… wir unterstützen Sie
… we support you

Pipe Hangers 2010

Start

Exit

Pipe Support Systems GmbH International

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Definitions

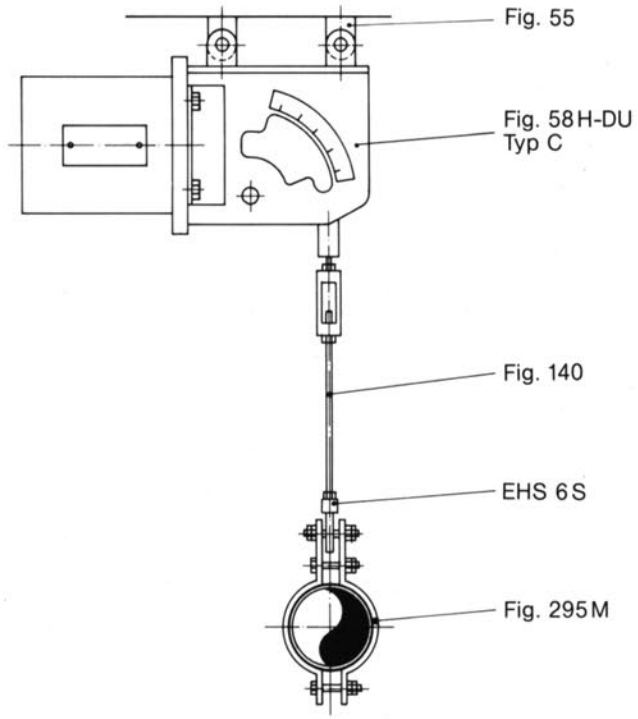
C.H.	=	Constant Hanger	(-)
F_S	=	Calculated operating load	(N, KN)
S_N	=	Total travel	(mm)
S_S	=	Calculated actual travel	(mm)
B	=	C.H. dimension from the middle of the travel position to the main pivot	(mm)
		(see also B & B table on page 10-13)	(mm)
E	=	Rod take out dimensin (please refer to the respective catalogue type sheet)	(mm)
Factor	=	Yveraged C.H. solid measure at the mid travel position	(mm)
B & B	=	Load and travel table for C.H.	(-)
$ØJ_{RH}$	=	Threaded rod diameter, right –hand thread	(mm)
$ØJ_{LH}$	=	Threaded rod diameter, left-hand thread	(mm)
GL	=	Thread length	(mm)
C-C	=	Variable distance between threaded rods at C.H. type G	(mm)

F.H.	=	Spring Hanger	(-)
F_W	=	Hot Load ≈ operating load H.L.	(N, KN)
F_K	=	Cold Load ≈ installation load K.L.	(N, KN)
S_S	=	Calculated travel	(mm)
S_R	=	Travel reserve	(mm)
f_n	=	Total spring travel	(mm)
R	=	Spring rate/-constant	(mm)
C-C	=	Variable distance between threaded rods at F.H. type G	(N/mm)

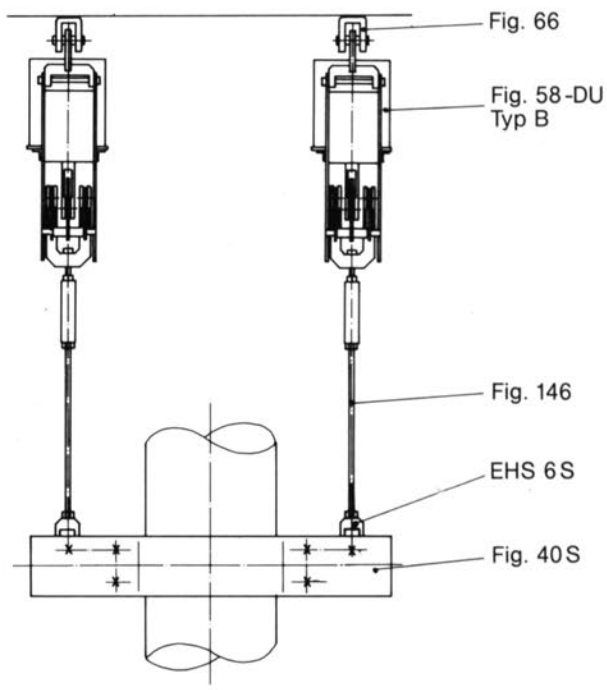
		Sway Struts, Mechanical/Hydraulic Shock and Sway Suppressors, Accessories	(-)
Fig. Nr.	=	Figur number	(-)
Gr.	=	Size	(-)
T_M	=	Medium temperature	(°C)
T	=	Design temperature	(°C)
NW	=	Pipe nominal diameter	(mm)
GW	=	Total weight	(kg)
C-C	=	Distance between threaded rods at U-traverse, Fig. 46 H and pipe clamp, Fig. 40 S	(mm)
F_N	=	Nominal load	(N, KN)
GL	=	Thread length	(mm)
$ØJ_{RH}$	=	Threaded rod diameter, right-hand thread	(mm)
$ØJ_{LH}$	=	Threaded rod diameter, left-hand thread	(mm)
SW	=	Wrench size	(mm)
X	=	Max. thread engagement	(mm)
E	=	Rod take out dimension	(mm)
Q	=	Horizontal load	(N, KN)
W	=	Friction force	(N, KN)

