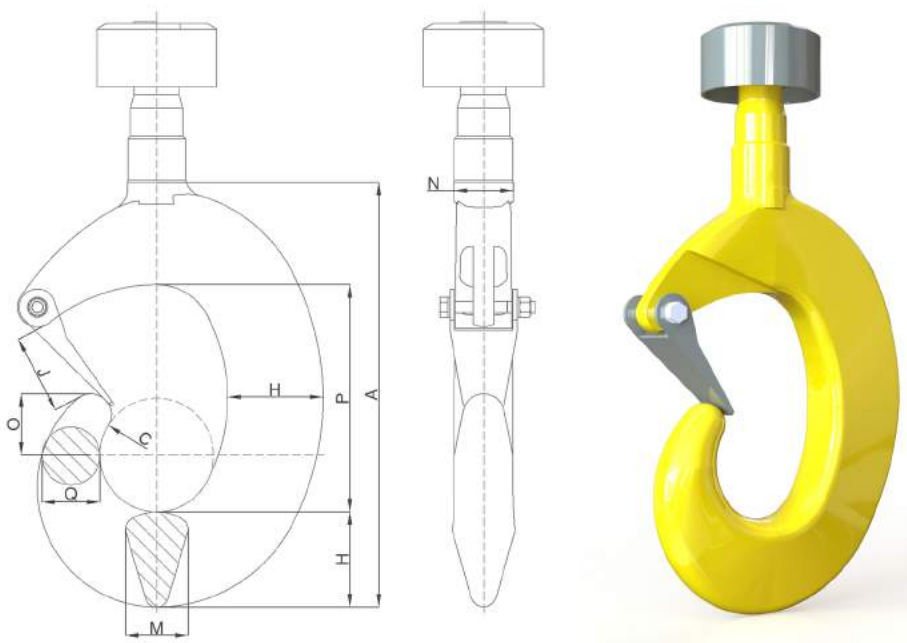
QUAD FORGED HOOKS BASED ON DIN15402-C | MACHINED FITTED WITH NUT, CROSSHEAD and BEARING

OVERALL DIMENSIONS (inch)													DIN 15412 Crosshead			DIN 15413 Nut		Weight
No	WLL	a1	a2	a3	b1	d1	e	f1	h1	d2 h11	d3	l4*	b1	b2	d5 h9	d7	h	lbs
16	160t	4 13/32	3 17/32	5 23/32	3 23/32	5 3/16	9 5/16	20 /	4 5/8	4 5/16	Rd110x12	30 7/32	10 7/32	14 7/8	3 29/32	9 7/16	5 5/32	509
20	200t	4 29/32	3 29/32	6 13/32	4 5/32	5 7/8	10 13/32	22 5/8	5 3/16	4 29/32	Rd125x14	33 31/32	11 7/32	16 5/16	4 5/16	10 5/8	5 21/32	717
25	250t	5 1/2	4 13/32	7 5/32	4 5/8	6 11/16	12 3/8	25 9/16	5 7/8	5 1/2	Rd140x16	37 5/32	13 3/16	18 9/32	4 29/32	12 19/32	6	1041
32	320t	6 9/32	4 29/32	8 1/16	5 3/16	7 15/32	13 3/16	28 23/32	6 11/16	6 9/32	Rd160x18	42 3/16	14 15/16	20 17/32	5 1/2	14 5/32	7 1/8	1497
40	400t	7 1/16	5 1/2	9 1/32	5 7/8	8 11/32	14 3/4	32 1/8	7 15/32	7 1/16	Rd180x20	47 11/16	16 17/32	22 7/32	6 9/32	15 23/32	7 25/32	2438
50	500t	7 27/32	6 9/32	10 7/32	6 11/16	9 9/32	16 17/32	35 23/32	8 11/32	7 27/32	Rd200x22	53 3/16	18 1/2	25 3/8	7 1/16	17 1/2	8 31/32	2912
63	640t	8 13/16	7 1/16	11 15/32	7 15/32	10 13/32	18 3/32	40 3/32	9 9/32	8 27/32	Rd225x24	59 29/32	20 1/16	26 15/16	7 27/32	19 9/32	9 21/32	4052
80	800t	9 13/16	7 27/32	12 25/32	8 11/32	11 25/32	20 1/4	45 1/4	10 13/32	9 13/16	Rd250x28	67 15/32	21 5/8	29 1/2	8 21/32	20 27/32	10 25/32	5562
100	1000t	11	8 13/16	14 5/16	9 9/32	13 3/16	22 5/8	50 9/16	11 25/32	11	Rd280x32	77 7/32	24	31 7/8	9 7/16	23 7/32	13 1/2	7932
125	1260t	12 3/8	9 13/16	16 1/16	10 13/32	14 3/4	25 3/8	56 11/16	13 3/16	12 19/32	Rd320x36	87 9/32	27 17/32	36 7/32	10 7/32	26 3/4	15 1/16	11277
160	1600t	13 31/32	11	18 1/32	11 25/32	16 23/32	28 17/32	64 5/32	14 3/4	14 9/16	Rd360x36	98 19/32	31 3/32	40 17/32	11	29 29/32	17 1/32	15917
200	2000t	15 23/32	12 3/8	20 1/4	13 3/16	18 11/16	31 15/32	71 27/32	16 23/32	16 5/16	Rd400x36	111	35 7/32	45 1/16	11 25/32	34 1/32	18 31/32	22476
250	2600t	17 11/16	13 31/32	22 13/16	14 3/4	21 5/8	34 7/16	82 21/32	18 11/16	18 7/8	Rd480x36	125	39 9/16	49 25/32	12 19/32	38 3/8	21 1/4	31912
320	3200t	19 21/32	15 23/32	25 9/16	16 23/32	24 19/32	37 3/4	94 3/32	20 27/32	21 5/8	Rd550x36	140 17/32	43 11/16	54 23/32	13 9/16	42 29/32	23 15/32	44996
400	4000t	22 1/32	17 11/16	28 23/32	18 11/16	28 17/32	41 1/8	109 1/4	23 19/32	25 3/16	Rd640x36	158 1/4	48 7/32	59 13/16	14 9/16	48 1/32	26 3/8	64154

WLL based on V material grade.
Tolerances: -0/+7% forging tolerance. Machining tolerances as per DIN15403.
Modifications: Shank length (L). Further dimensions upon request.
Hook section: b1xH: other sections can be design.

1.1 SHANK HOOKS BASED ON EN13001-3-5:2016

1.1.4 SINGLE FORGED CARGO HOOKS BASED ON BS2903:1980 DESIGN.



- WLL: from 10t to 50t. Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SINGLE FORGED CARGO HOOKS BASED ON BS2903:1980 DESIGN

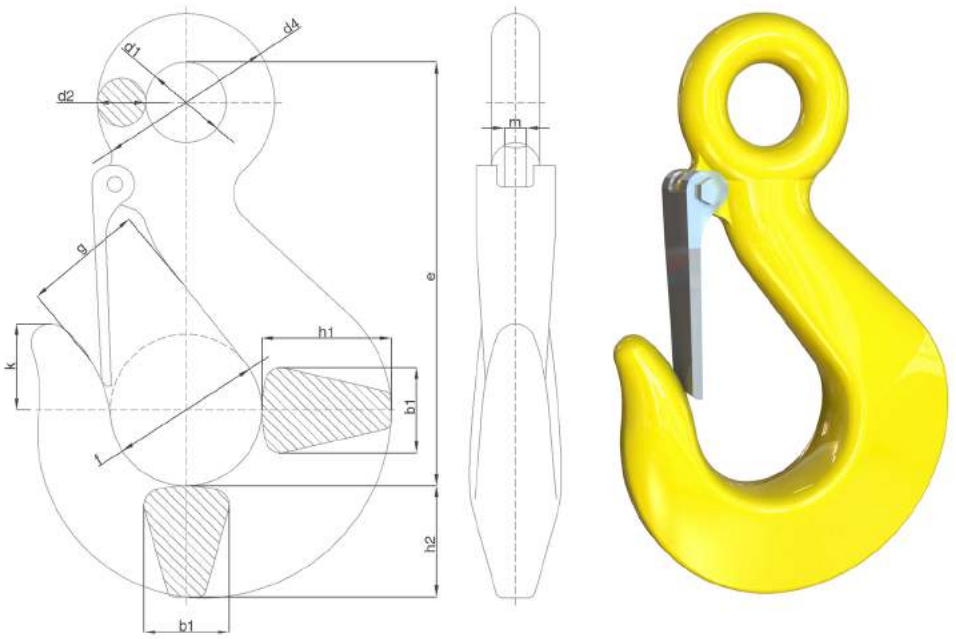
		OVERALL DIMENSIONS (inch)									Weight
No	WLL (t)	C	A	P	H	J	M	O	Q	N	lbs
5	10	2 3/4	10 5/32	5 1/2	2 5/16	1 15/16	1 15/32	1 15/32	1 3/8	1 19/32	12
6,3	13	3 1/16	11 9/32	6 1/8	2 19/32	2 5/32	1 11/16	1 5/8	1 17/32	1 25/32	18
8	16	3 7/16	12 3/4	6 29/32	2 29/32	2 7/16	1 7/8	1 7/8	1 23/32	2	24
10	20	3 27/32	14 3/16	7 11/16	3 7/32	2 3/4	2 1/8	2 1/16	1 29/32	2 3/16	33
12,5	25	4 5/16	15 15/16	8 21/32	3 19/32	3 1/16	2 11/32	2 5/16	2 5/32	2 3/8	49
16	32	4 7/8	17 15/16	9 3/4	4 3/32	3 7/16	2 21/32	2 5/8	2 7/16	2 19/32	71
20	40	5 15/32	20 5/32	10 15/16	4 19/32	3 7/8	2 31/32	2 15/16	2 3/4	2 31/32	99
25	50	6 1/8	22 19/32	12 9/32	5 5/32	4 11/32	3 3/8	3 9/32	3 1/16	3 3/16	139

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: Upon request.

1.2 EYE HOOKS

1.2.1 EYE FORGED SINGLE HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.1.1 Eye forged single CHAIN hook based on DIN7540 design



- WLL: from 3t to 400t (for super alloy materials).
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED SINGLE CHAIN HOOK BASED ON DIN7540 DESIGN

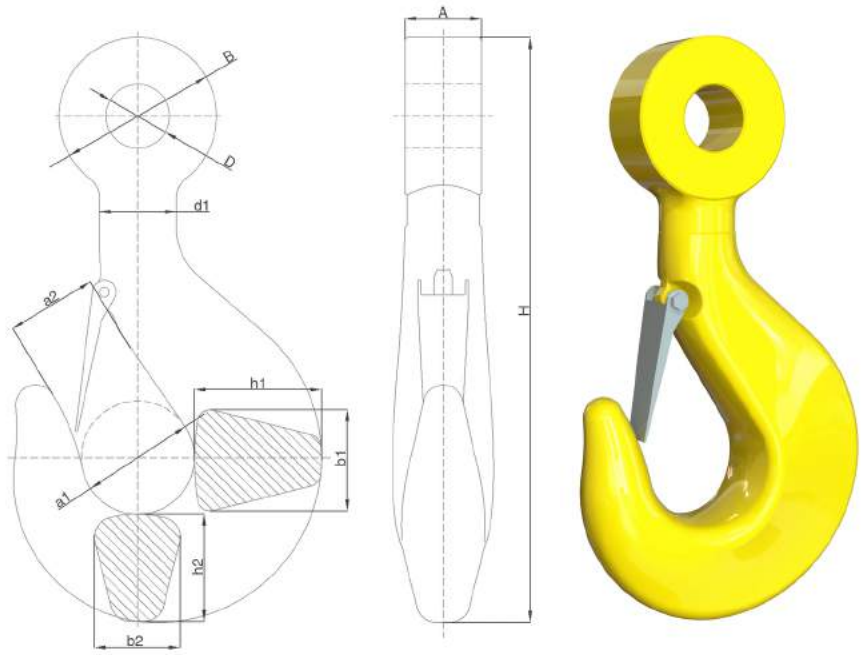
		OVERALL DIMENSIONS (inch)											Weight
No	WLL (t)	b1	d1	d2	e	f	g	h1	h2	k	m	d4	lbs
25	5	1 3/32	1	5/	5 13/32	1 15/16	1 17/32	1 21/32	1 13/32	1 3/32	13/32	2 9/32	3
27	8	1 3/8	1 1/4	2 5/2	6 27/32	2 7/16	1 29/32	2 3/32	1 25/32	1 13/32	15/32	2 13/16	6
28	10	1 9/16	1 13/32	7/	7 15/32	2 3/4	2 1/8	2 11/32	2 1/32	1 13/32	17/32	3 3/16	9
29	12,5	1 3/4	1 9/16	3 1/2	8 19/32	3 3/32	2 7/16	2 21/32	2 9/32	1 3/4	5/8	3 17/32	13
30	16	1 15/16	1 25/32	1 3/32	9 21/32	3 7/16	2 11/16	2 15/16	2 17/32	1 15/16	21/32	4	18
31	20	2 3/16	2 1/32	1 7/32	10 7/8	3 7/8	3 1/16	3 5/16	2 27/32	2 7/32	11/16	4 1/2	25
32	25	2 15/32	2 11/32	1 3/8	12 5/16	4 13/32	3 7/16	3 3/4	3 7/32	2 1/2	11/16	5 5/32	35
33	32	2 3/4	2 19/32	1 9/16	13 23/32	4 29/32	3 27/32	4 5/32	3 19/32	2 13/16	23/32	5 23/32	49
34	40	3 1/16	2 13/16	1 3/4	15 1/4	5 1/2	4 9/32	4 5/8	4 1/32	3 1/8	25/32	6 5/16	69
35	50	3 1/2	3 9/32	1 31/32	17 3/8	6 7/32	4 7/8	5 5/16	4 9/16	3 17/32	7/8	7 9/32	101
36	63	3 7/8	3 17/32	2 3/16	19 7/16	6 29/32	5 13/32	5 15/16	5 3/32	3 31/32	31/32	7 15/16	139
37	80	4 5/16	4	2 15/32	24	7 25/32	6 3/32	6 19/32	5 11/16	4 7/16	1 5/32	8 31/32	176
38	100	4 29/32	4 9/16	2 29/32	25 9/16	8 27/32	6 7/8	7 21/32	6 3/4	5 7/32	1 15/32	10 3/8	276
39	150	6 9/32	5 3/32	3 3/8	30 3/32	9 13/16	7 27/32	8 27/32	7 13/16	6 9/32	1 15/32	11 7/8	551
40	200	7 1/16	5 7/8	4	33 7/16	10 13/16	8 27/32	10 7/32	9 5/16	7 21/32	1 3/4	13 29/32	805
41	250	7 27/32	6 11/16	4 23/32	36 17/32	12 3/16	10 1/32	11 13/32	10 9/16	8 1/4	1 3/4	16 1/8	1135
42	300	8 21/32	7 15/32	5 1/2	41 13/32	13 3/4	11 13/32	12 31/32	12 5/32	9 7/16	1 3/4	18 1/2	1609
43	400	9 7/16	8 1/4	6 11/16	47 1/32	15 23/32	12 19/32	14 15/16	13 9/16	10 5/8	1 3/4	21 5/8	2326

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: Modifications upon request.

1.2 EYE HOOKS

1.2.1 EYE FORGED SINGLE HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.1.2 Eye forged single FIX hook based on IRIZAR DESIGN



- WLL: from 80t to 2.000t. Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED SINGLE FIX HOOK BASED ON IRIZAR DESIGN

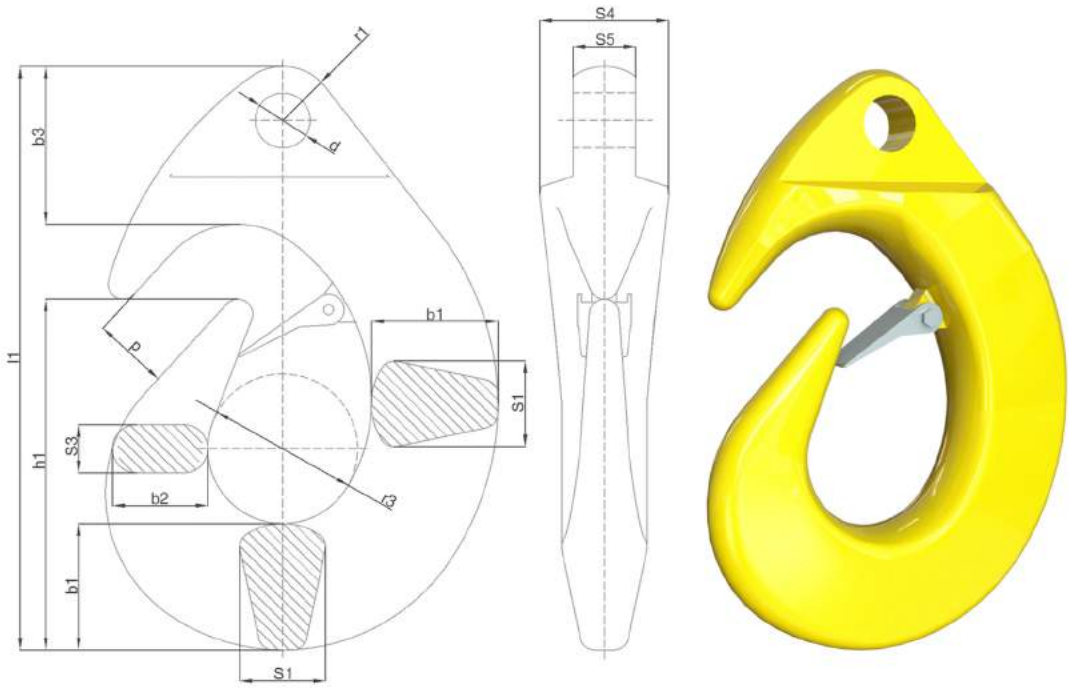
			OVERALL DIMENSIONS (inch)											Weight
No	WLL (t)	MBL (t)	a1	a2	b1	b2	h1	h2	d1	A	D	B	H	lbs
16	80	320	5 1/2	4 13/32	4 29/32	4 5/32	6 9/32	5 3/16	3 23/32	4 5/16	3 13/32	7 1/16	29 11/32	212
20	100	400	6 9/32	4 29/32	5 1/2	4 5/8	7 1/16	5 7/8	4 5/32	4 5/8	3 29/32	8 1/4	31 15/32	302
25	120	480	7 1/16	5 1/2	6 9/32	5 3/16	7 27/32	6 11/16	4 5/8	5 1/4	3 29/32	8 1/4	36 15/32	419
32	150	600	7 27/32	6 9/32	7 1/16	5 7/8	8 13/16	7 15/32	5 3/16	5 1/2	4 15/32	9 7/16	41 13/32	600
40	200	800	8 13/16	7 1/16	7 27/32	6 11/16	9 13/16	8 11/32	5 7/8	5 7/8	5 3/8	11 13/32	47 9/32	875
50	250	1000	9 13/16	7 27/32	8 13/16	7 15/32	11	9 9/32	6 11/16	6 11/16	5 25/32	12 3/16	51 23/32	1171
63	300	1200	11	8 13/16	9 13/16	8 11/32	12 3/8	10 13/32	7 15/32	7 15/32	6 7/32	12 31/32	57	1609
80	400	1600	12 3/8	9 13/16	11	9 9/32	13 31/32	11 25/32	8 11/32	8 1/16	7 7/32	14 15/16	66 5/16	2277
100	500	2000	13 31/32	11	12 3/8	10 13/32	15 23/32	13 3/16	9 9/32	9 1/32	7 5/8	15 23/32	73 21/32	3153
125	600	2400	15 23/32	12 3/8	13 31/32	11 25/32	17 11/16	14 3/4	10 13/32	10 1/32	8 7/16	17 11/16	81 11/16	4405
160	800	3200	17 11/16	13 31/32	15 23/32	13 3/16	19 21/32	16 23/32	11 25/32	11	9 7/16	19 21/32	90 5/16	6142
200	1000	4000	19 21/32	15 23/32	17 11/16	14 3/4	22 1/32	18 11/16	13 3/16	12 19/32	11	22 13/16	96 7/16	8527
250	1250	5000	22 1/32	17 11/16	19 21/32	16 23/32	24 25/32	20 27/32	14 3/4	13 31/32	12 3/8	25 9/16	110 5/8	11998
320	1550	6200	24 25/32	19 21/32	22 1/32	18 11/16	27 15/16	22 13/16	16 23/32	13 31/32	13 3/16	26 3/4	120 15/32	15942
400	1800	7200	27 15/16	22 1/32	24 25/32	20 27/32	31 15/32	24 25/32	18 11/16	16 1/8	15 17/32	29 1/2	135 1/32	22035

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: H, D and A. Others upon request.

1.2 EYE HOOKS

1.2.1 EYE FORGED SINGLE HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.1.3 Eye forged single CARGO hook based on DIN82017 design



- WLL: from 10t to 100t. Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED SINGLE CARGO HOOK BASED ON DIN82017 DESIGN

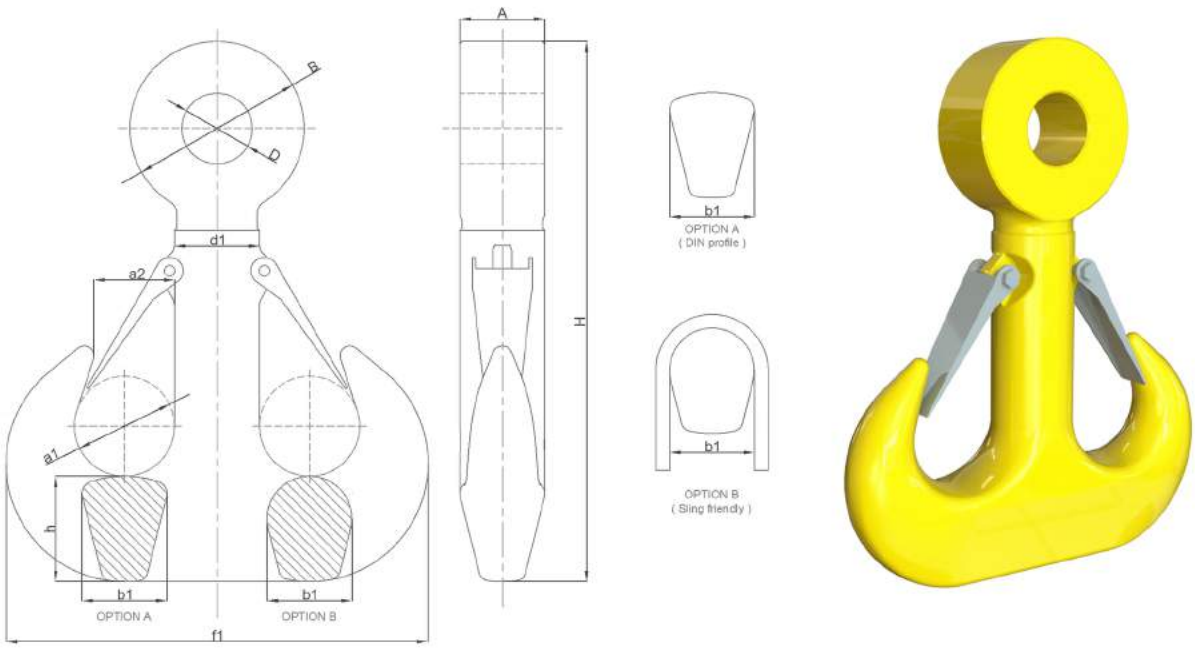
		OVERALL DIMENSIONS (inch)													Weight
No	WLL (t)	b1	b2	b3	d	h1	l1	p	r1	r3	S1	S3	S4	S5 A	S5 B	lbs
1	2	1 5/8	1 9/32	1 15/16	1 1/16	4 19/32	7 17/32	3 1/2	1 1/16	3 1/2	1 3/32	5/8	1 9/16	2 3/2	5/8	7
2	4	2 1/8	1 5/8	2 11/16	1 5/16	5 7/8	9 7/8	1 1/4	3 1/2	1 1/4	1 13/32	2 3/2	2 9/32	1 1/16	2 7/2	15
3	6	2 21/32	2 1/16	3 7/32	1 5/32	7 3/8	12 3/16	1 9/16	1 5/32	1 9/16	1 25/32	1	2 13/16	1 3/8	1 3/32	24
5	10	3 9/32	2 19/32	4 1/32	1 17/32	9 3/16	15 7/32	1 15/16	1 15/32	1 15/16	2 3/16	1 1/4	3 19/32	1 23/32	1 3/8	44
6	12	3 11/16	2 27/32	4 15/32	1 5/8	10 5/16	17	2 3/16	1 11/16	2 3/16	2 1/2	1 13/32	4	1 15/16	1 9/16	60
8	16	4 5/32	3 1/4	5 1/16	1 7/8	11 19/32	19 5/32	2 15/32	1 7/8	2 15/32	2 13/16	1 9/16	4 1/2	2 3/16	1 3/4	84
10	20	4 5/8	3 19/32	5 7/8	2 1/32	12 29/32	21 9/16	2 3/4	2 5/32	2 3/4	3 1/8	1 3/4	4 29/32	2 3/8	1 15/16	130
12	24	5 5/16	4 1/8	6 3/4	2 3/16	14 3/4	24 21/32	3 1/8	2 11/32	3 1/8	3 9/16	2	5 13/32	2 21/32	2 5/32	172
16	32	5 31/32	4 15/32	7 15/32	2 19/32	16 19/32	27 5/8	3 17/32	2 17/32	3 17/32	4 1/32	2 9/32	6 3/32	2 15/16	2 11/32	260
20	40	6 11/16	5 7/32	7 15/16	2 29/32	18 1/2	30 3/8	3 29/32	2 3/4	3 29/32	4 1/2	2 1/2	6 3/4	3 9/32	2 17/32	366
25	50	7 15/32	6	8 21/32	3 1/16	20 17/32	33 17/32	4 5/16	2 15/16	4 5/16	5 1/32	2 13/16	7 17/32	3 11/16	2 3/4	551
32	65	7 31/32	6 9/16	9 21/32	3 3/8	22 1/8	36 17/32	4 23/32	3 11/32	4 23/32	5 3/8	3 1/32	8 1/32	4	3 1/8	860
40	80	8 27/32	7 7/16	10 11/16	3 3/4	24 5/16	40 5/32	5 3/32	3 23/32	5 3/32	5 31/32	3 11/32	8 27/32	4 19/32	3 17/32	1345

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: H, D and A. Others upon request.

1.2 EYE HOOKS

1.2.2 EYE FORGED RAMSHORN HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.2.1 Eye forged Ramshorn FIX hook based on IRIZAR design



- WLL: from 80t to 2.000t. Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED RAMSHORN FIX HOOK BASED ON IRIZAR DESIGN

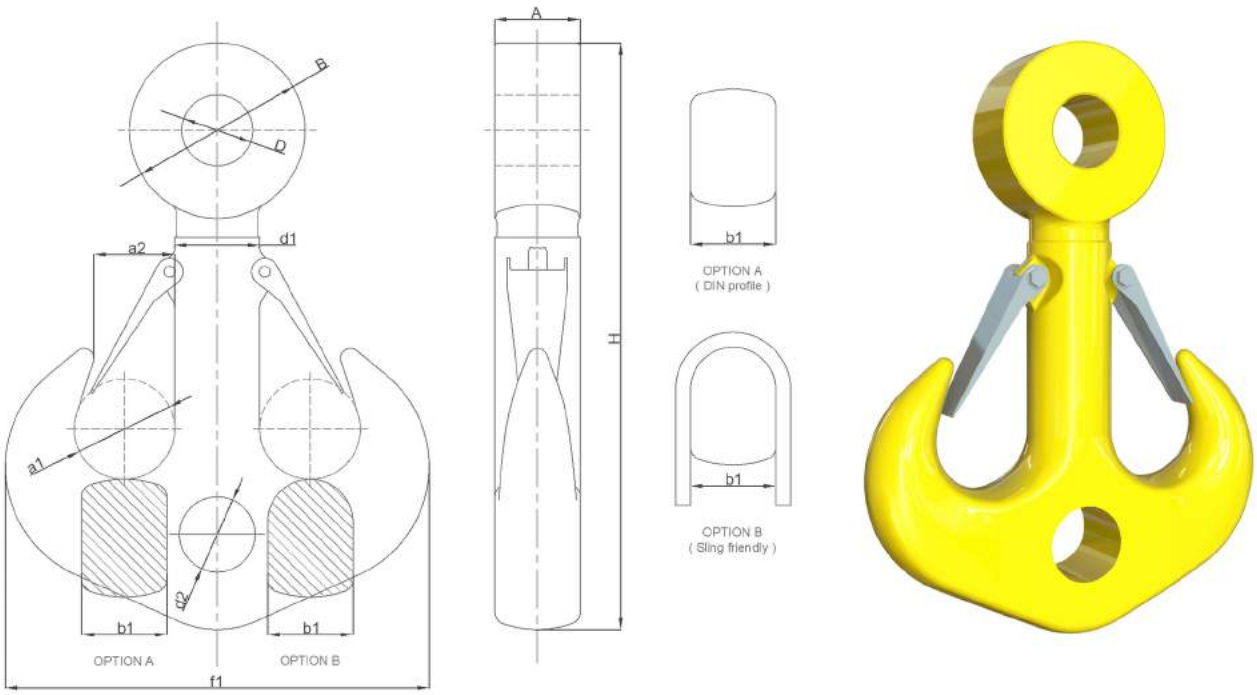
			OVERALL DIMENSIONS (Inch)										Weight
No	WLL (t)	MBL (t)	a1	a2	b1	h	d1	f1	A	D	B	H	kg
16	80	320	4 13/32	3 17/32	3 23/32	4 5/8	3 23/32	18 17/32	4 5/16	3 13/32	7 1/16	24 19/32	77
20	100	400	4 29/32	3 29/32	4 5/32	5 3/16	4 5/32	20 7/8	4 5/8	3 29/32	8 1/4	28 1/16	113
25	120	480	5 1/2	4 13/32	4 5/8	5 7/8	4 5/8	23 17/32	5 1/4	3 29/32	8 1/4	31 7/16	153
32	150	600	6 9/32	4 29/32	5 3/16	6 11/16	5 3/16	26 7/16	5 1/2	4 15/32	9 7/16	34 5/16	213
40	200	800	7 1/16	5 1/2	5 7/8	7 15/32	5 7/8	29 21/32	5 7/8	5 3/8	11 13/32	39 1/2	307
50	250	1000	7 27/32	6 9/32	6 11/16	8 11/32	6 11/16	33 1/8	6 11/16	5 25/32	12 3/16	43 3/4	420
63	300	1200	8 13/16	7 1/16	7 15/32	9 9/32	7 15/32	37 5/32	7 15/32	6 7/32	12 31/32	47 5/8	577
80	400	1600	9 13/16	7 27/32	8 11/32	10 13/32	8 11/32	41 25/32	8 1/16	7 7/32	14 15/16	55 13/32	831
100	500	2000	11	8 13/16	9 9/32	11 25/32	9 9/32	46 11/16	9 1/32	7 5/8	15 23/32	60 15/32	1096
125	600	2400	12 3/8	9 13/16	10 13/32	13 3/15	10 13/32	52 11/32	10 1/32	8 7/16	17 11/16	67 7/32	1576
160	800	3200	13 31/32	11	11 25/32	14 3/4	11 25/32	59 1/4	11	9 7/16	19 21/32	73 31/32	2187
200	1000	4000	15 23/32	12 3/8	13 3/16	16 23/32	13 3/16	66 5/16	12 19/32	11	22 13/16	83 21/32	3063
250	1250	5000	17 11/16	13 31/32	14 3/4	18 11/15	14 3/4	74 3/16	13 31/32	12 3/8	25 9/16	88 3/16	4072
320	1550	6200	19 21/32	15 23/32	16 23/32	20 27/32	16 23/32	83 21/32	13 31/32	13 3/16	26 3/4	94 3/32	5532
400	1800	7200	22 1/32	17 11/16	18 11/16	23 19/32	18 11/16	93 1/2	16 1/8	15 17/32	29 1/2	100 3/16	7526

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: H, D and A. Others upon request.

1.2 EYE HOOKS

1.2.2 EYE FORGED RAMSHORN HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.2.2 Eye forged Ramshorn B hook based on IRIZAR design



- WLL: from 80t to 2.000t (bottom hole included). Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED RAMSHORN B HOOK BASED ON IRIZAR DESIGN

			OVERALL DIMENSIONS (inch)										Weight
No	WLL (t)	MBL (t)	a1	a2	b1	d1	d2H15	f1	A	D	B	H	lbs
16	80	320	4 13/32	3 17/32	3 23/32	3 23/32	3 3/8	18 17/32	4 5/16	3 13/32	7 1/16	26 11/16	185
20	100	400	4 29/32	3 29/32	4 5/32	4 5/32	3 3/4	20 7/8	4 5/8	3 29/32	8 1/4	30 11/32	276
25	120	480	5 1/2	4 13/32	4 5/8	4 5/8	4 5/32	23 17/32	5 1/4	3 29/32	8 1/4	33 29/32	373
32	150	600	6 9/32	4 29/32	5 3/16	5 3/16	4 9/16	26 7/16	5 1/2	4 15/32	9 7/16	36 29/32	520
40	200	800	7 1/16	5 1/2	5 7/8	5 7/8	5 5/32	29 21/32	5 7/8	5 3/8	11 13/32	42 1/2	778
50	250	1000	7 27/32	6 9/32	6 11/16	6 11/16	5 23/32	33 1/8	6 11/16	5 25/32	12 3/16	47 9/32	1032
63	300	1200	8 13/16	7 1/16	7 15/32	7 15/32	6 19/32	37 5/32	7 15/32	6 7/32	12 31/32	51 15/32	1396
80	400	1600	9 13/16	7 27/32	8 11/32	8 11/32	7 3/8	41 25/32	8 1/16	7 7/32	14 15/16	59 3/4	1980
100	500	2000	11	8 13/16	9 9/32	9 9/32	8 3/16	46 11/16	9 1/32	7 5/8	15 23/32	65 11/32	2734
125	600	2400	12 3/8	9 13/16	10 13/32	10 13/32	9 1/4	52 11/32	10 1/32	8 7/16	17 11/16	72 3/4	3814
160	800	3200	13 31/32	11	11 25/32	11 25/32	10 7/32	59 1/4	11	9 7/16	19 21/32	80 1/16	5384
200	1000	4000	15 23/32	12 3/8	13 3/16	13 3/16	11 3/32	66 5/16	12 19/32	11	22 13/16	90 17/32	7694
250	1250	5000	17 11/16	13 31/32	14 3/4	14 3/4	12 9/32	74 3/16	13 31/32	12 3/8	25 9/16	100 1/2	10703
320	1550	6200	19 21/32	15 23/32	16 23/32	16 23/32	12 31/32	83 21/32	13 31/32	13 3/16	26 3/4	108 7/16	15322
400	1800	7200	22 1/32	17 11/16	18 11/16	18 11/16	14 9/16	93 1/2	16 1/8	15 17/32	29 1/2	117 5/16	21680

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: H, D and A. Others upon request.

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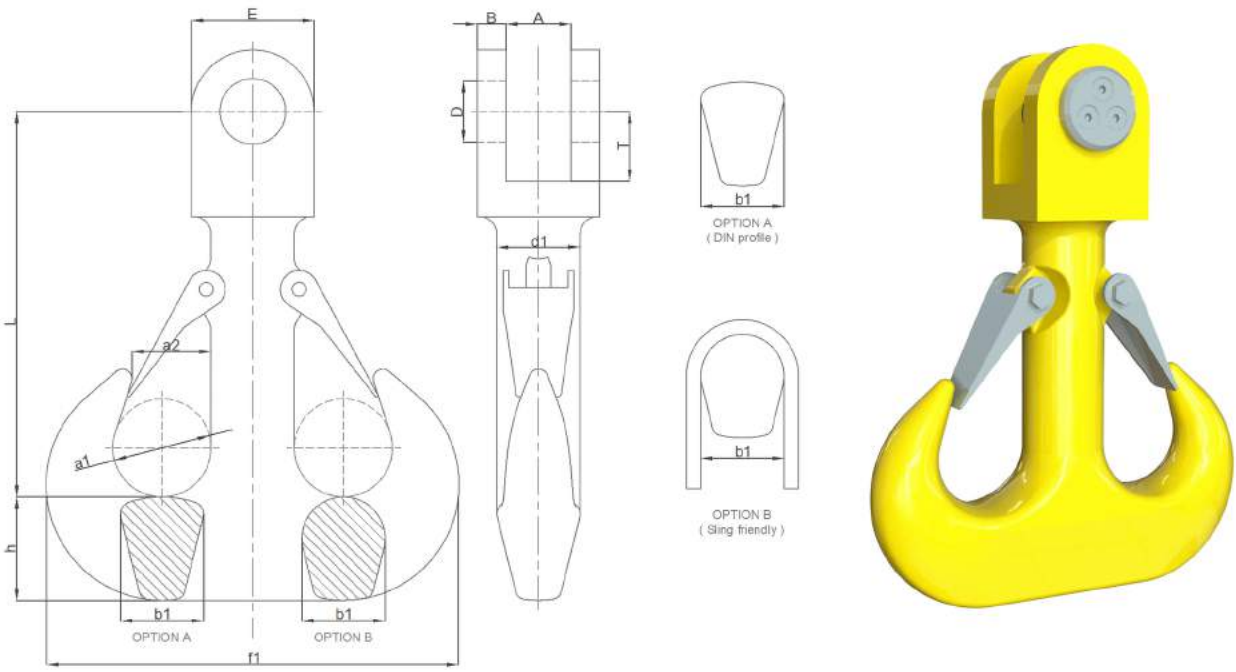
1.2 EYE HOOKS

1.2.2 EYE FORGED RAMSHORN HOOKS BASED ON RECOGNIZED EUROPEAN DESIGNS & IRIZAR DESIGNS

1.2.2.3 Eye forged Ramshorn FORK hook based on DIN82019 design



- WLL: from 80t to 2.000t. Larger ones upon request.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, V.
- Safety Factor: min. 4:1 with the highest material grade.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

EYE FORGED RAMSHORN FORK HOOK BASED ON DIN82019 DESIGN

			OVERALL DIMENSIONS (inch)											Weight
No	WLL (t)	MBL	a1	a2	h	d1	f1	A	B	D	L	E	T	lbs
16	80	320	4 13/32	3 17/32	4 5/8	3 23/32	18 17/32	4 23/32	2 3/4	3 1/8	19 9/32	6 3/32	4 23/32	240
20	100	400	4 29/32	3 29/32	5 3/16	4 5/32	20 7/8	5 5/16	3 1/8	3 11/32	21 5/8	6 11/16	4 29/32	351
25	120	480	5 1/2	4 13/32	5 7/8	4 5/8	23 17/32	5 7/8	3 1/2	3 23/32	24 9/16	7 27/32	5 9/16	500
32	150	600	6 9/32	4 29/32	6 11/16	5 3/16	26 7/16	6 11/16	4	4 5/16	28 11/32	9 1/32	6 15/32	756
40	200	800	7 1/16	5 1/2	7 15/32	5 7/8	29 21/32	7 1/16	4 23/32	4 29/32	32 1/16	10 7/32	7 9/32	1093
50	250	1000	7 27/32	6 9/32	8 11/32	6 11/16	33 1/8	8 1/16	4 29/32	5 1/2	35 13/32	10 7/32	8 1/4	1356
63	300	1200	8 13/16	7 1/16	9 9/32	7 15/32	37 5/32	8 1/16	5 3/32	5 7/8	39 9/16	12	8 27/32	1865
80	400	1600	9 13/16	7 27/32	10 13/32	8 11/32	41 25/32	9 1/32	6 15/32	6 7/8	44 15/32	13 3/4	10 7/32	2886
100	500	2000	11	8 13/16	11 25/32	9 9/32	46 11/16	10 1/32	7 1/16	7 9/32	49 19/32	14 9/16	10 13/16	3785
125	600	2400	12 3/8	9 13/16	13 3/16	10 13/32	52 11/32	11 7/32	7 21/32	8 1/16	54 23/32	15 15/16	11 25/32	5126
160	800	3200	13 31/32	11	14 3/4	11 25/32	59 1/4	12 3/16	8 1/4	8 7/16	60 1/32	17 1/8	12 19/32	6792
200	1000	4000	15 23/32	12 3/8	16 23/32	13 3/16	66 5/16	13 3/4	9 1/32	9 7/16	65 11/32	18 7/8	14 5/32	9365
250	1250	5000	17 11/16	13 31/32	18 11/16	14 3/4	74 3/16	14 9/16	10 15/16	10 5/8	71 7/16	23 7/32	15 15/16	14804
320	1550	6200	19 21/32	15 23/32	20 27/32	16 23/32	83 21/32	14 9/16	11	11 13/32	77 15/16	24	17 1/8	17831
400	1800	7200	22 1/32	17 11/16	23 19/32	18 11/16	93 1/2	16 29/32	11 25/32	12 31/32	93 1/2	25 31/32	19 15/32	24692

WLL: for V material grade.
Tolerances: -0/+7% forging tolerance.
Modifications: r5, b2 and b4. Others upon request.

1.3 CUSTOM HOOKS

FORGED HEAVY DUTY HOOKS

IRIZAR FORGE team can accommodate any forged hook to the specific lifting operation the market is ready to operate **up to 4.000t**, from safety, design, material strength and certification point of view.

- WLL: up to 4.000t.
- Hook FORGED and HEAT TREATED, fully machined and fitted & assembled.
- Material: carbon, alloys and super alloys. Stainless steels available upon request.
- Mechanical properties: P, T, V.
- Safety Factor: min. 4:1 with the highest material grade.
- General Tolerances: -0/+7% forged parts and Machining tolerances as per DIN15403.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

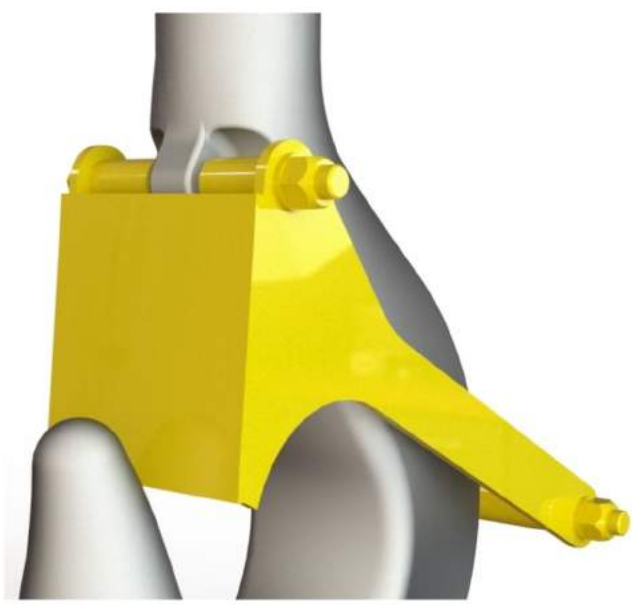
1.4 VARIETY OF SAFETY LATCHES FOR CRANE HOOKS

1.4.1 STANDARD LATCH

- Material: carbon & stainless steels.
- Suitable for: Single & Ramshorn hooks.
- Test: FAT upon request.

1.4.2 GRAVITY LATCH

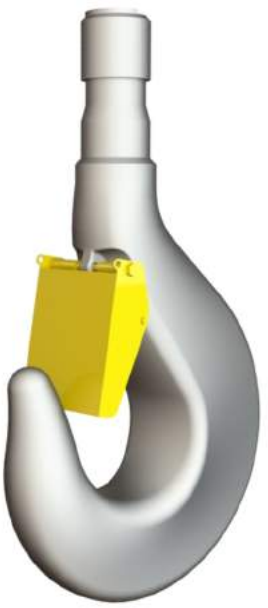
- Material: carbon & stainless steels.
- Suitable for: Single hooks only.
- Test: FAT upon request.

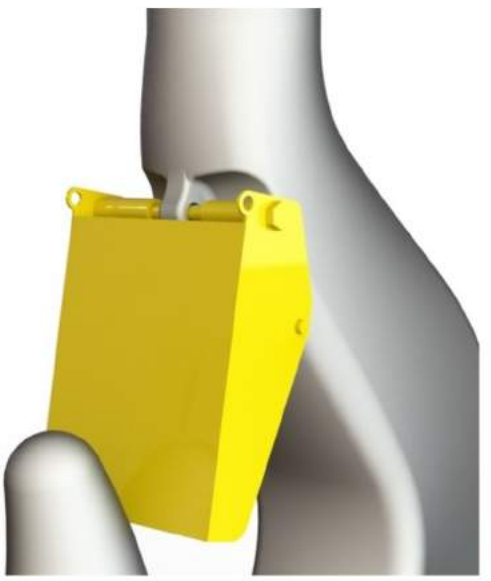


1.4 VARIETY OF SAFETY LATCHES FOR CRANE HOOKS

1.4.3 LOCKING LATCH

- Material: carbon & stainless steels.
- Suitable for: Single & Ramshorn hooks.
- Test: FAT upon request.





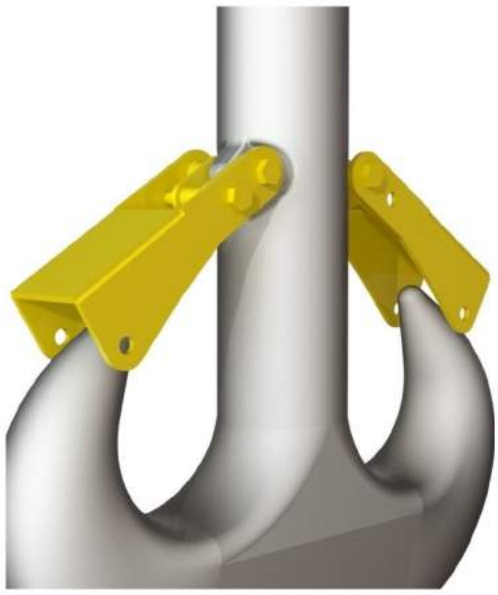
1.4.4 FIX LATCH

- Material: carbon & stainless steels.
- Suitable for: Single & Ramshorn hooks.
- Test: FAT upon request.

1.4 VARIETY OF SAFETY LATCHES FOR CRANE HOOKS

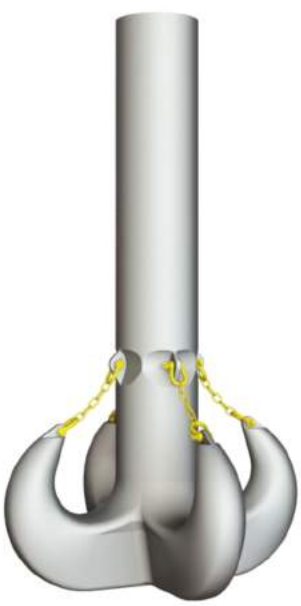
1.4.5 SUBSEA LATCH

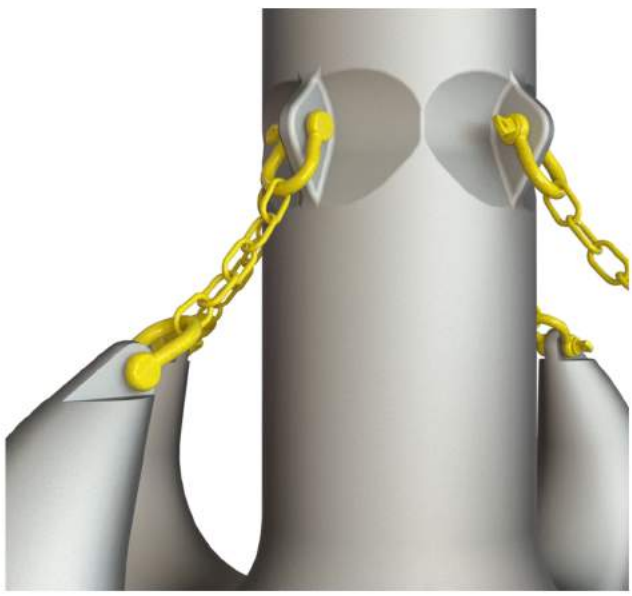
- Material: carbon & stainless steels.
- Suitable for: Single & Ramshorn hooks.
- Test: FAT upon request.



1.4.6 CHAIN LATCH

- Material: carbon & stainless steels.
- Suitable for: Quad & Ramshorn hooks.
- Test: FAT upon request.