Accessories, installation examples

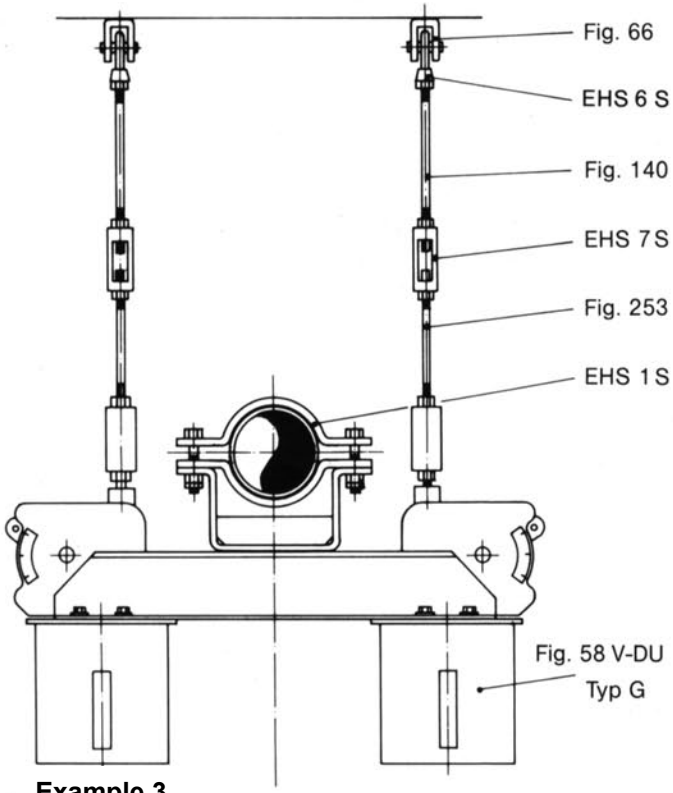
The following standart examples are to inform the customer about the combination possibilities of the individual components.



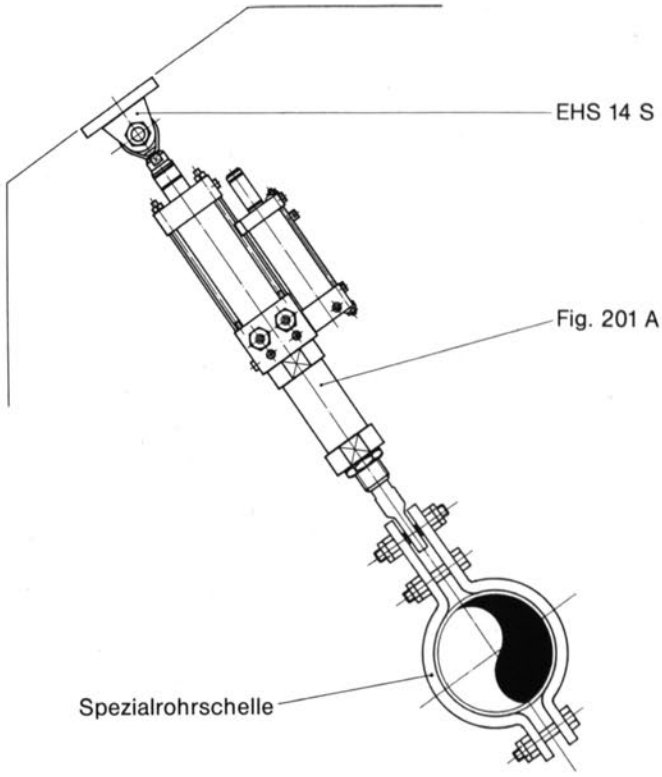
Example 1



Example 2

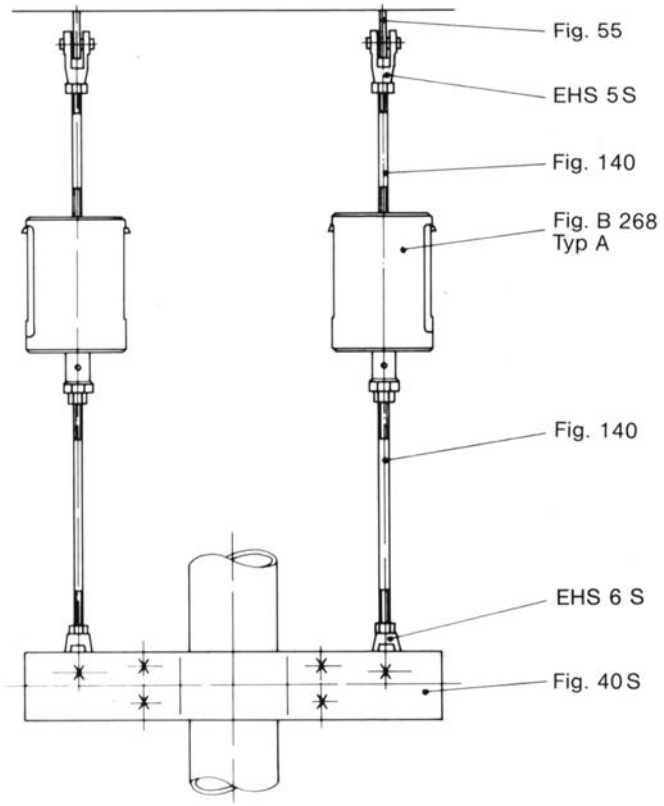


Example 3

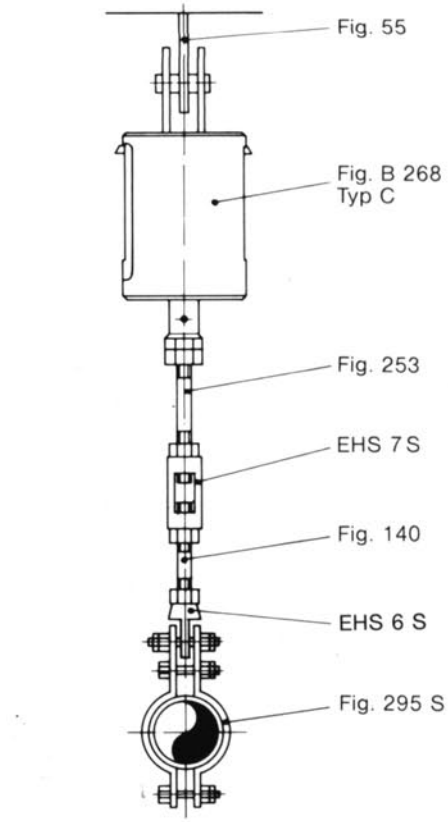


Example 4

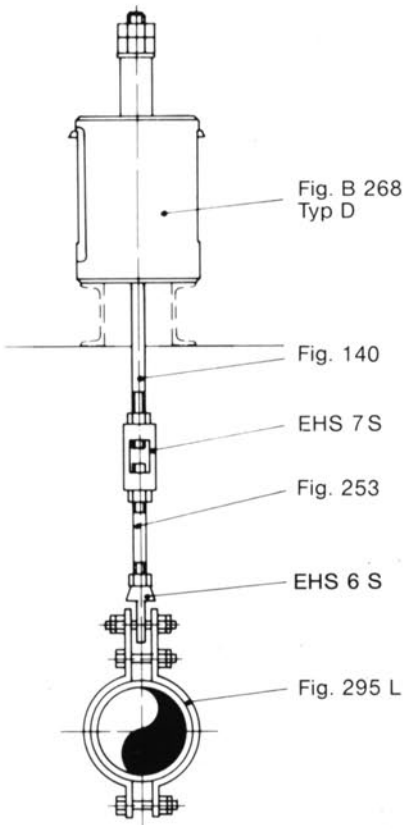
Accessories, installation examples



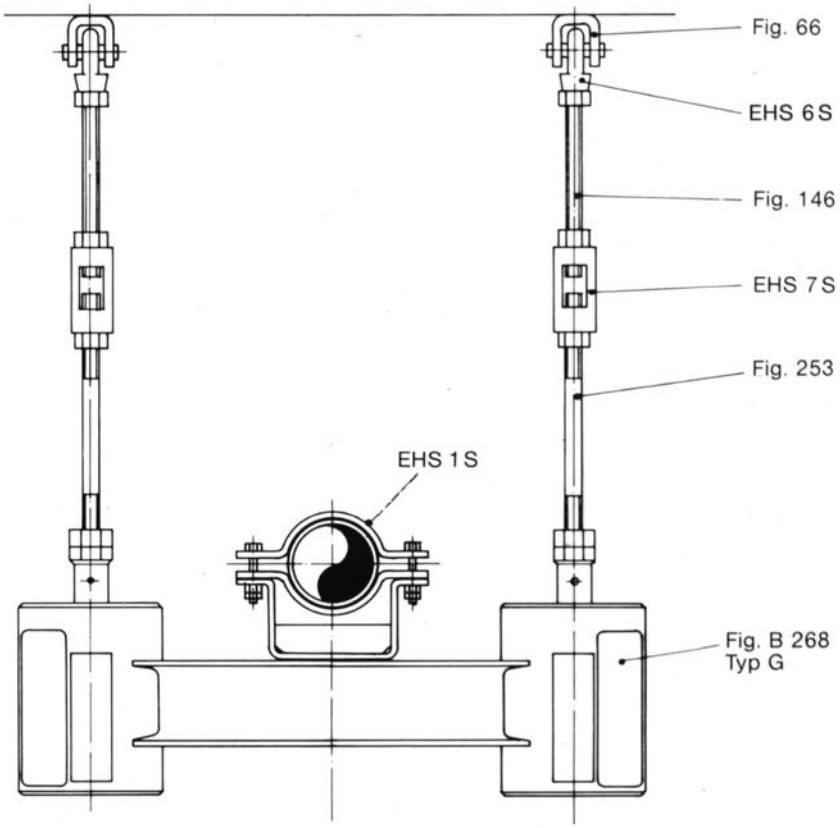
Example 5



Example 6



Example 7



Example 8

Introduction

The actual status of **PSS** Standard Supports is the result of more than 50 years of experience in the power plant industry and the petrochemistry.

Based upon this experience and customer requests and requirements, **PSS** developed ist actual standard and became one of the leading suppliers in hanger market.

If construction details or extraordinary pipe constructions necessiate deviations from this standard, **PSS** with its perfected technology and production possibilities can accommodate the hangers to the individual requirements.

Qualified experts and an independent QC- and QA Departement guarantee the high quality of all products.

PSS is in permanent contact to the Engineers and Hanger Experts responsible for the hanger specifications, so that new experiences can directly be used for the own products.