CRANE BLOCKS

2.0 INTRO

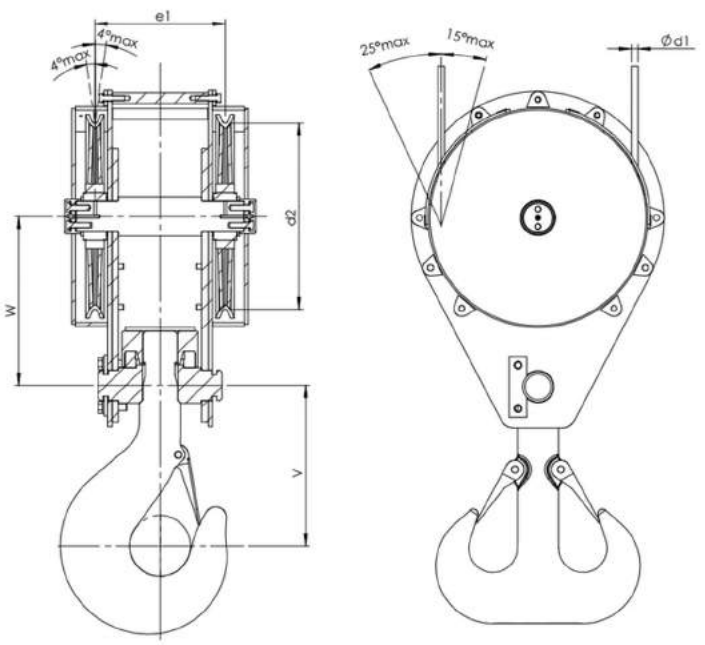
Crane block or Hook block is considered the complete component of the hoist and it's linked to the crane by the rope pulleys/ sheaves though the rope.

Its design depends on the crane purpose an concept design whereas rope pulleys or sheaves and hook assembly design will be the key factor to achieve customer requirements and expectations. Using the previous pages for the right hook selection, sheaves must keep a proportional relation and must be symetric to the gravity center of the Crane Block.

Last decades sheaves diameter has been decreased thanks to wire ropes advanced technology using more flexible wire ropes, reducing rope diameter and increasing strengthness thanks to very advanced materials, having decreased the historical factor (rope diameter (d1) x factor=sheave diameter (D). Please see Chapter 7, ROPE ACCESSORIES/SHEAVES.

The number of sheaves in the Hook Block will depend on the total WLL of the Hook Block and individual sheave WLL: falls is called to the twisted rope, whereas 1 sheave has always 2 falls, 2 sheaves have 4 falls...

The fall must have a certain angle for safety reasons: regularly the maximum angle is regulated by International Standards, being the most popular ones as shown below:



Modern Hook Block designs they need to respond to latest customer demands as:

* Easy to dissassemble to exchange hook type and replace inner components and accessories as bearings and sheaves.
* Easy to grease it during maintenance, in order to keep all turning parts lubricated.

Proof Test Load (PTL) is being performed at IRIZAR benches in order to cover a full guarantee to the crane operator.

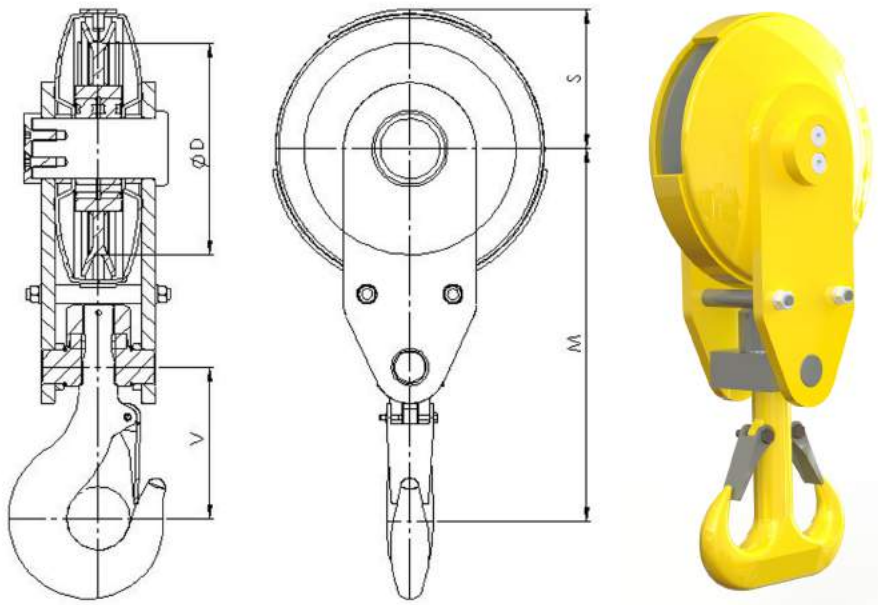
Complete Maintenance Manual is being delivered to the customer full of recommendations and good practices from the original manufacturer for a safe and long lifetime component.

Enjoy CRANE BLOCK RANGE in the following pages.

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.1 LIGHT DUTY BLOCKS

2.1.1.1 One Sheave Block



- WLL: from 2t to 32t.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 8 acc to DIN15400. Material grades: carbon (P) or alloy (T).
- Sheave: 1 (2 falls). Cold Laminated or Technical Plastic. Max size 450mm (inner diameter).
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

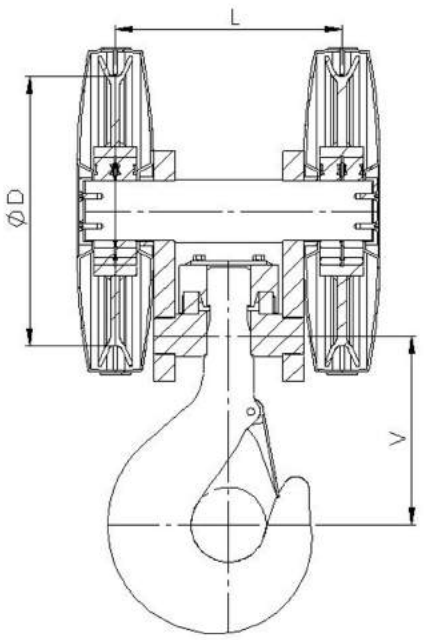
LIGHT DUTY BLOCKS | ONE SHEAVE BLOCK

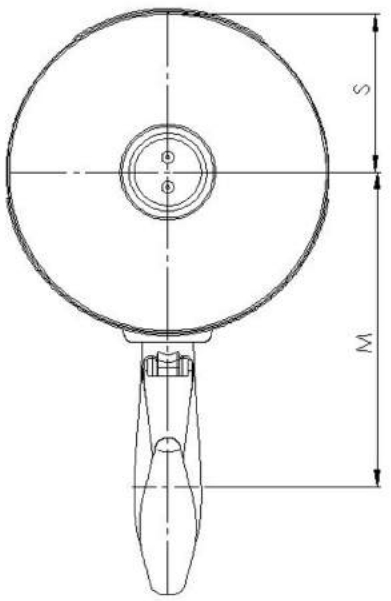
Hook No	OVERALL DIMENSIONS (inch) Ø Wire rope	ØD Sheave	V	M	S	WLL (t) 1Bm/M3 P	T	Weight lbs
0,8	1/4 - 5/16	6 9/32	4 23/32	11 7/32	4 1/8	2	-	26
1,6	11/32 - 3/8	7 27/32	5 1/2	13 9/16	5 5/32	4	6,3	44
2,5	9/16 - 5/8	11	6 3/32	17 1/8	7 1/16	6,3	10	79
4	5/8 - 11/16	13 31/32	6 7/8	19 21/32	8 3/4	10	16	161
5	5/8 - 11/16	13 31/32	7 21/32	20 15/32	8 3/4	12,5	20	174
6	27/32 - 15/16	17 11/16	9 7/16	24 25/32	10 25/32	16	25	278
8	27/32 - 15/16	17 11/16	10 13/32	26 3/8	10 25/32	20	32	302

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.1 LIGHT DUTY BLOCKS

2.1.1.2 Two Sheaves Block





- WLL: from 4t to 64t.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 16 acc to DIN15400. Material grades: carbon (P) or alloy (T).
- Sheave: 2 (4 falls). Cold Laminated or Technical Plastic. Max size 450mm (inner diameter).
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

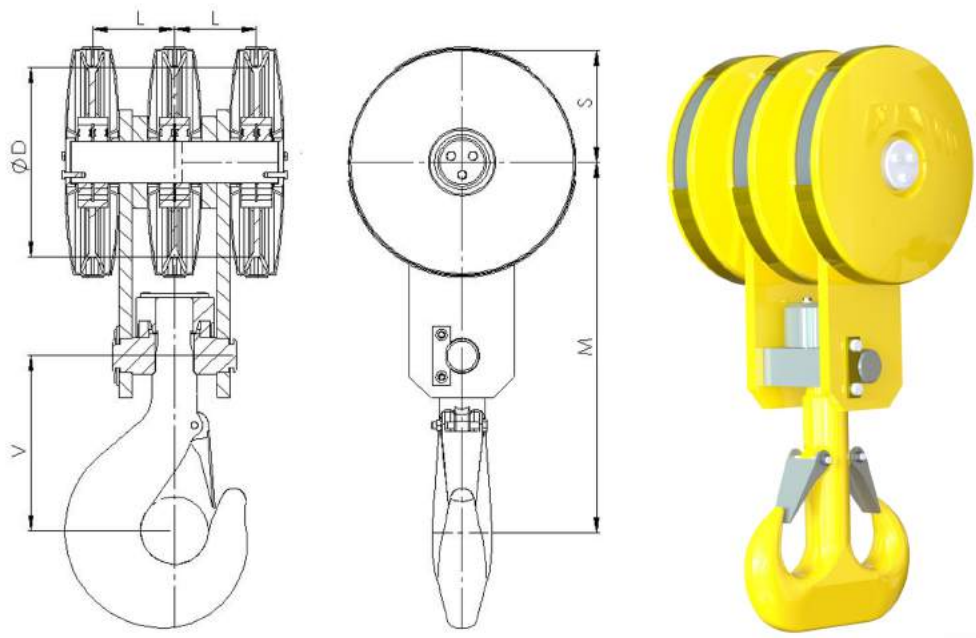
LIGHT DUTY BLOCKS | TWO SHEAVES BLOCK

OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3		Weight
Hook No	Ø Wire rope	ØD Sheave	L	V	M	S	P	T	lbs
1,6	3/16	6 9/32	6 3/8	5 1/2	9 7/16	4 1/8	4	6,3	40
2,5	9/32	7 27/32	7 5/8	6 3/32	10 13/32	5 5/32	6,3	10	66
4	13/32	11	8 23/32	6 7/8	12 19/32	7 1/16	10	16	132
5	13/32	11	9 1/2	7 21/32	13 3/16	7 1/16	12,5	20	146
6	7/16	13 31/32	11 7/8	9 7/16	16 5/16	8 3/4	16	25	289
8	7/16	13 31/32	12 27/32	10 13/32	17 1/8	8 3/4	20	32	313
10	19/32	17 11/16	13 23/32	11	19 9/32	10 25/32	25	40	498
12	19/33	17 11/16	14 29/32	12 3/8	20 21/32	10 25/32	32	50	567
16	19/34	17 11/16	15 5/16	14 9/16	23 7/32	10 25/32	40	63	631

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.1 LIGHT DUTY BLOCKS

2.1.1.3 Three Sheaves Block



- WLL: from 20t to 80t.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 20 acc to DIN15400. Material grades: carbon (P) or alloy (T).
- Sheave: 3 (6 falls). Cold Laminated or Technical Plastic. Max size 450mm (inner diameter).
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

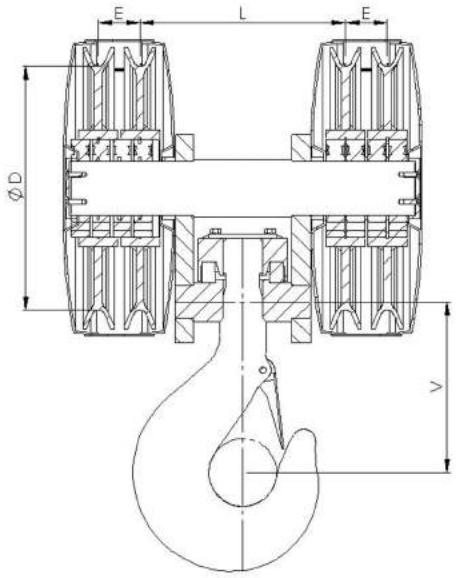
LIGHT DUTY BLOCKS | THREE SHEAVES BLOCK

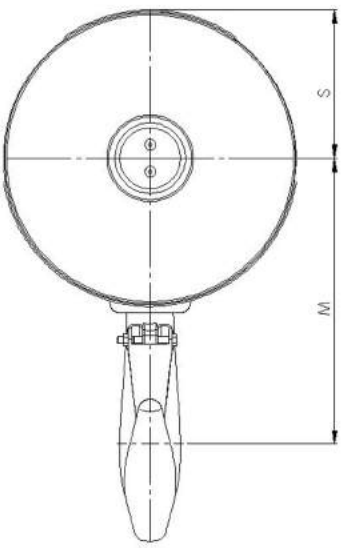
OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3		Weight
Hook No	Ø Wire rope	ØD Sheave	L	V	M	S	P	T	lbs
8	5/8	13 31/32	6 1/4	10 13/32	25 9/16	8 3/4	20	32	375
20	27/32	17 11/16	7 21/32	16 5/16	34 7/16	10 25/32	50	80	961

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.1 LIGHT DUTY BLOCKS

2.1.1.4 Four Sheaves Block





- WLL: from 6t to 100t.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 25 acc to DIN15400. Material grades: carbon (P) or alloy (T).
- Sheave: 4 (8 falls). Cold Laminated or Technical Plastic. Max size 450mm (inner diameter).
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

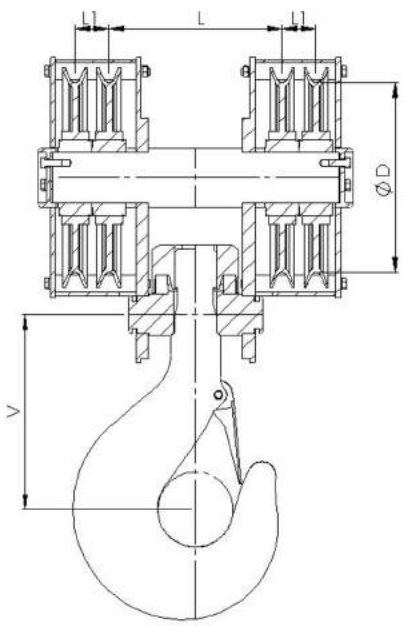
LIGHT DUTY BLOCKS | FOUR SHEAVES BLOCK

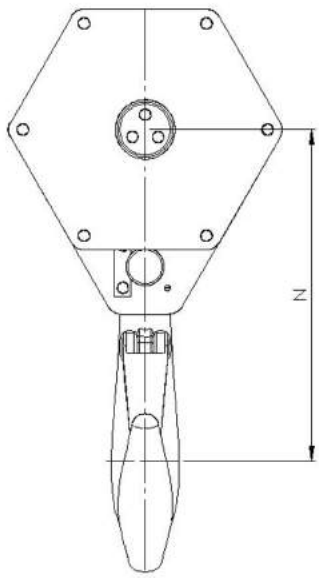
OVERALL DIMENSIONS (inch)								WLL(t) 1Bm/M3		Weight
Hook No	Ø Wire rope	ØD Sheave	L	V	M	S	E	P	T	lbs
2,5	3/8	7 27/32	7 5/8	6 3/32	10 13/32	5 5/32	1 3/4	6,3	10	99
5	9/16	11	9 1/2	7 21/32	13 3/16	7 1/16	1 15/16	12,5	20	209
8	5/8	13 31/32	12 27/32	10 13/32	17 1/8	8 3/4	2 17/32	20	32	434
12	27/32	17 11/16	14 29/32	12 3/8	20 21/32	10 25/32	2 15/16	32	50	741
25	27/32	17 11/16	16 1/8	18 3/32	30 5/16	10 25/32	2 15/16	63	100	904

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.2 MEDIUM DUTY BLOCKS

2.1.2.1 Four Sheaves Block



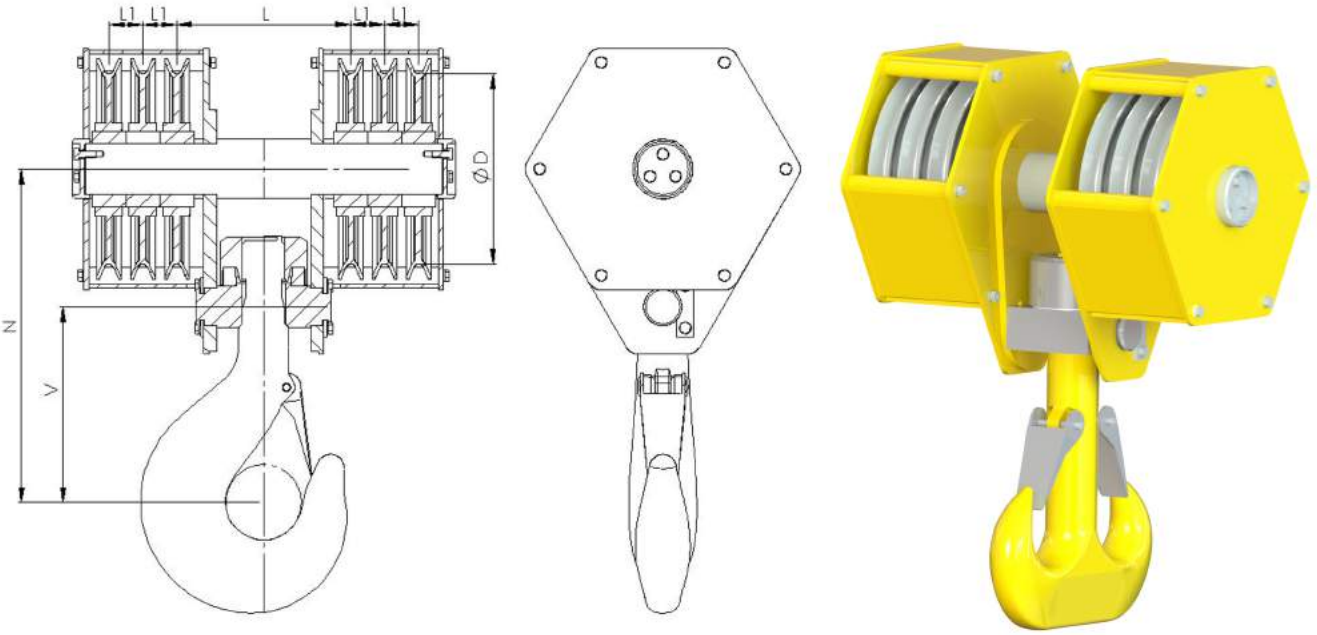


- WLL: from 12t to 200t. Further sizes upon request.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 63 acc to DIN15400. Material grades: carbon (P) or alloy (T). Further hook sizes and higher alloys upon request.
- Sheave: 4 (8 falls). Cold Laminated, Welded or Solid. Further sheaves upon request.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

MEDIUM DUTY BLOCKS | FOUR SHEAVES BLOCK

OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3	Weight
Hook No	Ø Wire rope	D	L	L1	V	N	P	lbs
5	15/32	11 13/32	7 27/32	2 1/16	7 21/32	15 17/32	12,5	397
6	15/32	11 13/32	8 21/32	2 1/16	9 7/16	18 3/32	16	441
8	5/8	15 23/32	9 7/16	2 1/16	10 13/32	22 7/32	20	529
10	25/32	15 23/32	10 5/8	2 11/32	11 /	22 13/16	25	595
16	25/32	15 23/32	12 19/32	2 17/32	14 9/16	26 3/4	40	926
20	25/32	17 5/16	13 3/4	3 1/8	16 5/16	29 1/8	50	1241
25	27/32	17 11/16	16 1/8	3 1/8	18 3/32	30 7/8	63	1257
32	15/16	25 3/16	17 11/16	3 17/32	19 21/32	39 9/16	80	1918
40	1 3/32	27 15/16	19 9/32	3 29/32	22 7/32	44 15/32	100	2535
50	1 5/32	31 7/8	22 1/32	4 1/8	24 13/32	48 13/16	125	3395
63	1 5/16	35 13/16	24 13/32	4 1/2	27 17/32	54 5/16	160	5732

2.1 OVERHEAD/GANTRY CRANE BLOCKS
2.1.2 MEDIUM DUTY BLOCKS
2.1.2.2 Six Sheaves Block



- WLL: from 50t to 300t. Further sizes upon request.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead.
  Max size: 63 acc to DIN15400. Material grades: carbon (P) or alloy (T). Further hook sizes and higher alloy steels upon request.
- Sheave: 6 (12 falls). Cold Laminated, Welded or Solid. Further sheaves upon request.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

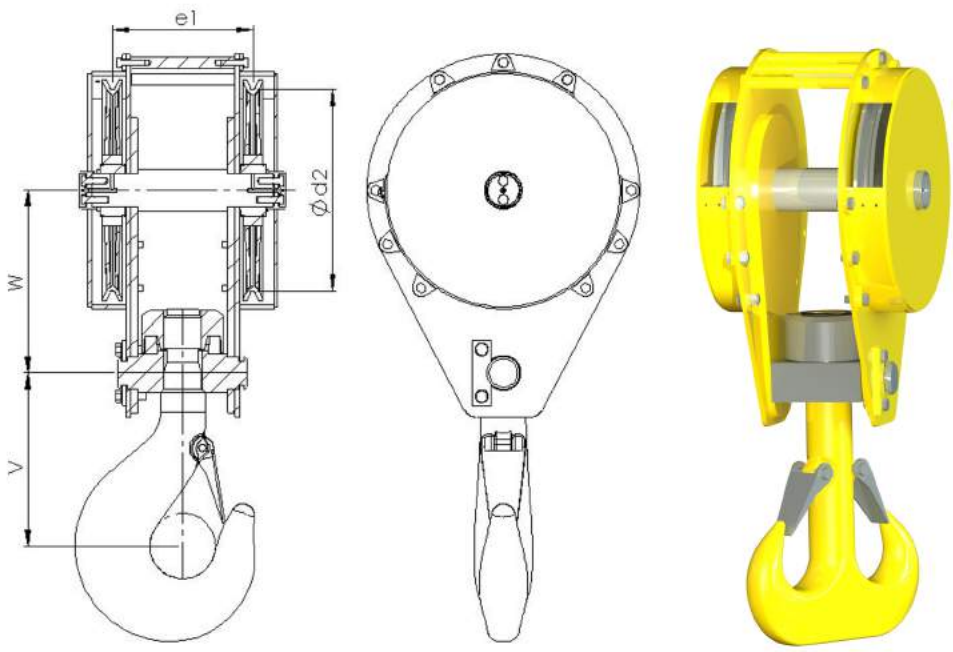
MEDIUM DUTY BLOCKS | SIX SHEAVES BLOCK

OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3	Weight
Hook No	Ø Wire rope	D	L	L1	V	N	P	lbs
20	25/32	15 11/32	14 5/32	2 31/32	16 5/16	28 17/32	50	1764
25	27/32	17 11/16	16 1/8	3 1/8	18 3/32	30 7/8	63	1905
32	27/32	22 7/16	18 3/32	3 29/32	19 21/32	38 3/8	80	2205
40	15/16	25 9/16	19 21/32	4 1/8	22 7/32	42 29/32	100	2910
50	1	28 11/32	22 7/16	4 1/2	24 13/32	46 27/32	125	3704
63	1 3/32	32 9/32	25 3/16	5 11/16	27 17/32	52 11/32	160	6482

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.3 HEAVY DUTY BLOCKS

2.1.3.1 Two Sheaves Block



- WLL: from 16t to 100t. Further sizes upon request.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 40 acc to DIN15400. Material grades: carbon (P) or alloy (T). Further hook sizes and higher alloy steels upon request.
- Sheave: 2 (4 falls). Cold Laminated, Welded or Solid. Further sheaves upon request.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

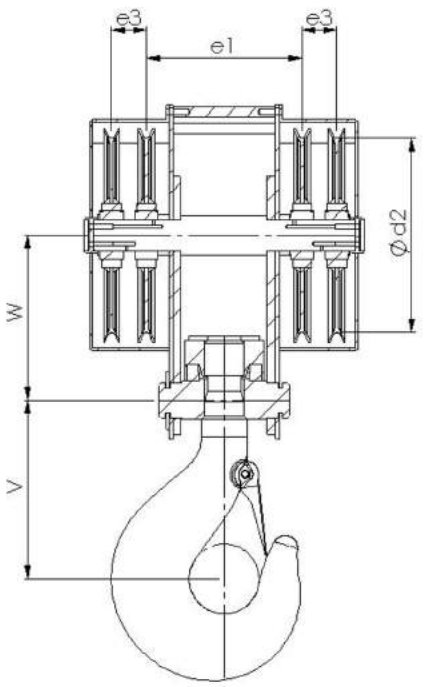
HEAVY DUTY BLOCKS | TWO SHEAVES BLOCK

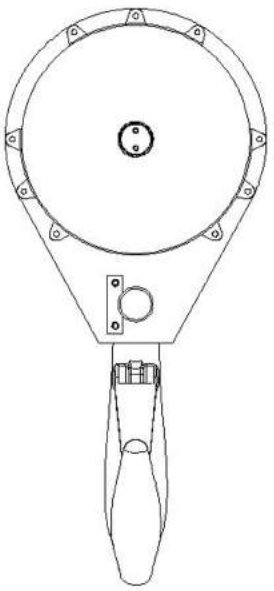
OVERALL DIMENSIONS (inch)						WLL (t) 1Bm/M3	Weight
Hook No	Ø Wire rope	d_2	e_1	V	W	P	lbs
6	17/32	13 31/32	9 1/32	9 7/16	10 5/8	16	320
8	5/8	15 23/32	10 1/32	10 13/32	12 3/16	20	419
10	11/16	17 11/16	11	11	13 3/8	25	518
12	25/32	19 21/32	12 19/32	12 3/8	14 9/16	32	816
16	27/32	22 1/32	12 31/32	14 9/16	16 17/32	40	882
20	1	24 25/32	14 11/32	16 5/16	18 3/32	50	1235
25	1 3/32	27 15/16	15 5/32	18 3/32	20 1/16	63	1521
32	1 1/4	31 15/32	18 3/32	19 21/32	22 1/32	80	2205
40	1 13/32	35 13/32	19 15/32	22 7/32	25 3/16	100	2987

2.1 OVERHEAD/GANTRY CRANE BLOCKS

2.1.3 HEAVY DUTY BLOCKS

2.1.3.2 Four Sheaves Block





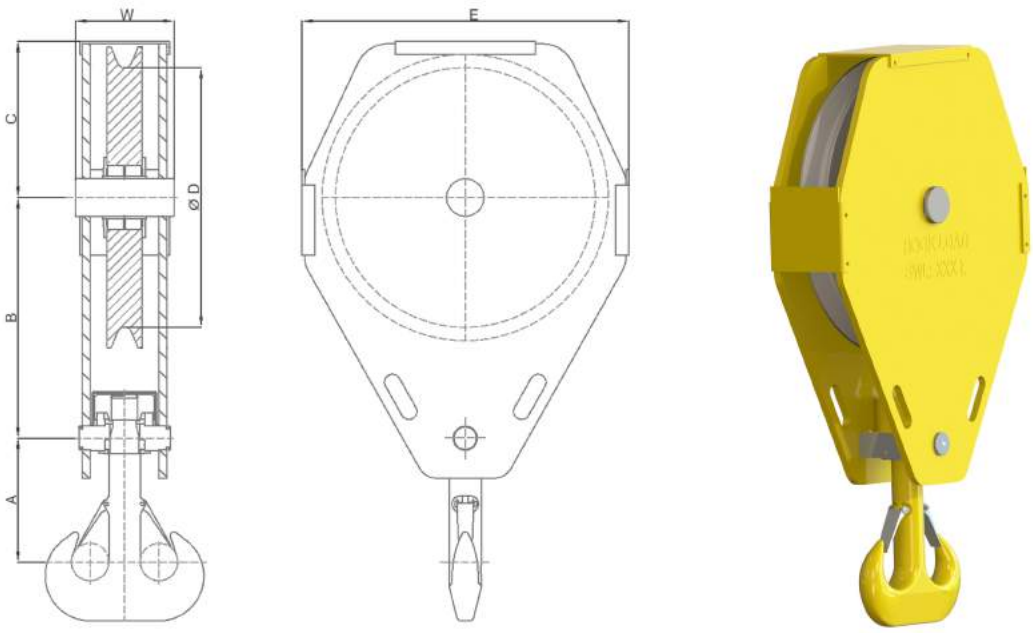
- WLL: from 60t to 500t. Further sizes upon request.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead.
  Max size: 125 acc to DIN15400. Material grades: carbon (P) or alloy (T). Further hook sizes and higher alloy steels upon request.
- Sheave: 4 (8 falls). Cold Laminated, Welded or Solid. Further sheaves upon request.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

HEAVY DUTY BLOCKS | FOUR SHEAVES BLOCK

OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3	Weight
Hook No	Ø Wire rope	d2	e1	e3	V	W	P	lbs
25	2 5/2	22 1/32	15 23/32	3 29/32	18 3/32	16 17/32	63	1510
32	2 7/2	24 25/32	18 9/32	4 1/8	19 21/32	18 1/2	80	2105
40	1	27 15/16	20 15/32	5 3/32	22 7/32	20 15/32	100	2943
50	1 3/32	31 15/32	23 1/32	5 11/16	24 13/32	23 1/32	125	3902
63	1 1/4	35 13/32	25 25/32	6 3/32	27 17/32	25 3/8	160	6460
80	1 13/32	39 11/32	27 3/4	6 15/32	31 15/32	27 15/16	200	6768
100	1 9/16	44 3/32	30 1/2	6 11/16	34 13/16	31 3/32	250	8973
125	1 23/32	49 3/16	33 1/4	7 21/32	39 11/32	33 27/32	320	11464

2.2 OFFSHORE CRANE BLOCKS

2.2.1 SINGLE SHEAVE OFFSHORE BLOCK



- WLL: from 80t to 500t.
- Hook: Single or Ramshorn. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Max size: 125 acc to DIN15400. Material grades: alloy (T/V). Further hook sizes upon request.
- Sheave: 1 (2 falls). Solid sheave.
- Bearing: axial for hook assembly + roller/spherical-roller for sheaves. Bronze bushing fully recommended.
- Coating Protection: fully painted inside & outside for offshore environment.
- Sealings: for offshore topsite and subsea lifting.
- Certificate: EN10204-2.1. Load Test & FAT upon request.

OFFSHORE CRANE BLOCKS | SINGLE SHEAVE BLOCK

	OVERALL DIMENSIONS (inch)							WLL(t) 1Bm/M3	Weight
Hook No	Ø Wire rope	ØD	W	A	B	C	E	T	lbs
20	1 5/8	31 15/32	15 1/32	17 17/32	35 13/32	20 15/32	42 29/32	80	3307
32	2 3/16	42 1/2	19 3/32	20 15/16	45 1/4	26 3/8	55 1/2	125	7377
50	2 3/4	53 1/8	22 5/8	25 3/4	53 1/8	32 21/32	67 11/16	200	12582
80	2 29/32	55 1/2	26 5/32	32 31/32	59 1/32	34 1/4	72 1/32	320	17619
100	2 31/32	57 1/16	29 1/32	36 7/16	59 1/32	35 1/32	72 7/16	400	20518
125	3 3/8	64 15/16	30 13/16	40 25/32	64 15/16	40 5/32	83 1/16	500	27683

2.2 OFFSHORE CRANE BLOCKS

2.2.2 MULTIPLE SHEAVES OFFSHORE BLOCK

- WLL: from 80t to 2.000t.
- Hook: Ramshorn or Quad based on DIN15400 or others. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Material grades: alloy (T/V). See chapter 1 (Crane Hooks).
- Sheave: Multiple sheaves. Solid sheaves.
- Bearing: axial for hook assembly + roller/spherical-roller for sheaves. Bronze bushing fully recommended.
- Coating Protection: fully painted inside & outside for offshore environment.
- Sealings: for offshore topsite and subsea lifting.
- Certificate: EN10204-3.1. For 3.2 cert with ABS, DNV, ... upon request.

2.3 OTHER TYPE OF CRANE BLOCKS

2.3.1 TOWER CRANE BLOCK

- Hook: Single or Ramshorn based on DIN15400 or others. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Material grades: carbon (P) or alloy (T/V). See chapter 1 (Crane Hooks).
- Sheave: 1 or 2 sheaves (2 or 4 falls). Cold Laminated or Technical Plastic.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-3.1. For 3.2 cert with ABS, DNV, ... upon request.

2.3 OTHER TYPE OF CRANE BLOCKS

2.3.2 MOBILE CRANE BLOCKS

- WLL: from 8t to 100t. Further sizes upon request.
- Hook: Single or Ramshorn based on DIN15400 or others. FORGED and HEAT TREATED fully MACHINED with nut & crosshead. Material grades: carbon (P) or alloy (T/V). See chapter 1 (Crane Hooks).
- Sheave: 1 or multiple sheaves. Cold Laminated, Welded, Solid or technical plastic.
- Bearing: axial for hook assembly + roller/ball for sheaves.
- Coating Protection: fully painted inside & outside.
- Certificate: EN10204-3.1. For 3.2 cert with ABS, DNV, ... upon request.

SUBSEA FORGED HOOKS

3.0 INTRO

SUBSEA is considered OFFSHORE environment and it´s divided into shallow water and deep water (PRESALT, SALT and POSTSALT for latins).

SUBSEA Deep Water application is considered one of the most critical OFFSHORE application because of the poor accessibility of the products, harsh environment and high costs to get the products back to top site. Consequently maintenance jobs are difficult to manage and long life times are required.

Under these conditions, FORGED material is the preferred & valued technology to guarantee long life times with low maintenance costs. For high safety factor during long life time, super alloy steels are the preferred steel grades to guarantee a safe functional long life products. Surface protection & coatings have also a key role to keep designed life times.

Besides forging material IRIZAR subsea hooks are fully BENDED with 100% grain orientation, following the good practices of international crane hook rules and standards.

Related to hooks, because its geometry, can comply with different purposes, being the main ones:

Related to **SUBSEA LIFTING**, the crane is regularly located top site, even if recently semi-submergible and submergible cranes are being designed and installed. This kind of Offshore cranes regularly do subsea operations: most of them they do in shallow water, but others do deep water for e.g maniffols recovery, seabed pipeline maintenance or repair… being possible to do operations up to 4.000m subsea.

Related to **LONG TERM MOORING LINE,** main technology to fix floating structures into the seabed, forged hook is a great product to link two chains, chain with rope, rope with sling… or any technology used for floating structures mooring lines. Recently other technologies beside steel chain are being used and recommended by installation companies based on two criterias:

* Weight of mooring line in deep water.
* Cost of commissioning & installation.

IRIZAR FORGE is approved by DNV & ABS to produce, test & certify Offshore Mooring Accessories in material R4 according to "DNV-OS-E302 Offshore Mooring Chain" and "ABS Guide for Offshore Mooring Chain" (see annex 3 and 4).

Mooring Line is being a combination technology in recent projects, combining steel with fiber products: steel chain, steel wire ropes, synthetic ropes and textile slings. Combination of all 4 technologies is reducing commissioning costs and reducing weight. Hooks and other links are in between different technologies to ensure a permanent steel-fiber, steel-steel or fiber-fiber join or linkage.

Seabed is full of **PIPELINES** and related equipment: pipelines are flexible to avoid crack when ocean currents effect hits against pipes and related equipment. PLET hook (pipe line end termination), is used to return the pipe to the original position and correct its position permanently.

Seabed is also full of rubbish as consequence of decades extraction activity: hooks together with ROV systems are used to **COLLECT & RECOVER** materials and clean seabed for environmental reasons.

Enjoy SUBSEA FORGED HOOK RANGE in the following pages.

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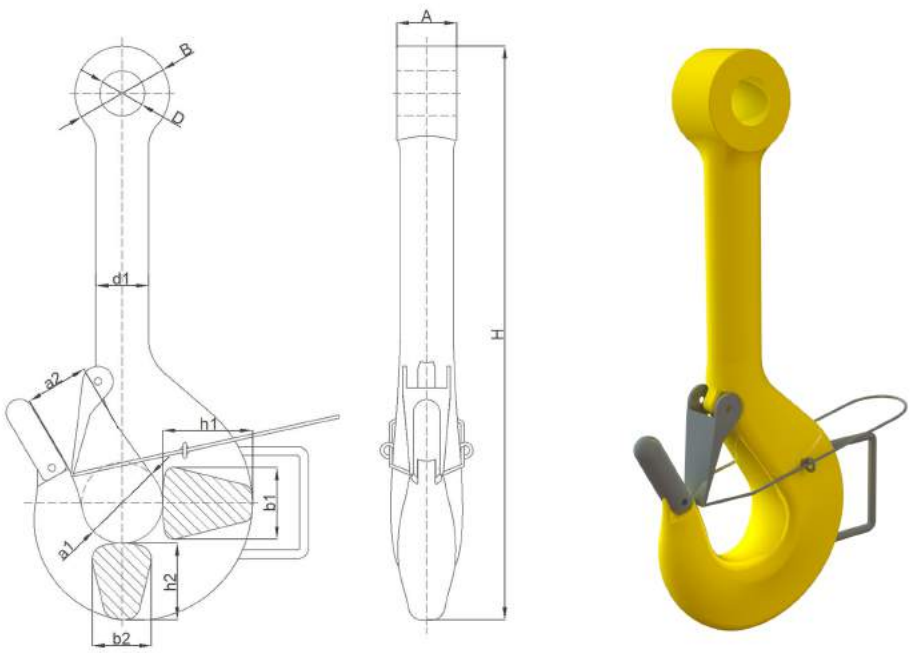
3.1 FORGED ROV EYE HOOKS

3.1.1 LONG SHANK ROV EYE HOOK



- WLL: from 10t to 600t.
- Hook FORGED and HEAT TREATED. Fully bended with 100% grain orienting.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

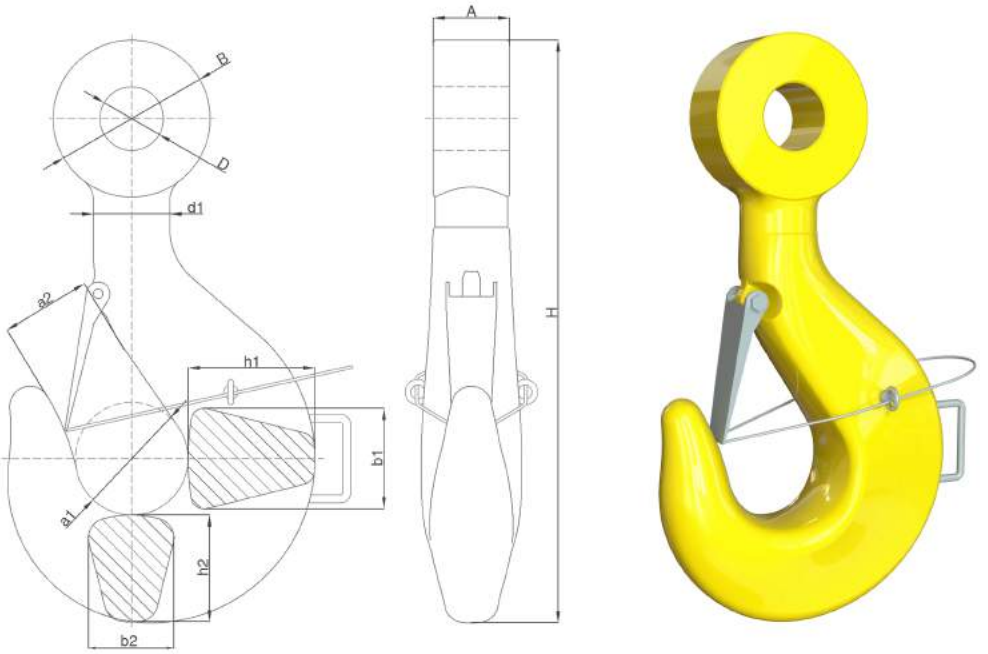
FORGED ROV EYE HOOKS | LONG SHANK ROV EYE HOOK

			OVERALL DIMENSIONS (inch)											Weight
No	WLL (t)	MBL (t)	a1	a2	b1	b2	h1	h2	d1	A	D	B	H	lbs
2,5	12	46	2 15/32	1 15/16	2 1/16	1 3/4	2 5/8	2 9/32	1 5/8	1 27/32	1 9/16	3 29/32	23 19/32	33
5	22	88	3 1/8	2 15/32	2 25/32	2 11/32	3 17/32	2 15/16	2 1/16	2 21/32	2 1/16	4 23/32	26 27/32	55
6	32	126	3 17/32	2 25/32	3 1/8	2 5/8	3 29/32	3 11/32	2 11/32	2 15/16	2 11/32	5 3/32	31 3/32	88
12	55	220	4 29/32	3 29/32	4 13/32	3 23/32	5 1/2	4 5/8	3 11/32	3 13/16	2 29/32	6 3/32	36 5/32	185
16	80	320	5 1/2	4 13/32	4 29/32	4 5/32	6 9/32	5 3/16	3 23/32	4 5/16	3 13/32	7 1/16	41 5/32	247
20	100	400	6 3/32	4 29/32	5 1/2	4 5/8	7 1/16	5 7/8	4 5/32	4 5/8	3 29/32	8 1/4	43 3/4	346
25	120	480	7 1/16	5 1/2	6 9/32	5 3/16	7 27/32	6 11/16	4 5/8	5 1/4	3 29/32	8 1/4	50 1/4	485
32	150	600	7 27/32	6 9/32	7 1/16	5 7/8	8 13/16	7 15/32	5 3/16	5 1/2	4 15/32	9 7/16	55 3/16	683
40	200	800	8 13/16	7 1/16	7 27/32	6 11/16	9 13/16	8 11/32	5 7/8	5 7/8	5 3/8	11 13/32	61 1/16	992
50	250	1000	9 13/16	7 27/32	8 13/16	7 15/32	11	9 9/32	6 11/16	6 11/16	5 25/32	12 3/16	65 1/2	1389
63	300	1200	11	8 13/16	9 13/16	8 11/32	12 3/8	10 13/32	7 15/32	7 15/32	6 7/32	12 31/32	72 3/4	1852
80	400	1600	12 3/8	9 13/16	11	9 9/32	13 31/32	11 25/32	8 11/32	8 1/16	7 7/32	14 15/16	82 1/16	2635
100	500	2000	13 31/32	11	12 3/8	10 13/32	15 23/32	13 3/16	9 9/32	9 1/32	7 5/8	15 23/32	89 13/32	3605
125	600	2400	15 23/32	12 3/8	13 31/32	11 25/32	17 11/16	14 3/4	10 13/32	10 1/32	8 7/16	17 11/16	97 7/16	5027

WLL Working load limit using R4 material.
Tolerances: -0/+7% forging tolerance.
EYE dimensions (A, B, D) and other dimensions can be modified.

3.1 FORGED ROV EYE HOOKS

3.1.2 STANDARD SHANK ROV EYE HOOK



- WLL: from 80t to 1.000t.
- Hook FORGED and HEAT TREATED. Fully bended with 100% grain orienting.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

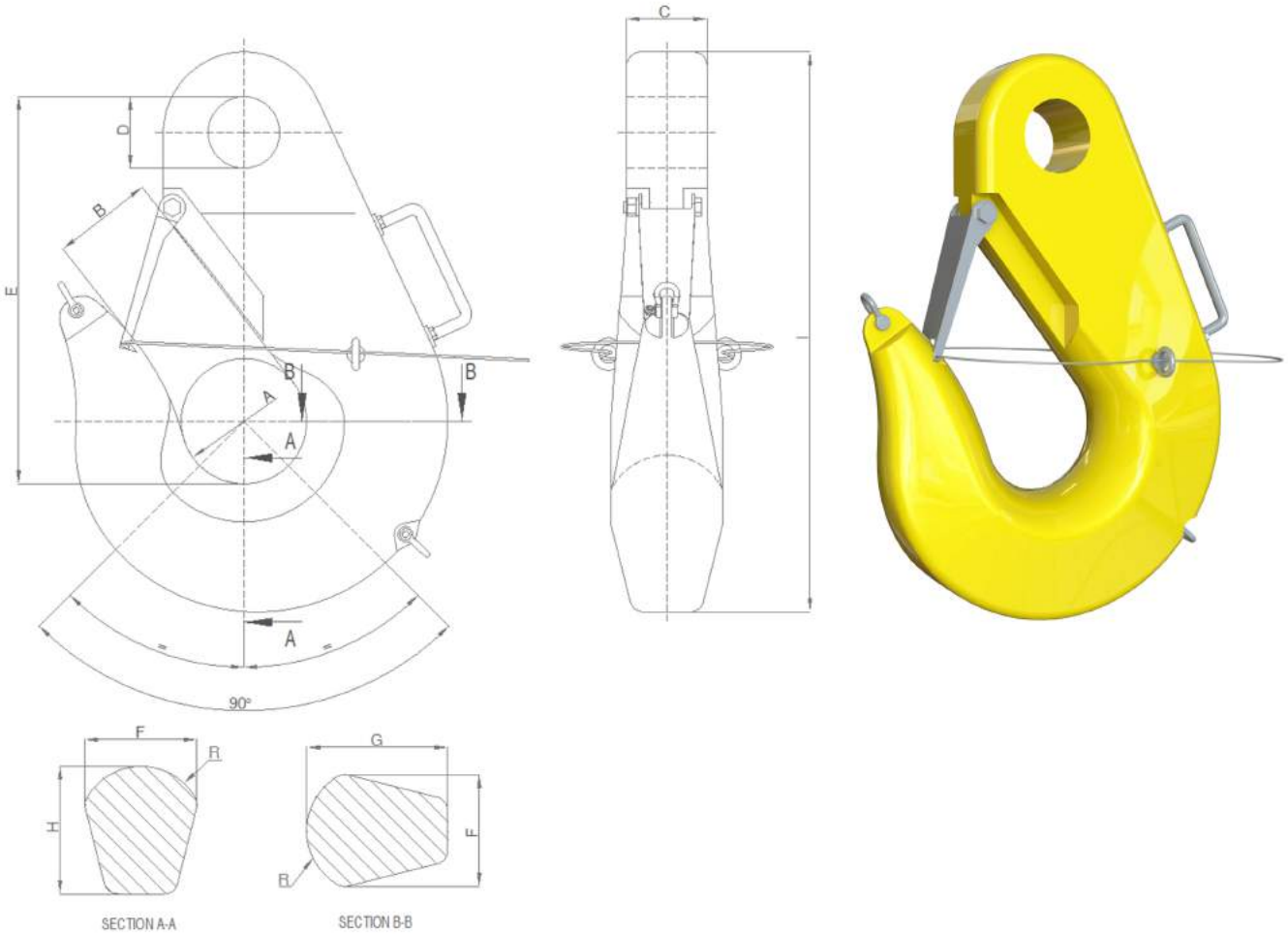
FORGED ROV EYE HOOKS | STANDARD SHANK ROV EYE HOOK

			OVERALL DIMENSIONS (inch)											Weight
No	WLL (t)	MBL (t)	a1	a2	b1	b2	h1	h2	d1	A	D	B	H	lbs
16	80	320	5 1/2	4 13/32	4 29/32	4 5/32	6 9/32	5 3/16	3 23/32	4 5/16	3 13/32	7 1/16	29 11/32	212
20	100	400	6 9/32	4 29/32	5 1/2	4 5/8	7 1/16	5 7/8	4 5/32	4 5/8	3 29/32	8 1/4	31 15/16	302
25	120	480	7 1/16	5 1/2	6 9/32	5 3/16	7 27/32	6 11/16	4 5/8	5 1/4	3 29/32	8 1/4	36 15/32	419
32	150	600	7 27/32	6 9/32	7 1/16	5 7/8	8 13/16	7 15/32	5 3/16	5 1/2	4 15/32	9 7/16	41 13/32	600
40	200	800	8 13/16	7 1/16	7 27/32	6 11/16	9 13/16	8 11/32	5 7/8	5 7/8	5 3/8	11 13/32	47 9/32	875
50	250	1000	9 13/16	7 27/32	8 13/16	7 15/32	11	9 9/32	6 11/16	6 11/16	5 25/32	12 3/16	51 23/32	1171
63	300	1200	11	8 13/16	9 13/16	8 11/32	12 3/8	10 13/32	7 15/32	7 15/32	6 7/32	12 31/32	57	1609
80	400	1600	12 3/8	9 13/16	11	9 9/32	13 31/32	11 25/32	8 11/32	8 1/16	7 7/32	14 15/16	66 5/16	2277
100	500	2000	13 31/32	11	12 3/8	10 13/32	15 23/32	13 3/16	9 9/32	9 1/32	7 5/8	15 23/32	73 21/32	3153
125	600	2400	15 23/32	12 3/8	13 31/32	11 25/32	17 11/16	14 3/4	10 13/32	10 1/32	8 7/16	17 11/16	81 11/16	4405
160	800	3200	17 11/16	13 31/32	15 23/32	13 3/16	19 21/32	16 23/32	11 25/32	11	9 7/16	19 21/32	90 5/16	6142
200	1000	4000	19 21/32	15 23/32	17 11/16	14 3/4	22 1/32	18 11/16	13 3/16	12 19/32	11	22 13/16	96 7/16	8527
250	1250	5000	22 1/32	17 11/16	19 21/32	16 23/32	24 25/32	20 27/32	14 3/4	13 31/32	12 3/8	25 9/16	110 5/8	11998
320	1550	6200	24 25/32	19 21/32	22 1/32	18 11/16	27 15/16	22 13/16	16 23/32	13 31/32	13 3/16	26 3/4	120 15/32	15942
400	1800	7200	27 15/16	22 1/32	24 25/32	20 27/32	31 15/32	24 25/32	18 11/16	16 1/8	15 17/32	29 1/2	135 1/32	22035

WLL Working load limit using R4 material.
Tolerances: -0/+7% forging tolerance.
EYE dimensions (A, B, D) and other dimensions can be modified.

3.2 FORGED ROV HOOKS

3.2.1 STANDARD ROV HOOK



- WLL: from 50t to 1.000t.
- Hook FORGED and HEAT TREATED. Fully bended with 100% grain orienting.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

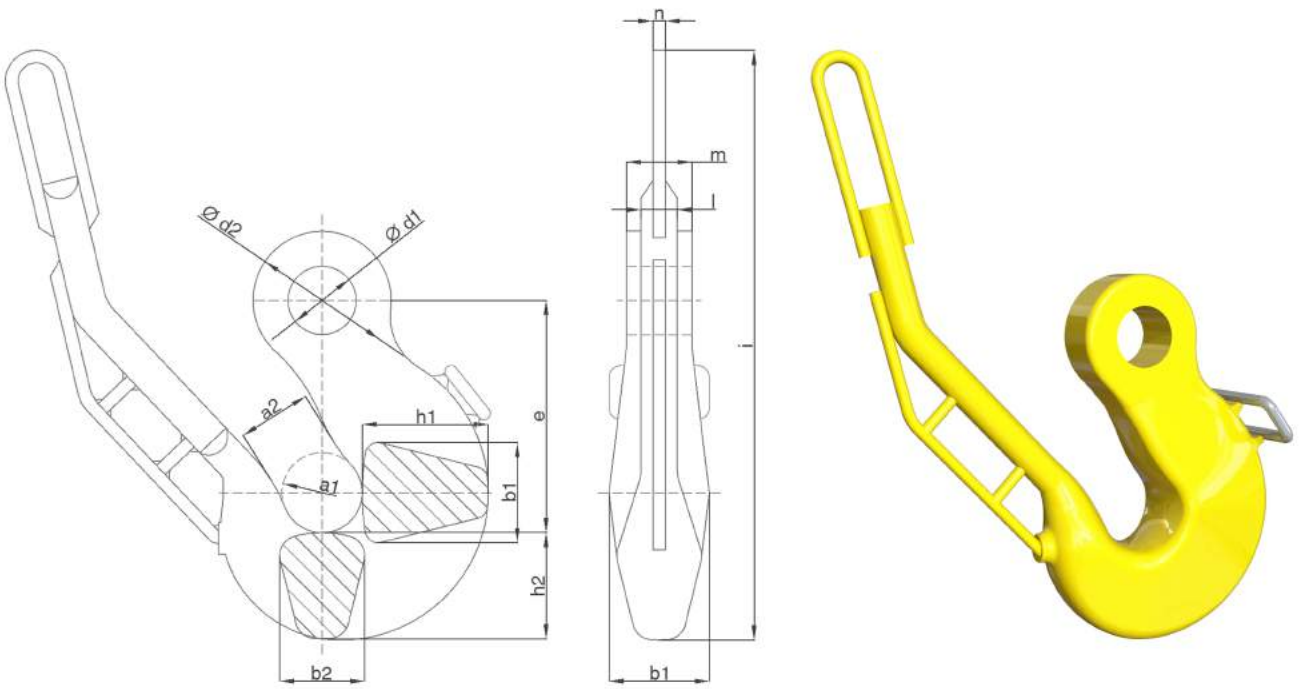
FORGED ROV HOOKS | STANDARD ROV HOOK

			OVERALL DIMENSIONS (inch)										Weight
No	WLL (t)	MBL (t)	A	B	C	D	E	F	R	G	H	I	lbs
10	50	200	4 13/32	3 17/32	3 1/8	2 15/16	15 11/32	3 29/32	2 5/32	4 29/32	4 1/2	21 27/32	143
12	63	250	4 29/32	3 29/32	3 29/32	3 1/8	16 23/32	4 13/32	2 11/32	5 1/2	4 29/32	23 13/16	194
16	80	320	5 1/2	4 13/32	3 29/32	3 13/32	18 9/32	4 25/32	2 11/32	6 9/32	5 11/16	26 3/8	247
20	100	400	6 9/32	4 29/32	5 3/32	3 29/32	20 27/32	5 1/2	3 1/8	7 1/16	6 15/32	29 29/32	353
25	120	480	7 1/16	5 1/2	5 3/32	3 29/32	22 1/32	6 9/32	3 1/8	7 27/32	7 9/32	32 1/16	485
32	150	600	7 27/32	6 9/32	5 1/2	4 15/32	23 7/32	7 1/16	3 17/32	8 13/16	8 1/16	34 1/32	672
40	200	800	8 13/16	7 1/16	5 7/8	5 3/8	26 3/4	7 27/32	4 5/16	9 13/16	8 27/32	38 3/4	1003
50	250	1000	9 13/16	7 27/32	6 11/16	5 25/32	29 1/2	8 13/16	4 29/32	11	9 13/16	42 29/32	1334
63	300	1200	11	8 13/16	7 15/32	6 7/32	34 1/32	9 13/16	5 1/2	12 3/8	11 7/32	49 3/16	1863
80	400	1600	12 3/8	9 13/16	8 1/16	7 7/32	35 13/16	11	6 11/16	13 31/32	12 19/32	52 17/32	2601
100	500	2000	13 31/32	11	9 1/32	7 5/8	38 3/4	12 3/8	7 1/16	15 23/32	14 5/32	57 9/32	3329
125	600	2400	15 23/32	12 3/8	10 1/32	8 7/16	40 23/32	13 31/32	7 15/32	17 11/16	15 23/32	61 7/32	4519
160	800	3200	17 11/16	13 31/32	11	9 7/16	46 7/16	15 23/32	8 21/32	19 21/32	17 29/32	69 7/8	6812
200	1000	4000	19 21/32	15 23/32	12 19/32	11	52 3/4	17 11/16	9 7/16	22 1/32	20 1/16	79 1/8	9656

WLL Working load limit using R4 material.
Tolerances: -0/+7% forging tolerance.
EYE dimensions (C, D) can be modified

3.2 FORGED ROV HOOKS

3.2.2 KS-ROV HOOK



- WLL: from 200t to 345t.
- Hook FORGED and HEAT TREATED (nose welded). Body fully bended with 100% grain orienting.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

FORGED ROV HOOKS | KS-ROV HOOKS

	OVERALL DIMENSIONS (inch)													Weight
No	a1	a2	b1	b2	d1	d2	e	h1	h2	i	l	m	n	lbs
KS40	7 27/32	6 15/32	7 27/32	6 11/16	5 9/32	13 1/8	22 3/4	9 13/16	8 27/32	56 11/16	3 17/32	5 3/32	1 1/4	871
KS50	7 27/32	7 1/16	9 5/8	7 27/32	6 11/16	13 9/16	22 13/16	12 3/8	10 1/16	57 27/32	3 17/32	6 13/32	1 1/4	1345

WLL Working load limit using R4 material.
Tolerances: -0/+7% forging tolerance.
EYE dimensions (d1,d2, m) can be modified.

3.2 FORGED ROV HOOKS

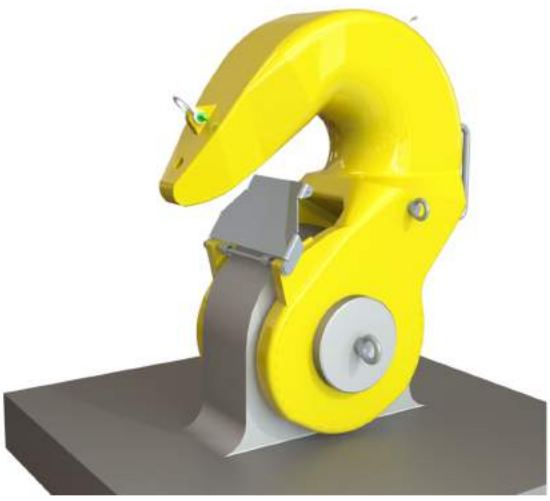
3.2.3 CUSTOM ROV HOOK

IRIZAR FORGE team can accommodate any forged ROV hook to the specific subsea lifting or mooring operation the market is ready to operate **up to 2.000t**, from safety, design, material strength and certification point of view.

- WLL: from 20t to 2.000t.
- Hook FORGED and HEAT TREATED (nose welded).
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- General Tolerances: -0/+7% for forged parts.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

3.2.3.1 LOAD TRANSFER hook.

3.2.3.2 CLEVIS ROV hook.

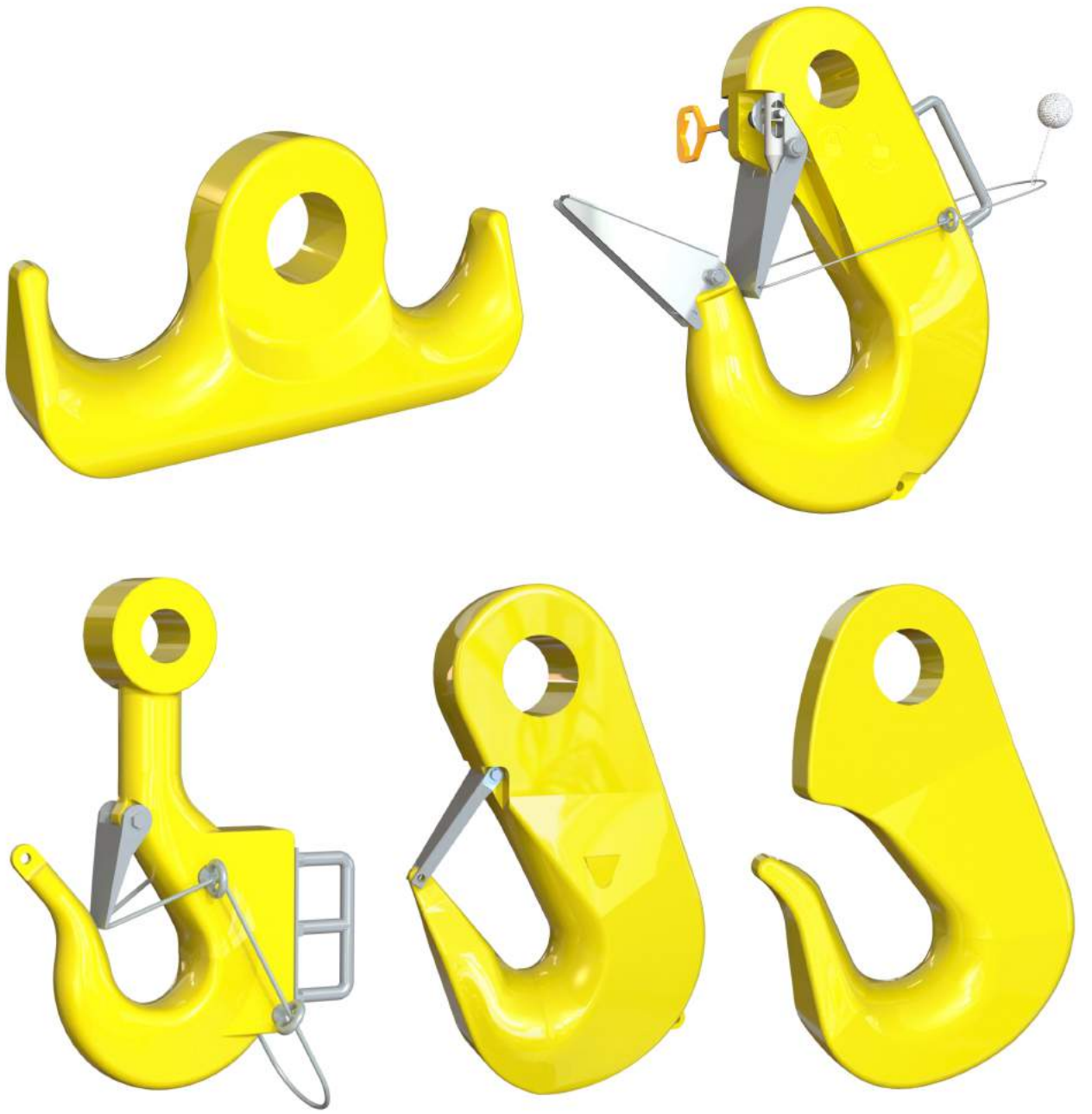


3.2 FORGED ROV HOOKS

3.2.3 CUSTOM ROV HOOK

IRIZAR FORGE team can accommodate any forged ROV hook to the specific subsea lifting or mooring operation the market is ready to operate **up to 2.000t**, from safety, design, material strength and certification point of view.

3.2.3.3 Other CUSTOM ROV hooks designs

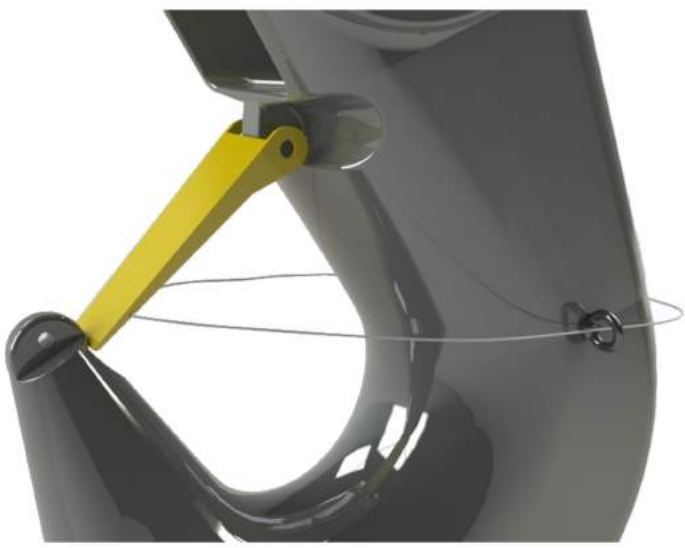


- WLL: from 20t to 2.000t.
- Hook FORGED and HEAT TREATED.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel (R4).
- Surface Protection & Coatings: upon request
- Safety Factor: min. 4:1.
- Load Test: requested / recommended. ILO-3, FAT or Breaking Test available upon request.
- General Tolerances: -0/+7% for forged parts.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

3.3 ROV FRIENDLY ACCESSORIES

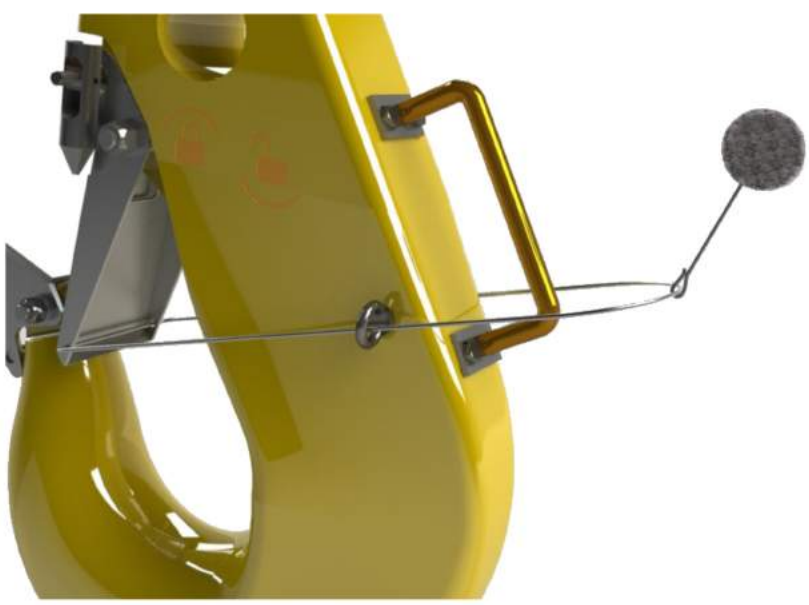
3.3.1 SAFETY LATCH

- Material: stainless steel.
- Useful for: ROV operations opening and closing.
- Additional accessories: monkey fits, rope, eye bolts
- Test: FAT upon request.



3.3.2 MONKEY FIST

- Material: textile.
- Suitable for: ROV operations handling.
- Additional accessories: rope
- Test: FAT upon request.



3.3 ROV FRIENDLY ACCESSORIES

3.3.3 FISHING DEVICE

- Material: stainless steel.
- Useful for: fishing and hooking other connectors.
- Additional accessories: rope, eye bolts.
- Test: FAT upon request.

3.3.4 HANDLES

- Material: stainless steel.
- Suitable for: ROV operations and hook handling.
- Test: FAT upon request.

3.3.5 PADEYES

- Material: non welded, belonging to forging.
- Useful for: hook handling operations.
- Additional accessories: shackle, lifting points…
- Test: FAT upon request.

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LIFTING & MOORING

IRIZAR FORGE

FORGED SHACKLES

4.0 INTRO

Shackle is considered critical accessory from safety point of view because is one of the major hardware link between the crane and the load, and regularly works fix together with chain or non steel fittings as textile slings and similar terminals.

Related to **LIFTING application**, its considered a fix/static temporary rigging accessory and does not belong to the crane itself. Straight design shackles are regularly used for 1 pull and bow design shackles for various pulls. For heavy duty lifting operations widebody is the referred and valued product, that guarantees a safe radius of the related sling into operation, that guarantees a longer life time of the related sling.

Related to **MOORING application**, forged shackle is a great product to link two chains, chain with rope, rope with sling, connected to triplates and masterlinks… or any technology used for floating structures long term mooring lines. Recently other technologies beside steel chain are being used and recommended by installation companies based on two criterias:

* Weight of mooring line in deep water.
* Cost of commissioning & installation.

IRIZAR FORGE is approved by DNV and ABS to produce, test & certify Offshore Mooring Accessories in material R4 according to "DNV-OS-E302 Offshore Mooring Chain" and "ABS Guide for Offshore Mooring Chain" (see annex 3 and 4).

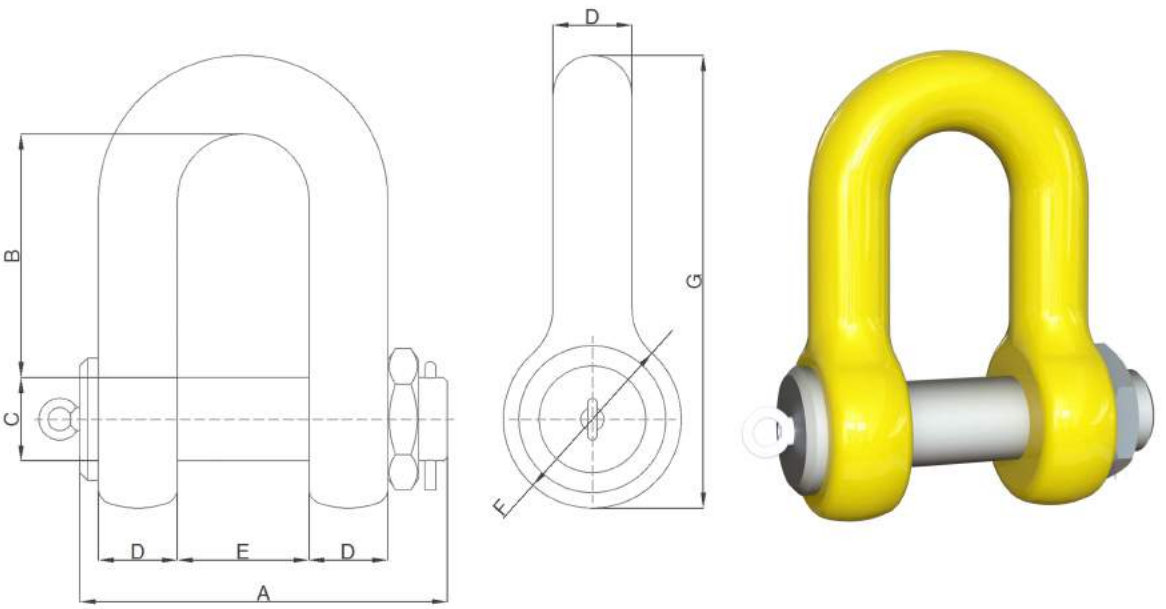
Mooring Line is being a combination technology in recent projects, combining steel with fiber products: steel chain, steel wire ropes, synthetic ropes and textile slings. Combination of all 4 technologies is reducing commissioning costs and reducing weight. Shackles and other links are in between different technologies to ensure a permanent steel-fiber, steel-steel or fiber-fiber join or linkage.

Under this specific conditions, FORGED material is the preferred technology to guarantee safety and long life time. For high safety factors during long life times, super alloy steels are the valued ones to guarantee functionality, safe operating and low maintenance costs during its long life time.

As for forged hooks, all shackles are produced for operating temperatures from -40ºC to +200ºC, considered normal, abnormal and extreme conditions.

Enjoy FORGED SHACKLE RANGE in the following pages.

4.1 DEE FORGED SHACKLES



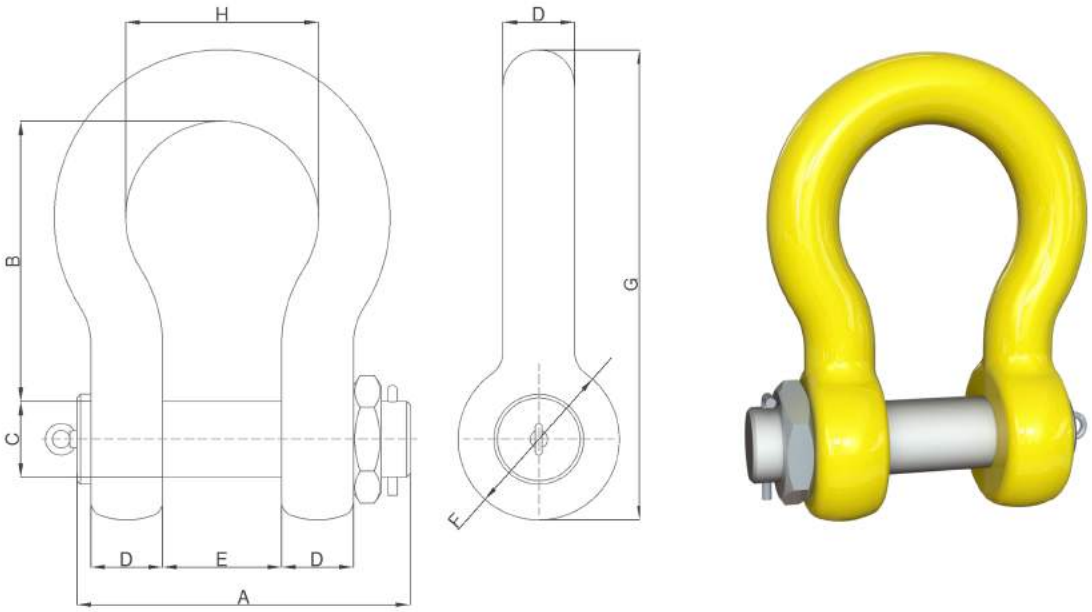
- WLL: from 120t to 550t.
- Shackle FORGED, HEAT TREATED and MACHINED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4)
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

DEE FORGED SHACKLES

OVERALL DIMENSIONS (inch)								Weight
WLL (t)	A	B	C	D	E	F	G	lbs
120	16 17/32	10 5/8	3 23/32	3 1/2	5 7/8	7 27/32	19 13/16	220
150	18 11/16	12 3/8	4 1/4	4 /	6 11/16	9 1/32	23 1/16	315
175	17 11/16	14 5/32	4 5/16	3 29/32	5 7/8	8 21/32	24 19/32	298
200	20 15/32	19 21/32	4 29/32	4 23/32	7 1/16	10 7/32	32	527
250	22 7/32	18 3/32	5 1/2	5 3/32	7 21/32	11	31 9/32	591
300	23 13/32	19 21/32	5 7/8	5 1/2	8 1/16	11 25/32	33 21/32	732
350	24 25/32	20 15/32	6 9/32	5 7/8	8 21/32	12 19/32	35 13/16	888
400	26 5/32	22 13/16	6 11/16	6 9/32	9 1/4	13 3/8	37 31/32	1067
450	27 17/32	23 19/32	7 1/16	6 11/16	9 13/16	14 5/32	40 11/32	1270
500	28 29/32	24 13/32	7 15/32	7 1/16	10 13/32	14 15/16	42 1/2	1495
550	31 9/32	26 5/32	8 7/16	7 15/32	11 7/32	15 15/16	45 27/32	1852

WLL: for R4 material grades.
Tolerance: Inner Length +/- 7,5%, other forged parts +/-5% and machined parts +/-1%.

4.2 BOW FORGED SHACKLES



- WLL: from 120t to 2.000t.
- Shackle FORGED, HEAT TREATED and MACHINED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4).
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

BOW FORGED SHACKLES

	OVERALL DIMENSIONS (inch)								Weight
WLL (t)	A	B	C	D	E	F	G	H	lbs
120	16 17/32	14 15/16	3 23/32	3 1/2	5 7/8	7 27/32	24 9/32	9 11/32	243
150	18 11/16	15 23/32	4 1/4	4	6 11/16	9 1/32	26 13/32	10 13/16	353
200	20 15/32	19 21/32	4 29/32	4 23/32	7 1/16	10 7/32	32	11 13/32	518
250	22 1/32	21 1/4	5 1/2	4 29/32	8 1/16	10 7/32	34 1/32	12	628
300	22 7/16	23 19/32	5 7/8	5 3/32	8 1/16	12	37 11/16	12	750
400	26 5/32	26 3/4	6 7/8	6 15/32	9 1/32	13 3/4	43 19/32	12 25/32	1235
500	28 11/32	27 17/32	7 9/32	7 1/16	10 1/32	14 9/16	45 9/16	13 3/4	1510
600	32 1/16	27 17/32	8 1/16	7 21/32	11 7/32	15 15/16	47 7/32	14 3/4	1940
700	33 27/32	27 17/32	8 17/32	8 1/16	12 3/16	17 1/8	48 7/16	15 23/32	2161
800	34 1/4	27 17/32	8 17/32	8 1/4	12 3/16	17 1/8	48 21/32	15 23/32	2425
900	35 13/16	27 17/32	9 1/32	8 21/32	12 31/32	18 9/32	49 29/32	16 17/32	2822
1000	37 3/8	29 1/2	9 7/16	9 1/32	13 3/4	18 7/8	50 25/32	16 17/32	3219
1250	43 1/2	30 11/16	10 5/8	10 15/16	14 9/16	23 7/32	58 21/32	17 11/16	5115
1500	43 1/2	31 15/32	11 13/32	11	14 9/16	24	60 7/32	17 11/16	5401
1750	48 13/32	37 3/8	12 31/32	11 25/32	16 29/32	25 31/32	68 11/16	21 1/4	7231
2000	51 5/32	41 5/16	14 5/32	12 19/32	18 3/32	26 3/4	74 13/32	22 1/32	8642

WLL: for R4 material grades.
Tolerance: Inner Length +/- 7,5%, other forged parts +/-5% and machined parts +/-1%.

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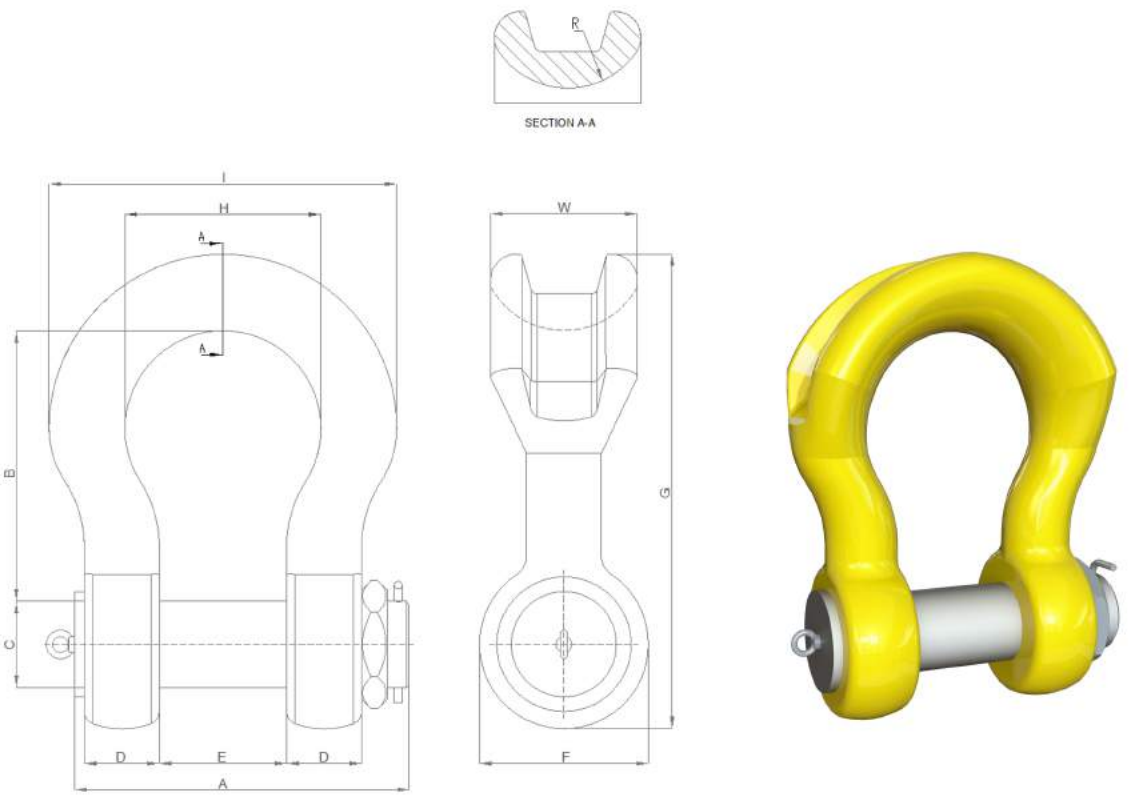
4.3 WIDE BODY FORGED SHACKLES



- WLL: from 120t to 4.000t.
- Shackle FORGED, HEAT TREATED and MACHINED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4)
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

WIDE BODY FORGED SHACKLES

	OVERALL DIMENSIONS (inch)											Weight
WLL (t)	A	B	C	D	E	F	G	H	I	W	R	lbs
125	15 17/32	14 9/16	3 1/8	3 11/32	5 1/2	6 15/32	22 15/16	8 21/32	15 11/32	5 7/8	3 1/8	183
150	16 17/32	15 23/32	3 23/32	3 17/32	5 7/8	7 27/32	25 3/32	9 13/16	16 7/8	6 11/16	3 17/32	251
200	18 1/2	18 7/8	4 1/8	4 1/8	6 9/32	8 27/32	29 23/32	10 13/16	19 1/32	8 1/16	4 5/16	399
250	20 15/32	21 5/8	4 23/32	4 23/32	7 1/16	9 7/16	33 7/16	11 25/32	21 1/4	9 1/32	4 29/32	558
300	22 13/16	23 19/32	5 1/4	5 1/2	7 21/32	11	37 9/32	13 3/4	24 23/32	10 13/32	5 1/2	805
400	25 25/32	24 13/32	6 9/32	6 9/32	9 1/32	12 31/32	40 23/32	14 9/16	27 1/8	12 19/32	6 11/16	1250
500	27 15/16	26 3/4	7 1/16	6 11/16	10 13/32	13 3/4	44 3/32	17 5/16	30 21/32	13 3/8	7 1/16	1576
600	31 9/32	28 11/32	7 27/32	7 1/16	11 13/32	15 15/16	47 3/4	19 9/32	33 11/32	14 9/16	7 15/32	2099
700	34 5/8	30 11/16	8 7/16	8 1/4	12 19/32	18 9/32	52 11/32	21 1/4	37 21/32	15 23/32	8 1/4	2956
800	36 13/32	31 15/32	9 1/32	8 21/32	12 19/32	18 9/32	53 7/16	21 27/32	38 31/32	16 17/32	8 21/32	3064
900	39 3/4	33 7/16	9 13/16	9 1/4	14 9/16	18 7/8	57 1/16	23 1/32	41 23/32	17 5/16	9 1/4	4590
1000	41 5/16	33 7/16	10 5/8	9 1/4	15 23/32	20 27/32	58 21/32	24 3/16	42 15/16	18 3/32	9 7/16	4663
1250	47 5/8	37 25/32	11 25/32	10 13/16	17 29/32	22 7/16	66 23/32	25 3/8	47 7/16	22 1/32	11 7/32	6345
1550	48 13/16	38 9/16	12 19/32	10 13/16	19 3/32	24	68 1/16	26 3/4	48 13/16	22 13/16	11 13/32	6911
1750	52 5/32	44 3/32	14 5/32	12 5/16	19 21/32	25 31/32	77 5/32	27 17/32	52 31/32	23 19/32	11 25/32	9965
2000	53 23/32	44 7/8	15 5/32	12 19/32	20 15/32	26 3/4	79 3/16	28 11/32	53 27/32	24 13/32	12 3/16	10141
2500	54 5/16	44 7/8	15 23/32	12 31/32	20 15/32	29 1/8	81 9/32	28 23/32	54 7/16	25	12 19/32	11420
3000	55 1/2	44 7/8	16 17/32	13 3/8	20 27/32	29 29/32	81 7/8	29 1/8	55 5/8	25 9/16	12 31/32	12247
3500	58 1/4	44 7/8	17 5/16	13 3/4	21 1/4	31 3/32	83 27/32	29 1/2	58 1/4	26 3/8	13 3/8	14374
4000	59 7/16	44 7/8	18 3/32	14 5/32	21 5/8	31 7/8	84 1/4	29 29/32	59 7/16	27 5/32	13 3/4	15421

WLL: for R4 material grades.
Tolerance: Inner Length +/- 7,5%, other forged parts +/-5% and machined parts +/-1%.

4.4 CUSTOM MADE SHACKLES

IRIZAR FORGE team can accommodate any forged shackle to the specific lifting, rigging or mooring operation the market is ready to operate **up to 4.000t**, from safety, design, material strength and certification point of view.

- WLL: from 120t to 4.000t.
- Shackle FORGED, HEAT TREATED and MACHINED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4).
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Tolerance: Inner Length +/- 7,5%, other forged parts +/-5% and machined parts +/-1%.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

SWIVELS

5.0 INTRO

Swivels are used in Lifting, Mooring & Anchoring applications, and consequently are considered critical lifting component from safety point of view because is the main turning hardware between the crane and the load.

The main difference between Swivel Hook and Block Hook (chapter 2) are pulleys: swivel hook does not need sheaves and the main reason is because there are certain lifting operations where straight lifting is necessary with enough weight and protection to turn.

The key component of the Swivel Hook is the COVER: this part is protecting inner machined parts, bearing and thread to guarantee a full turning and proper rotation of the load, and at the same time is giving the necessary weight to avoid rope outlet and crane incidents. Weight and rotating are the main functions of swivel.

Regularly this kind of products are used in Offshore environments, where swivels could have two main purposes:

For **SUBSEA LIFTING**, the crane is regularly located top site, even if recently semi-submergible and submergible cranes are being designed and installed. This kind of Offshore cranes regularly do subsea operations even if there are dry cranes too: most of them they do in shallow water, but others do deep water for e.g maniffols recovery, seabed pipeline maintenance or repair… being possible to do operations up to 4.000m subsea. For this application regularly Swivel Hooks are used.

For **LONG TERM MOORING LINE,** main technology to fix floating structures into the seabed, forged swivels are a great product to link two chains, chain with rope, rope with sling… or any technology used for floating structures mooring lines. Recently other technologies beside steel chain are being used and recommended by installation companies based on two criterias:

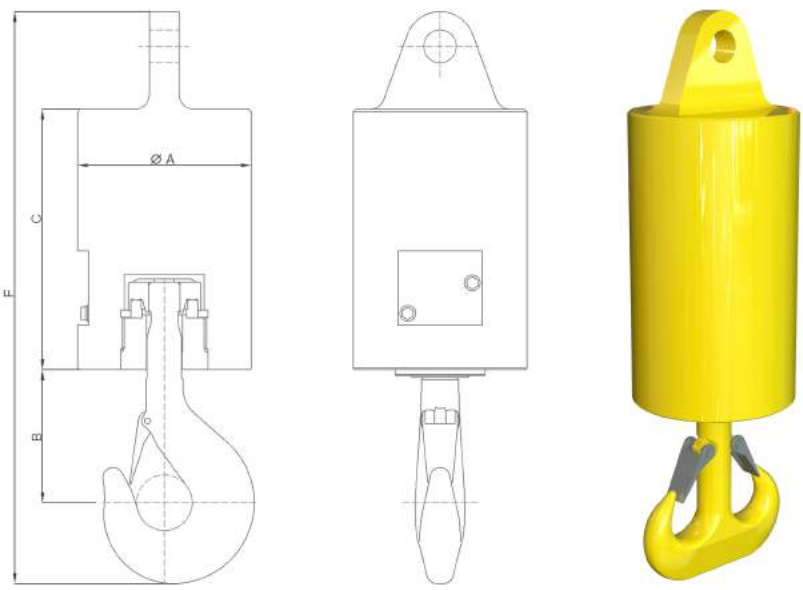
* Weight of mooring line in deep water.
* Cost of commissioning & installation.

Mooring Line is being a combination technology in recent projects, combining steel with fiber products: steel chain, steel wire ropes, synthetic ropes and textile slings. Combination of all 4 technologies is reducing commissioning costs and reducing weight. Hooks and other links are in between different technologies to ensure a permanent steel-fiber, steel-steel or fiber-fiber join or linkage. For this application regularly Eye-Eye and Eye-Clevis Swivels are used.

In both cases, with hook or without hook, swivels are working submergible and to avoid salty water getting into the inner parts, cover part and sealings are used to guarantee a long life time. Additionally when operation is held in deep water, outer & inner pressure difference is a big issue and sealings are a key factor to avoid any problem and guarantee the bearing is rotating correctly.

Enjoy SWIVELS RANGE in the following pages.

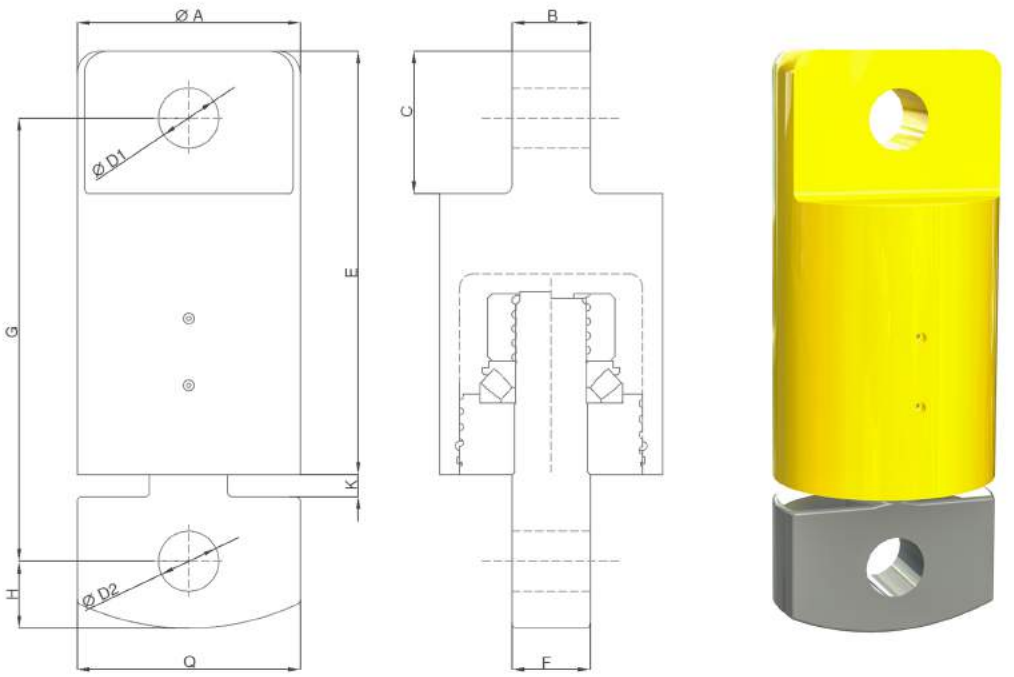
5.1 SWIVEL HOOKS



- WLL/SWL: from 50t to 1.500t.
- Hook FORGED, HEAT TREATED and MACHINED, as per DIN15400 design or others upon request.
- Cover: free of weld
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel.
- Coating Protection: fully painted.
- Safety Factor: 4:1.
- Sealings: for onshore lifting, offshore topsite and subsea lifting & mooring.
- Load Test: requested and recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SWIVEL HOOKS						
OVERALL DIMENSIONS (inch)						Weight
WLL (t)	Hook No	A	B	C	F	lbs
70	25	19 21/32	16 7/8	23 19/32	63 29/32	2205
125	40	23 19/32	20 9/16	22 5/8	71 29/32	3307
150	50	23 19/32	22 7/16	25 9/16	70 3/16	2866
200	63	31 15/32	25 1/2	30 11/16	90 3/32	7716
250	80	39 11/32	29 1/32	47 7/32	99	17637
300	100	39 11/32	32 1/32	68 7/8	131 9/16	26455
400	125	39 11/32	35 3/4	67 29/32	154 3/4	26455

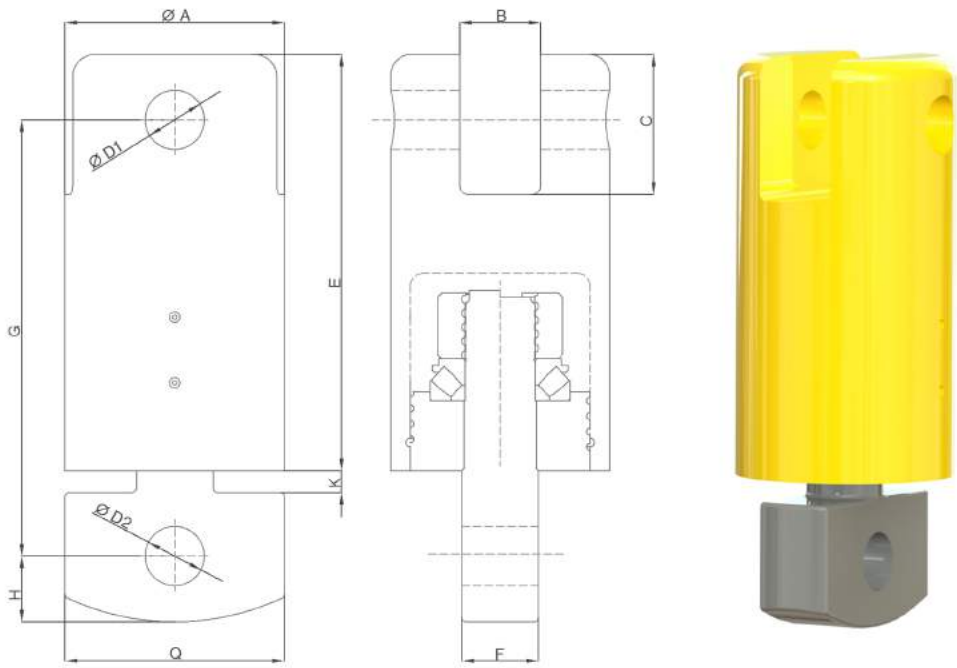
5.2 EYE-EYE SWIVEL



- WLL/SWL: from 50t to 1.500t.
- Hook FORGED, HEAT TREATED and MACHINED, as per DIN15400 design or others upon request.
- Cover: free of weld.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel.
- Coating Protection: fully painted.
- Safety Factor: 4:1.
- Sealings: for onshore lifting, offshore topsite and subsea lifting & mooring.
- Load Test & MBL: requested and recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SWIVEL | EYE - EYE												
	OVERALL DIMENSIONS (inch)											Weight
WLL (t)	A	B	C	D1	D2	E	F	G	H	K	Q	lbs
200	19 21/32	6 7/8	12 19/32	5 5/16	5 5/16	37 3/8	6 7/8	39 5/32	5 7/8	1 15/16	19 21/32	2456
300	23 19/32	7 27/32	14 11/32	6 3/32	6 3/32	43 9/32	7 27/32	45 1/4	7 1/16	1 15/16	23 19/32	4059
400	25 9/16	8 7/8	16 1/8	7 1/16	7 1/16	45 1/4	8 7/8	47 7/32	8 1/16	1 15/16	25 9/16	4740

5.3 EYE-CLEVIS SWIVEL



- WLL/SWL: from 50t to 1.500t.
- Hook FORGED, HEAT TREATED and MACHINED, as per DIN15400 design or others upon request.
- Cover: free of weld.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel.
- Coating Protection: fully painted.
- Safety Factor: 4:1.
- Sealings: for onshore lifting, offshore topsite and subsea lifting & mooring.
- Load Test & MBL: requested and recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

SWIVEL | EYE - CLEVIS												
	OVERALL DIMENSIONS (inch)											Weight
WLL (t)	A	B	C	D1	D2	E	F	G	H	K	Q	lbs
200	19 21/32	7 9/32	12 19/32	5 5/16	5 5/16	37 3/8	6 7/8	39 5/32	5 7/8	1 15/16	19 21/32	2006
300	23 19/32	8 1/4	14 11/32	6 3/32	6 3/32	43 9/32	7 27/32	45 1/4	7 1/16	1 15/16	23 19/32	3740
400	25 9/16	8 1/2	16 1/8	7 1/16	7 1/16	45 1/4	8 7/8	47 7/32	8 1/16	1 15/16	25 9/16	4565

CONNECTORS

6.0 INTRO

Connectors or Links are used both for Lifting as well as Mooring Applications and it is considered critical accessory from safety point of view because is one of the major hardware link between the crane and the load, and regularly works fix together with chain or non steel fittings as textile slings and similar terminals.

For **Lifting application**, connectors are considered as rigging accessories, consequently the links are not belonging to the crane itself, but as a separate and temporary crane accessory.

For **Subsea Mooring**, links & connectors are considered part of the long term mooring line for floating platforms. Regularly floating platforms are located in deep water seas.
SUBSEA Deep Water application is considered one of the most critical OFFSHORE application because of the poor accessibility of the products, harsh environment and high costs to get the products back to top site. Consequently maintenance jobs are difficult to manage and long life times are required.

Under these conditions, FORGED material is the preferred & valued technology to guarantee long life times with low maintenance costs. For high safety factor during long life time, super alloy steels are the preferred steel grades to guarantee a safe functional long life products. Surface protection & coatings have also a key role to keep designed life times.

Related to connectors, because its geometry, can comply with different purposes, being the main ones:

Related to **LIFTING**, the main connector is MASTER LINK besides shackles (see chapter 4 SHACKLES) and its considered crane accessories not belonging to the crane itself. Crane can be an onshore or offshore crane: the latest can be dry operation or subsea operations: most of them they do in shallow water, but others do deep water for e.g maniffols recovery, seabed pipeline maintenance or repair… being possible to do operations up to 4.000m subsea.

Related to **LONG TERM MOORING LINE**, the most popular connector designs are H-Link & Y-Links as preferred product to link two chains, chain with rope, rope with sling… or any technology used for floating structures mooring lines. Recently other technologies beside steel chain are being used and recommended by installation companies based on two criterias:

* Weight of mooring line in deep water.
* Cost of commissioning & installation.

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Mooring Line is being a combination technology in recent projects, combining steel with fiber products: steel chain, steel wire ropes, synthetic ropes and textile slings. Combination of all 4 technologies is reducing commissioning costs and reducing weight. Links & connectors are in between different technologies to ensure a permanent steel-fiber, steel-steel or fiber-fiber join or linkage.



Enjoy CONNECTORS RANGE in the following pages.

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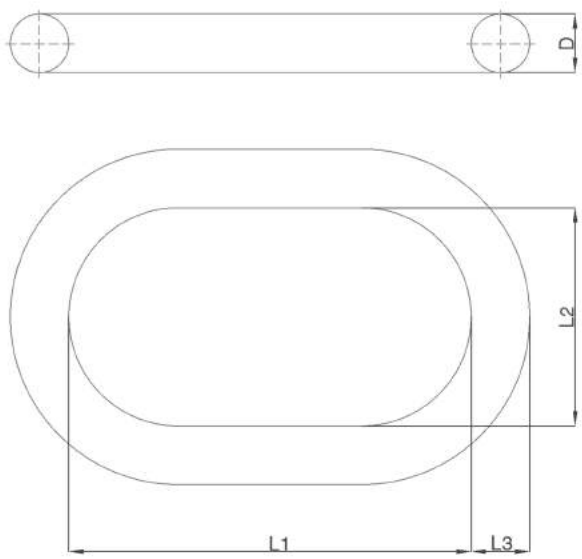
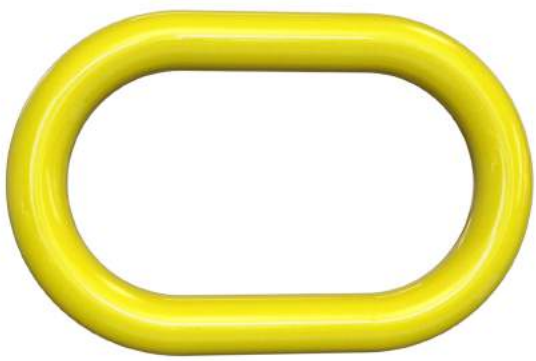
6.1 MASTER LINK





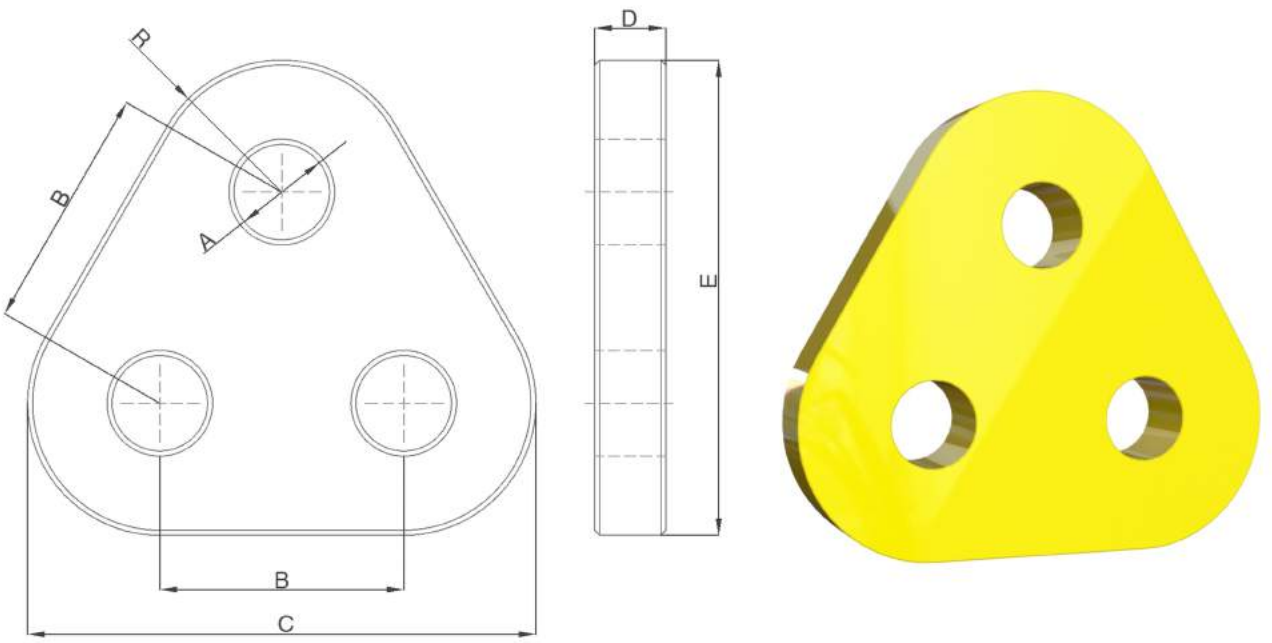
- WLL: from 155t to 1.500t.
- Master links FORGED and HEAT TREATED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4).
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

CONNECTORS | STANDARD MASTER LINK

		OVERALL DIMENSIONS (inch)				Weight
WLL (t)	MBL (t)	D	L1	L2	L3	lbs
157	628	3 29/32	19 21/32	11 25/32	3 29/32	227
250	1000	4 1/2	23 19/32	15 23/32	4 1/2	364
300	1200	4 1/2	23 19/32	11 25/32	4 1/2	353
400-1	2000	4 1/2	19 9/32	9 13/16	4 1/2	298
400-2	2000	4 1/2	27 17/32	9 13/16	4 1/2	373
400-3	1600	6 3/32	31 15/32	15 23/32	8 1/16	1157
500	2000	6 7/8	31 15/32	15 23/32	8 21/32	1429
600	2400	7 21/32	31 15/32	15 23/32	9 1/32	1682
700	2800	7 27/32	33 7/16	15 23/32	9 1/4	1841
800	3200	8 1/4	33 7/16	15 23/32	9 5/8	2033
900	3600	9 1/32	35 13/32	15 23/32	10 5/8	2606
1000	4000	9 7/16	35 13/32	15 23/32	11	2848
1250	5000	10 7/32	39 11/32	15 23/32	12 3/16	3737
1500	6000	10 5/8	39 11/32	15 23/32	12 19/32	4039

Tolerance: forged surface tolerance +/-5% .

6.2 TRIPLATE



- WLL: from 120t to 700t.
- Triplates FORGED, HEAT TREATED and MACHINED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4)
- Coating Protection: upon request.
- Safety Factor: min. 4:1.
- Load Test: requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

CONNECTORS | STANDARD TRIPLATE

OVERALL DIMENSIONS (inch)							Weight
WLL (t)	A	B	C	D	E	R	lbs
120	4 1/8	11	24 13/32	3 29/32	22 29/32	6 11/16	414
150	4 1/2	12 19/32	27 5/32	4 5/16	25 15/32	7 9/32	564
175	4 1/2	12 19/32	27 15/16	4 5/16	26 1/4	7 21/32	604
200	5 1/2	15 11/32	32 9/32	4 23/32	30 7/32	8 7/16	860
250	5 7/8	15 11/32	34 1/4	5 1/2	32 3/16	9 7/16	1142
300	6 9/32	16 17/32	36 7/32	5 7/8	34	9 13/16	1360
400	7 9/32	19 9/32	42 29/32	7 27/32	40 5/16	11 25/32	2579
500	7 27/32	21 5/8	50	7 27/32	47 1/16	14 5/32	3569
600	8 21/32	23 19/32	55 3/32	7 27/32	51 15/16	15 23/32	4348
700	9 1/32	23 19/32	55 3/32	9 13/16	51 15/16	15 23/32	5406

Tolerance: machined surface tolerance +/-1%. +/-5% for D tolerance.

6.3 CUSTOM CONNECTORS

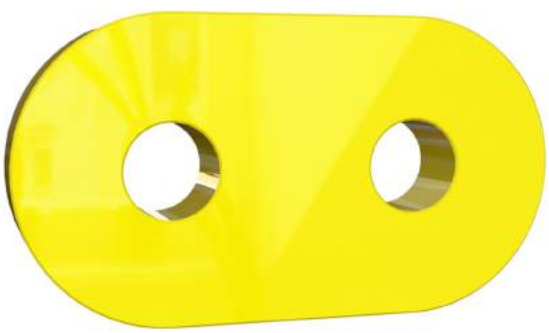
IRIZAR FORGE team can accommodate any forged connector to the specific lifting, rigging or mooring operation the market is ready to operate **up to 1.500t**, from safety, design, material strength and certification point of view.

- WLL: from 155t to 1.500t.
- Y Link, H Link, Twin Plate and Double Pin Connector FORGED and HEAT TREATED.
- Material: carbon steel, alloy and super alloy. Most regular super alloy steel (R4).
- Coating Protection: upon request.
- General Tolerances: +/-5% forged parts and machined parts +/-1%.
- Safety Factor: min. 4:1.
- Load test requested and recommended. ILO-3, FAT or Breaking Test available upon request.
- Certificate: EN10204-3.1. For 3.2, Mooring Accessory Cert with ABS and DNV upon request (see annex 3 and 4).

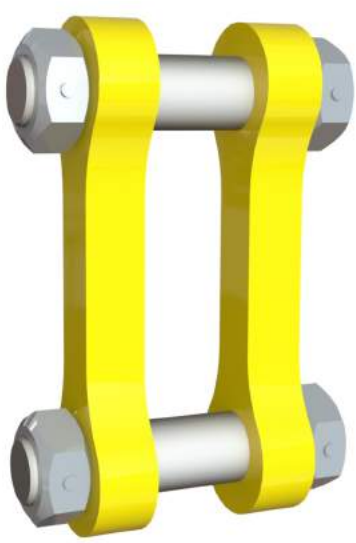
6.3.1 Y LINKS

6.3.2 H LINKS

6.3.3 TWIN PLATE



6.3.4 DOUBLE PIN CONNECTOR



ROPE ACCESSORIES

7.0 INTRO

In this guide Rope Accessories are divided into Sheaves and Sockets.

Sheave or Pulley has always been connected to the rope industry because sheave is the vehicle for the rope to move: sheave is the road and bearing is the motor/vehicle to make the movement faster or slower.

Sheaves can be used in a crane (to guide ropes) and out of a crane equipment wherever the rope is.

Last decades ropes have suffered a big development based in metallurgical R&D: rope diameter has been decreased thanks to wire ropes advanced technology using more flexible wire ropes, reducing rope diameter and increasing strengthness thanks to very advanced materials, having decreased the historical factor "rope diameter (d1) x factor = sheave diameter (D)".

The number of sheaves in the hook block for instance will depend on the total WLL of the hookblock and individual sheave WLL: falls is called to the twisted rope, whereas 1 sheave has always 2 falls, 2 sheaves have 4 falls...

Sheaves or pulleys can be manufactured in several materials (carbon steel, alloy steel, technical plastic) based on the purpose of it. Steel made sheaves can be forged, laminated plate and casting. Forged/casted ones are considered weldfree and plate ones regularly have welding points.

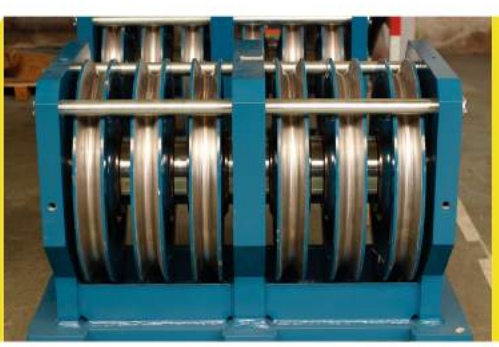
Diferents hardness in the groove can be achieved dependig on the material and the induction treatment.

Bearing is naturally linked to the sheave to get movement and rope can turn: depending on the sheave, load and design main purpose, bearings can be roller bearing, ball bearing, bronze bushing, etc, depending on customer requirements.

Proof Test Load (PTL) is being performed at IRIZAR benches in order cover a full guarantee to the crane operator.

Related to sockets it is considered rope terminal hardware (wirerope end fitting). Depending on the customer requirements, forged socket, close or open type, can be designed and manufactured to comply with the specific lifting, rigging, anchoring, fastening or mooring operations. Regularly forged sockets are required for mooring operations for permanent mooring systems and long term mooring lines.

Sockets can be manufactured in different materials (carbon, alloy and super alloy steel) and designed for the specific rope diameter and capacity required by the application with a minimum safety factor of 4:1. With the correct assembly into the wire rope, socket can meet the breaking strength of the wire rope.



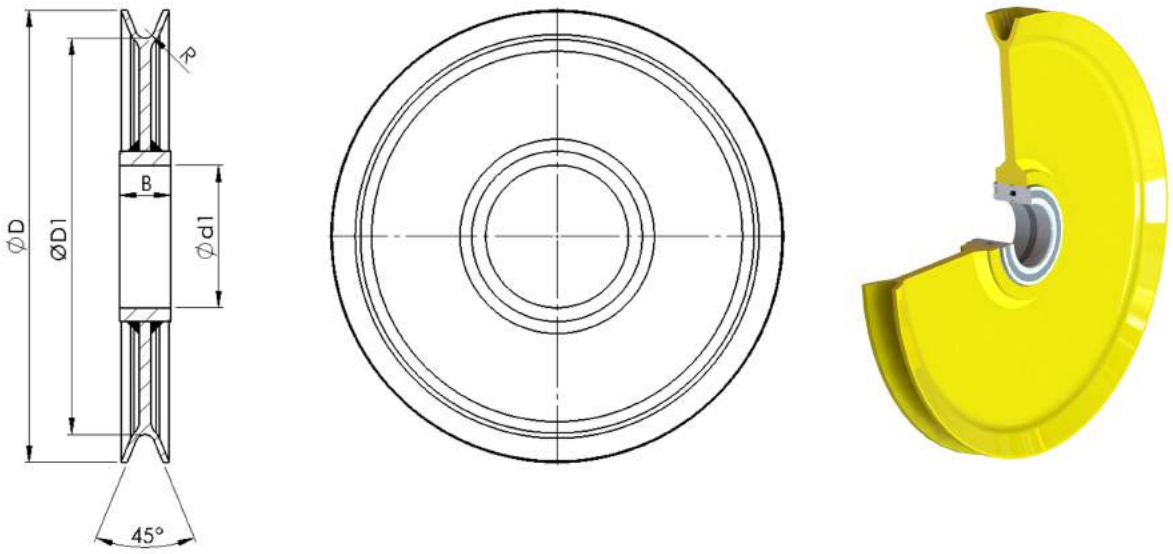
Enjoy ROPE ACCESSORIES RANGE in the following pages.

7.1 SHEAVES

7.1.1 METALLIC SHEAVES

7.1.1.1 Welded sheaves

7.1.1.1.1 One plate sheave

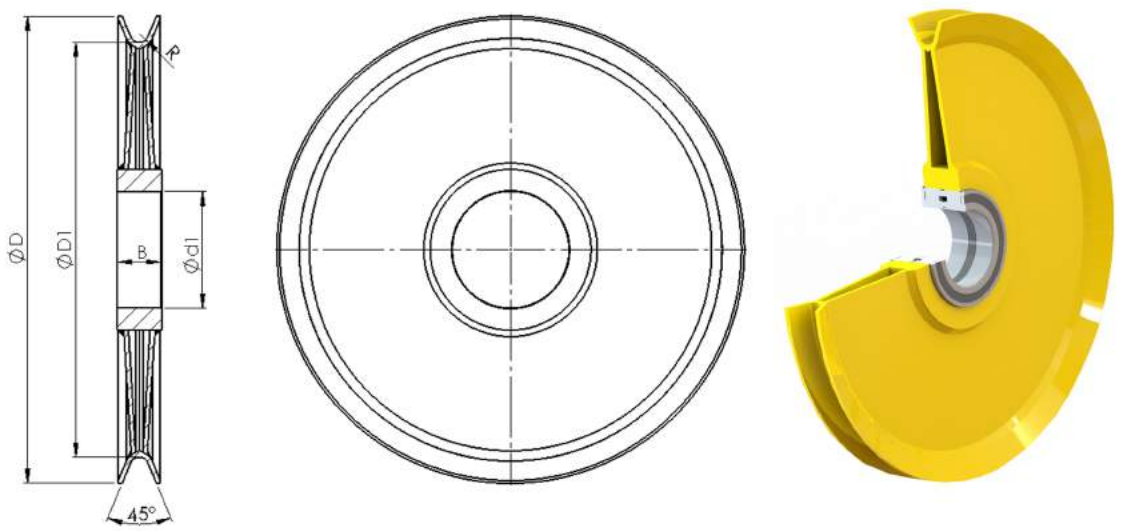


- Material (steel): cold laminated 1 plate + 1 welding
  - Plates: S275JR
  - Hub: S355
- "D" diameter from Ø160mm to Ø800mm.
- Hardness (groove): min 200HB. Further by induction treatment upon request.
- Coating Protection: fully painted.
- Rope diam: acc to customer requirement.
- Assembly: with bearing upon request. FAT upon request.
- Certificate: EN10204-3.1. For 3.2, and Load Test upon request.

METALLIC WELDED SHEAVES | ONE PLATE SHEAVE

OVERALL DIMENSIONS (inch)								Weight
No	D1	D	d1	B	R	Rope	Bearing Ref.	Shaft Ø	lbs
Ø 160	6 9/32	7 17/32	2 15/16	1 3/8	5/32	5/16	6009-2RS	1 3/4	8
Ø 200	7 27/32	9 7/16	3 11/32	1 19/32	3/16	3/8	6209-2RS	1 3/4	11
Ø 280	11 /	13 3/16	4 5/16	1 7/8	5/16	5/8	6212-2RS	2 11/32	26
Ø 355	13 31/32	16 5/16	5 7/8	2 11/32	11/32	11/16	6217-2RS	3 11/32	39
Ø 450-1	17 11/16	20 15/32	7 1/16	2 13/16	15/32	15/16	6220-2RS	3 29/32	75
Ø 450-2	17 11/16	20 15/32	5 7/8	2 1/8	15/32	15/16	SL04 5020PP	3 29/32	69
Ø 550	21 5/8	24 25/32	7 1/16	2 17/32	17/32	31/32	SL04 5024PP	4 23/32	95
Ø 650	25 9/16	28 29/32	8 27/32	3 3/16	9/16	1 3/32	SL04 5030PP	5 7/8	148

7.1.1.1.2 Two plates sheave



- Material (steel): cold laminated 2 plates + 2 welding
  - Rim: S355J2
  - Plates: S355J2+N
  - Hub: E355
- "D" diameter from Ø160mm to Ø2000mm.
- Hardness (groove): min 200HB. Further by induction treatment upon request.
- Coating Protection: fully painted.
- Rope diam: acc to customer requirement.
- Assembly: with bearing upon request. FAT upon request.
- Certificate: EN10204-3.1. For 3.2, and Load Test upon request.

METALLIC WELDED SHEAVES | TWO PLATES SHEAVE

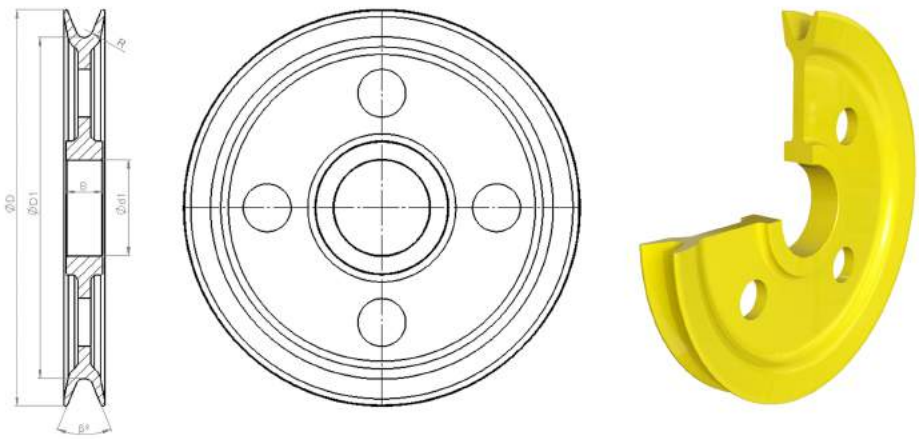
OVERALL DIMENSIONS (inch)									Weight
No	D1	D	d1	B	R	Rope	Bearing Ref.	Shaft Ø	lbs
Ø 500	19 21/32	22 1/32	5 1/2	2 1/8	13/32	25/32	SL04 5018PP	3 17/32	83
Ø 560	22 1/32	24 25/32	5 7/8	2 1/8	15/32	27/32	SL04 5020PP	3 29/32	99
Ø 630	24 25/32	27 15/16	6 11/16	2 17/32	17/32	1 /	SL04 5022PP	4 5/16	122
Ø 710	27 15/16	31 15/32	7 1/16	2 17/32	9/16	1 3/32	SL04 5024PP	4 23/32	154
Ø 800	31 15/32	35 13/32	7 27/32	3 1/32	11/16	1 1/4	SL04 5026PP	5 3/32	203
Ø 900	35 13/32	39 3/4	8 1/4	3 1/32	3/4	1 13/32	SL04 5028PP	5 1/2	291

7.1 SHEAVES

7.1.1 METALLIC SHEAVES

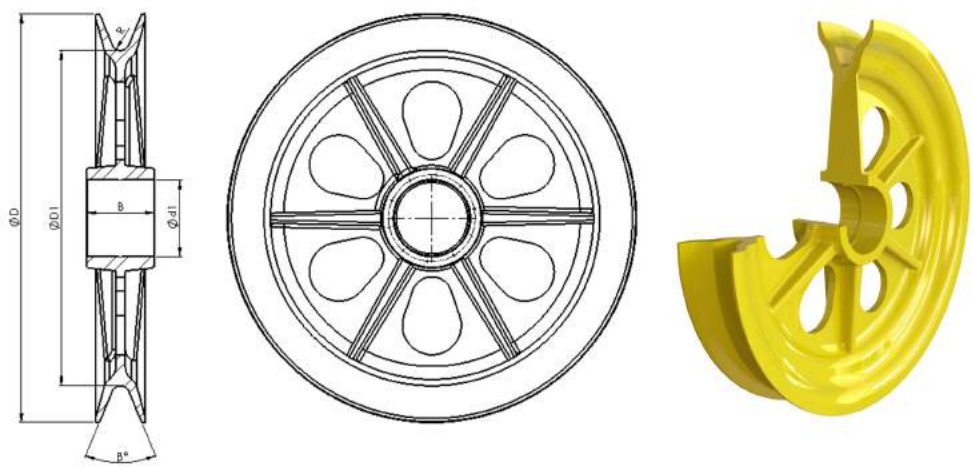
7.1.1.2 Free of weld sheaves

7.1.1.2.1 Solid sheaves



- Material: hot forged / laminated.
  - Carbon steel.
  - Alloy steel.
- "D" diameter up to Ø2000mm.
- Hardness: groove hardness depends on steel grade & treatments. Induction treatment upon request.
- Coating Protection: fully painted.
- Rope diam: acc to customer requirement.
- Assembly: with bearing upon request. FAT upon request.
- Certificate: EN10204-3.1. For 3.2, and Load Test upon request.

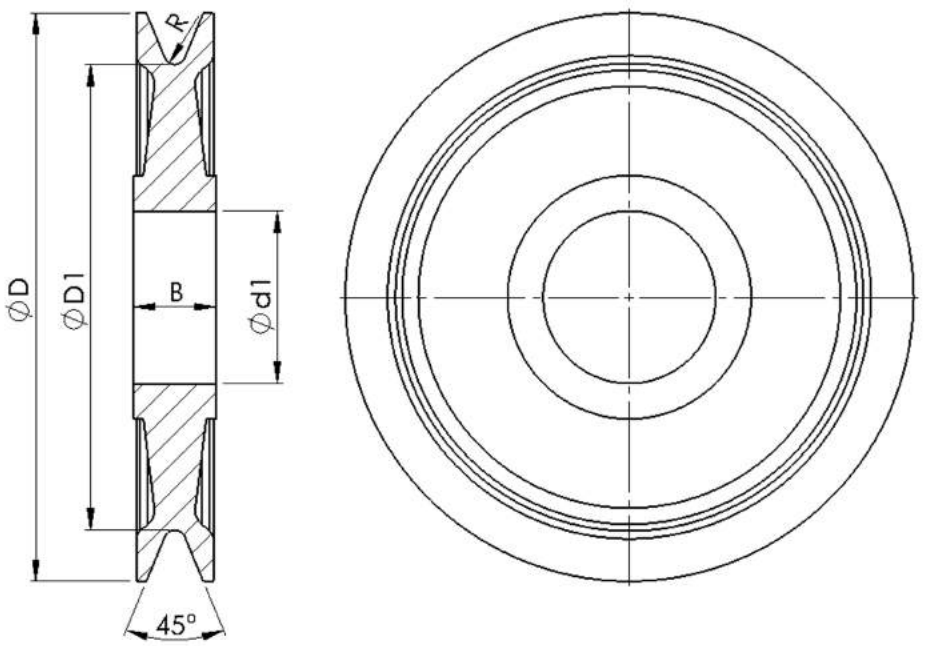
7.1.1.2.2 Cast sheaves



- Material (steel): casting.
  - Carbon and alloy steels.
- "D" diameter up to Ø6000mm.
- Hardness: groove hardness depends on steel grade & treatments. Induction treatment upon request.
- Coating Protection: fully painted.
- Rope diam: acc to customer requirement.
- Assembly: with bearing upon request. FAT upon request.
- Certificate: EN10204-3.1. For 3.2, and Load Test upon request.

7.1 SHEAVES

7.1.2 NON METALLIC SHEAVES



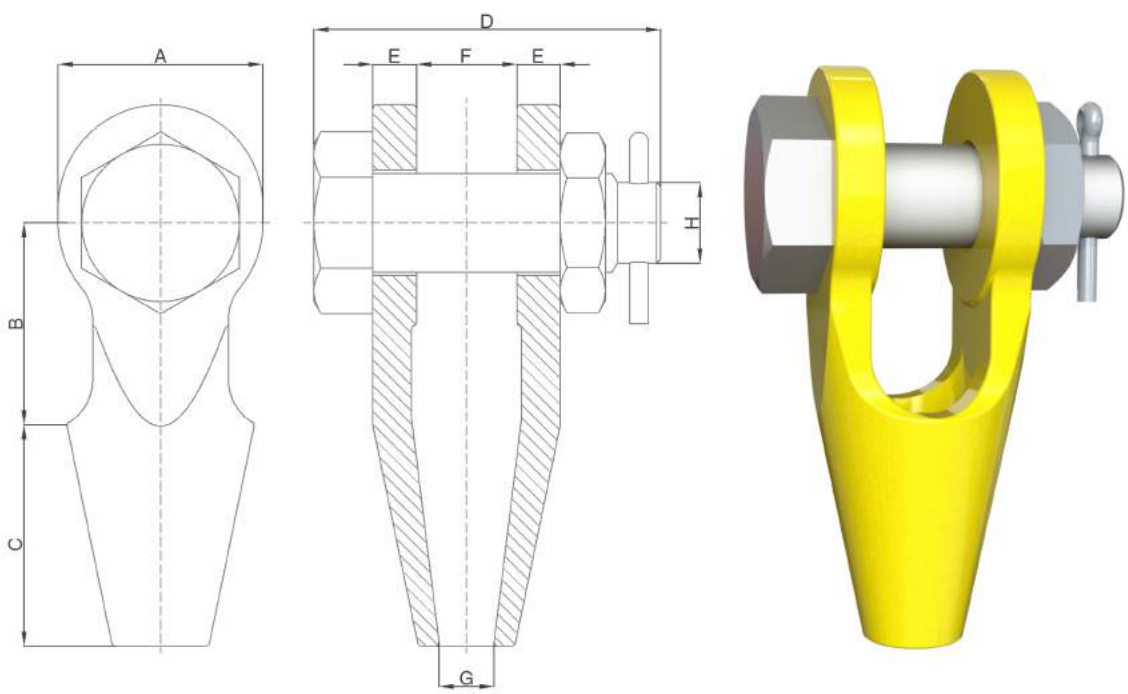
- Material: technical plastic.
  - Lamigamid.
  - Poli-mid 1100.
- "D" diameter from Ø140 to Ø1000mm.
- Rope diam: acc to customer requirement.
- Assembly: with bearing upon request. FAT upon request.
- Load Test upon request.

7.2 FORGED SOCKETS

IRIZAR FORGE team can accommodate any forged socket to the specific lifting, rigging or mooring operation the market is ready to operate up to 320t, from safety, design, material strength and certification point of view.

- WLL: 320t.
- Swivel FORGED, HEAT TREATED and FULLY MACHINED.
- Material: carbon, alloys and super alloys. Most regular: super alloy steel.
- Rope diameter: acc to customer requirement.
- Safety Factor: min. 5:1.
- Surface Protection & Coatings: upon request.
- Sealings: upon request for subsea and offshore apps.
- Load Test: requested / recommended.
- Certificate: EN10204-3.1. For 3.2, ILO-3, FAT or Breaking Test available upon request.

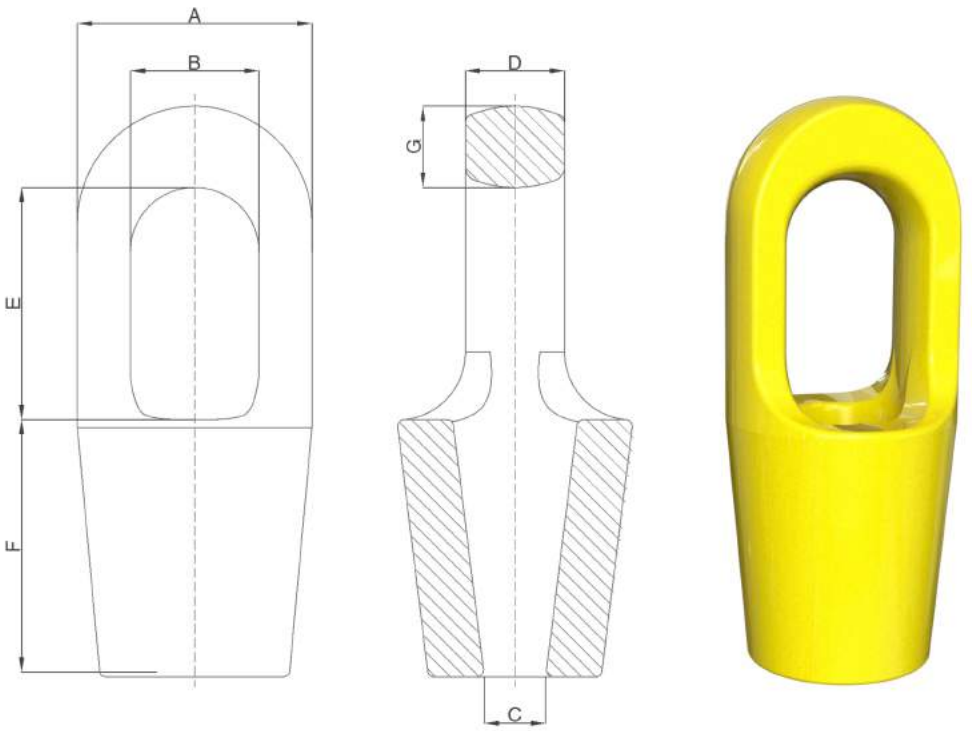
7.2.1 OPEN FORGED SOCKETS



FORGED SOCKETS | OPEN FORGED SOCKETS

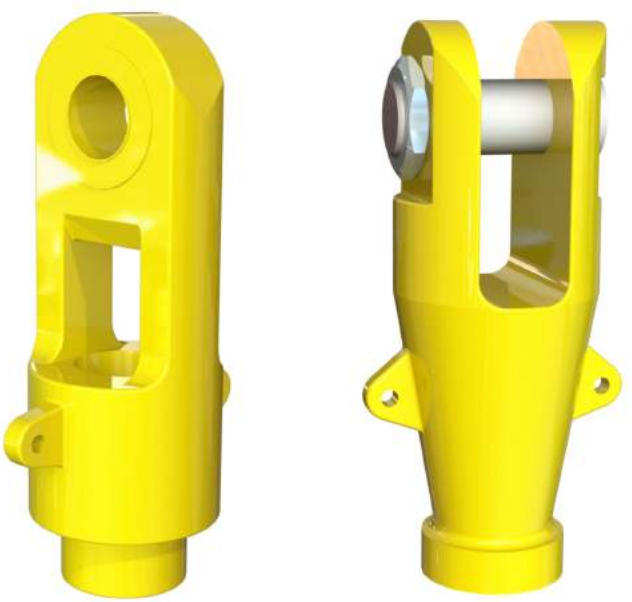
	OVERALL DIMENSIONS (inch)											Weight
Art. No	Wire diam inch	WLL (t)	MBL (t)	A	B	C	D	E	F	G	H	lbs
IFSSS-140	3¼ - 3⅜	140	700	11 ¼	11 23/32	12 31/32	16 7/32	3 3/32	6 ¼	3 19/32	5 ½	494
IFSSS-150	3½ - 3⅝	150	750	12 3/16	12 ½	14	17	3 ¼	6 23/32	3 ⅞	5 31/32	617
IFSSS-190	3¾ - 4	190	950	13 27/32	13 ½	15	18 ¼	3 ½	7 ½	4 ¼	7	833
IFSSS-240	4 ½	240	1200	16 29/32	18 ⅞	18 3/32	20 1/16	3 31/32	8 3/16	4 29/32	7 15/32	1243
IFSSS-280	5	280	1400	21 ⅝	19 21/32	19 21/32	22 1/32	4 23/32	8 ¼	5 13/32	9 13/16	2033
IFSSS-400	5½ - 6	400	2000	23 7/32	19 21/32	22 13/16	24 13/32	5 ½	9 1/32	6 9/32	10 13/16	2855
IFSSS-500	6 ½	500	2500	25 3/16	23 19/32	26 9/16	27 15/16	6 ⅞	12 3/16	6 ⅞	11 13/32	4299

7.2.2 CLOSE FORGED SOCKETS



FORGED SOCKETS | CLOSE FORGED SOCKETS											
	OVERALL DIMENSIONS (inch)										Weight
Art. No	Wire diam inch	WLL (t)	MBL (t)	A	B	C	D	E	F	G	lbs
IFCSS-140	3 1/4 - 3 3/8	140	700	12 7/32	7 7/32	3 19/32	5 23/32	12 7/32	12 31/32	4	315
IFCSS-150	3 1/2 - 3 5/8	150	750	12 31/32	7 3/4	3 7/8	6 1/4	12 31/32	14	4	366
IFCSS-190	3 3/4 - 4	190	950	14 1/4	8 1/2	4 1/4	7	14	15	4 1/4	478
IFCSS-240	4 1/2	240	1200	15 15/16	9 1/4	4 29/32	7 15/32	16 23/32	18 3/32	4 23/32	745
IFCSS-280	5	290	1400	20 1/4	10 5/8	5 13/32	8 1/4	18 11/16	19 21/32	5 1/2	1276
IFCSS-400	5 1/2 - 6	400	2000	20 1/16	11 25/32	6 9/32	9 13/16	21 5/8	22 13/16	5 7/8	1442
IFCSS-500	6 1/2	500	2500	23 19/32	12 25/32	6 7/8	11 25/32	23 19/32	26 9/16	6 7/8	2344

7.2.3 CUSTOM MADE SOCKETS



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Annex 1

CRANE GENERAL INFORMATION (EN13001-1, EN13001-2)

CRANE PROPERTIES

Crane Type	
Dispositive Hoisting Type	
Hoisting Device Type & Starting Method	
Maximum Constant Hoisting Speed (vh,max) [m/s]	
Constant Hoisting Creep Speed (vh,CS) [m/s]	
Maximum Traslation Acceleration[m/s2]	
Maximum Distribution Acceleration [m/s2]	
Maximum Vertical (Drag) Acceleration[m/s2]	
Drag Device Acceleration Force	
Articulation Type	
Tilting Resistance Factor for Balanced Rope Reeving(Ct)	
Maximum Deliberated Hook Suspension Inclination (β) [º]	

TEMPERATURE FACTORS

Operation Temperature [ºC]	

APPLICATION FACTORS

Risk Factor (n r)	

MASS FACTORS

Mass of the rated hook load (mRC)[kg]	
Total Hook Load with Release device (m H)[kg]	
Maximum Hoisting Load [kg]	

WIND FACTORS

Wind Range in Service	
European Wind Location	
Out of Service (OS) Wind Interval [R] [years]	
Maximum Load Heigth to the Surrounding Ground OS cond.(m)	
Load Percentage for Out of Service Condition (ηW)	

FATIGUE DESIGN FACTORS

Fatigue Operation Temperature [ºC]	
Mass of the Hook Load in a Lifting Cycle (mi) [kg]	
Class Q Parameter	
Class U Parameter	
Average Number of accelerations per Cycle	
Total Number of Lifting Cycles	

ADDITIONAL LOAD OPTIONS

LOAD RELEASE FACTORS

Apply Fast Load Release?	
Load Release Speed	
Release Load Percentage [%]	
Load Release Device Mass [kg]	

TRANSLATION FACTORS

Irregular Traslation surface?	
Factor ϕ4 (EN13001-2)	

SNOW & ICE FACTORS

Apply Snow and Ice Loads?	
Load Horizontal Area Projection (mm)	
Snow or Ice Build-up Thickness (mm)	

EARTHQUAKE FACTORS

Apply Earthquake Loads?	
Máximum Vertical Acceleration due to Earthquake [m/s2]	

Annex 2

DIN 15400 Drive Groups

This table specifies the drive group as a function of hook strength class and the lifting capacity as a function of hook number.

Strength class	Drive group [1]										Strength class
M	Hooks used in a drive group lower				$1B_m$	$1A_m$	2_m	3_m	4_m	5_m	M
P	than $1B_m$ are not included			$1B_m$	$1A_m$	2_m	3_m	4_m	5_m	-	P
S	here.		$1B_m$	$1A_m$	2_m	3_m	4_m	5_m	-	-	S
T		$1B_m$	$1A_m$	2_m	3_m	4_m	-	-	-	-	T
V	$1B_m$	$1A_m$	2_m	3_m	4_m	-	-	-	-	-	V
Hook Number	Lifting capacity, in kg										Hook number
006	320	250	200	160	125	100	-	-	-	-	006
010	500	400	320	250	200	160	125	100	-	-	010
012	630	500	400	320	250	200	160	125	100	-	012
020	1000	800	630	500	400	320	250	200	160	125	020
025	1250	1000	800	630	500	400	320	250	200	160	025
04	2000	1600	1250	1000	800	630	500	400	320	250	04
05	2500	2000	1600	1250	1000	800	630	500	400	320	05
08	4000	3200	2500	2000	1600	1250	1000	800	630	500	08
1	5000	4000	3200	2500	2000	1600	1250	1000	800	630	1
1.6	8000	6300	5000	4000	3200	2500	2000	1600	1250	1000	1.6
2.5	12500	10000	8000	6300	5000	4000	3200	2500	2000	1600	2.5
4	20000	16000	12500	10000	8000	6300	5000	4000	3200	2500	4
5	25000	20000	16000	12500	10000	8000	6300	5000	4000	3200	5
6	32000	25000	20000	16000	12500	10000	8000	6300	5000	4000	6
8	40000	32000	25000	20000	16000	12500	10000	8000	6300	5000	8
10	50000	40000	32000	25000	20000	16000	12500	10000	8000	6300	10
12	63000	50000	40000	32000	25000	20000	16000	12500	10000	8000	12
16	80000	63000	50000	40000	32000	25000	20000	16000	12500	10000	16
20	100000	80000	63000	50000	40000	32000	25000	20000	16000	12500	20
25	125000	100000	80000	63000	50000	40000	32000	25000	20000	16000	25
32	160000	125000	100000	80000	63000	50000	40000	32000	25000	20000	32
40	200000	160000	125000	100000	80000	63000	50000	40000	32000	25000	40
50	250000	200000	160000	125000	100000	80000	63000	50000	40000	32000	50
63	320000	250000	200000	160000	125000	100000	80000	63000	50000	40000	63
80	400000	320000	250000	200000	160000	125000	100000	80000	63000	50000	80
100	500000	400000	320000	250000	200000	160000	125000	100000	80000	63000	100
125	*630000*	500000	400000	320000	250000	200000	160000	125000	100000	80000	125
160	*800000*	*630000*	500000	400000	320000	250000	200000	160000	125000	100000	160
200	*1000000*	*800000*	*630000*	500000	400000	320000	250000	200000	160000	125000	200
250	*1250000*	*1000000*	*800000*	*630000*	500000	400000	320000	250000	200000	160000	250

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Annex 3

DNV·GL

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM000004R

This is to certify:

That

FORJAS IRIZAR, S.L.
Lazkao, Gipuzkoa, Spain

is an approved manufacturer of
Chain Cables

in accordance with
DNV-OS-E302 Offshore Mooring Chain

and the following particulars:

Product	**Forged chain cable accessories**
Grades	**NV R3,** **NV R3S,** **NV R4**
Delivery condition	**Annealed, quenched and tempered**
Max. thickness	**See page 2**

This Certificate is valid until **2019-12-31**.

Issued at **Høvik** on **2015-09-18**

DNV GL local station: **Bilbao**

Approval Engineer: **Gorka Lozano**

for **DNV GL**
Digitally Signed By: Gran, Terje
Location: DNV GL Høvik, Norway
Signing Date: 20.09.2015, on behalf of

Hanne Anita Hjerpetjønn
Head of Section

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Job Id: **263.11-004880-1**
Certificate No: **AMMM000004R**

Particulars of the approval

Particular of approvals for Offshore mooring chain cable accessories			
Grade [2]	**Delivery conditions** [1]	**Max. diameter or thickness (mm)**	**Material manufacturer** [3]
NV R3 **NV R3S** **NV R4**	AQT	265	GERDAU ACEROS ESPECIALES EUROPA, S.L. Reinosa Plant

Remarks:
[1] AQT: Annealed, Quenched and Tempered.
[2] For approved material specification see table S1
[3] The approval is limited to the listed raw material manufacturer

Table S1 - Specification for chemical composition - Offshore mooring chain cable accessories													
Grade, thickness (mm)			C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	Ti	N
NV R3 **NV R3S** **NV R4**	265 [2]	Min	.29	-	.60	-	-	1.50	1.65	.25	-	.015	.010	-
		Max	.33	.30	.70	.015	.008	1.65	1.70	.28	.40	.030	.020	.012

Remarks:
[1] The content of Sn, Sb, As and B may be required. In such cases, the maximum content shall be 0.030 % for Sn, 0.030 % for Sb, 0.030% for As and 0.0008% for B.
[2] GERDAU ACEROS ESPECIALES EUROPA, S.L. Reinosa Plant

Miscellaneous:
1) Approval of procedures detailed in the approval letter: OENNO716/GLC/P261.1H-J-5355

Annex 4

Electronically published by ABS London.
Reference T1605602, dated 28-FEB-2017.

ABS

FORJAS IRIZAR S.L. (926420),
HIRIBARREN NO 26,
20210 LAZKAO,
GUIPUZCOA,
SPAIN

Reference: NE/NV T1605602
Project Number: 2167707
Certificate no: QA-3184750

ATTN: Mr. Iñigo Ugarte

Offshore Mooring Chain Manufacturer Facility and Process Approval
ABS Approval of FORJAS IRIZAR S.L., Spain to produce Offshore Mooring Accessories

We have the ABS plant survey report BB3123138 dated 06 May 2016 for your facility along with your submittals together with enclosures relative to the subject. With regard thereto we advise that FORJAS IRIZAR S.L., Spain is considered approved to produce Offshore Mooring Accessories with rolled and forged bars manufactured by Gerdau Aceros Especiales Europa, S.L., Spain & Asco Industries, Fos Sur Mer, France to the requirements of *ABS Guide for Offshore Mooring Chain (2009, updated 2014)* and *ABS Materials & Welding Rules Part 2 (2016)* as outlined herein, provided the Rules are adhered to in all respects and all production, testing and inspection are to the satisfaction of the attending ABS Surveyor.

Repair by welding of forged or rolled Offshore Mooring Accessories is not permitted.

The manufacturer and QA approval is valid for five years subject to quarterly audits and will expire on 05 May 2021. Please note it is the responsibility of the facility to inform ABS of any changes to the manufacturing parameters, to request quarterly audits and renewal of approval prior to the five year expiry date. Our invoice to cover the costs of the technical review is subject to a separate correspondence.

An electronic copy of the drawings, appropriately stamped, is available through the ABS Eagle Construct Engineering Manager (O2E) Web portal. If you need to contact ABS regarding this review please email Nina Edmonds at nedmonds@eagle.org and Nikolaos Vrellos at nvrellos@eagle.org.

Very truly yours

Stefano Penco
Vice President of Engineering
ABS Europe Ltd.

Nikolaos Vrellos
Principal Engineer
London Offshore Engineering Department

CC: ABS Bilbao Port
CC: ABS Houston Materials Dept

Electronically published by ABS London.
Reference T1605602, dated 28-FEB-2017.

Offshore Mooring Chain Manufacturer Facility and Process Approval
ABS Approval of FORJAS IRIZAR S.L., Spain to produce Offshore Mooring Accessories

Product	Grade	Maximum Thickness	Heat Treatment Facility	Delivery Condition	Additional Information	Forged or Rolled Bar Diameter	Steel Bar Manufacturer	Marking
Accessory - Hooks	ABS - R4	265 mm	RAZYA, S.A. (436129) SAN MIGUEL DE ACHA, 7, POLIGONO INDUSTRIAL ALI - GOBEO, VITORIA, SPAIN	Quench & Tempered (QT)	Hooks can be connected to R3, R3S, R4, and R4S chain links. Attention is to be paid to the difference in hardness between adjoining grades.	315 mm	Gerdau Aceros, Especiales Europa, S.L., Spain	AB/R4
Accessory - Shackles	ABS - R4	160 mm	RAZYA, S.A. (436129) SAN MIGUEL DE ACHA, 7, POLIGONO INDUSTRIAL ALI - GOBEO, VITORIA, SPAIN	Quench & Tempered (QT)	Shackles can be connected to R3, R3S, R4, and R4S chain links. Attention is to be paid to the difference in hardness between adjoining grades.	220 mm	Asco Industries, Fos Sur Mer, France	AB/R4
Accessory – H-Link	ABS - R4	225 mm	RAZYA, S.A. (436129) SAN MIGUEL DE ACHA, 7, POLIGONO INDUSTRIAL ALI - GOBEO, VITORIA, SPAIN	Quench & Tempered (QT)	H-Links can be connected to R3, R3S, R4, and R4S chain links. Attention is to be paid to the difference in hardness between adjoining grades.	315 mm	Gerdau Aceros, Especiales Europa, S.L., Spain	AB/R4

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VOCABULARY & ABBREVIATIONS

t: metric ton (1000kg)
kg: kilogram
lbs: pounds
No: number
mm: millimeters
inch: inches
WLL: Working Load Limit
SWL: Safety Working Load
COC: Certificate of Conformity
COO: Certificate of Origin
DAC: Design Approval Certificate
CSIC: Classification Society Inspection Certificate
EN: European Standard
EN13001: New European Standard for Cranes
EN13001-3-5:2016: New European Standard for forged Crane Hooks
EN10204: Metallic products - Types of inspection documents (Material Certificate recognized in Europe)
3.1: EN10204-3.1 Original Manufacturer Material Certificate, with tests results (no 3rd Party)
2.1: EN10204-2.1 Original Manufacturer Assembly Certificate
3.2: EN10204-3.2 Third Party Material Certificate, with tests results (witnessed by 3rd Party)
ILO-3: Load Test Certificate recognized by International Labour Office
PTL: Proof Test Load
FAT: Factory Acceptance Test
MBL: Minimum Breaking Load
FEA: Finite Element Analysis
YS: Yield Strength
US: Ultimate Strength
FS: Fatigue Strength
PL: Proof Load by cold forming
DT: Destructive Test
NDT: Non Destructive Test
UT: Ultrasonic Test
MT: Magnetic Test
+QT: Quenched & Tempered (a kind of heat treatment)
+N: Normalizing (a kind of heat treatment)
R4: alloy steel linked to chain materials
SF: Safety Factor (MBL/WLL)
DIN: Deutsches Institut für Normung
DIN15400: old recognized European standard for crane shank hooks
P: very low mechanical properties material (regularly carbon steel)
S: low mechanical properties material (regularly low alloy steel)
T: medium mechanical properties material (regularly medium alloy steel)
V: high mechanical properties material (regularly high alloy steel)
W: very high mechanical properties material (regularly super alloy steel)

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