During the last years, all Standard Supports have been qualified in compliance with the TÜV Specification and project requirements. **PSS** GmbH disposes of a manufacturer qualification for qualification tested supports.

PSS Pipe Support Systems GmbH International
Geßbachstr. 2, D-66538 Neunkirchen

Our post office adress:
Postfach 1142, D-66511 Neunkirchen

Tel. 0049 (0)6821 4011-0
Fax 0049 (0)6821 4011-37

E-Mail: info@pipesupp.de
www.pipesupp.de

Application, Materials, Processing and Surface Treatment

Application

PSS Standard Supports are designed in accordance with **DIN, VGB-Specification, SVDB-Specification, BS3974 Part1, KTA3205.3, ANSI B31.1, MSS SP 58, MSS SP 69, ASME Section III, Subsection NF**.

The Standard Supports are generally designed for temperatures of 80° C.

Proceeding on the nominal load F_N the different load cases can be defined as follows:

Load case KTA 3205.3	ASME Sec.III, Subsec. NF	max. Nominal load F_N
H	≈ A / B Normal / Upset	1 x F_N
HZ	≈ C Emergency	1,5 x F_N
HS	≈ D Faulted	1,7 x F_N

Besides the theoretical calculation all products are subjected to experimental tests.

Materials, processing and surface treatment

In general only DIN and ASME materials with guarenteed stress values are used. All weldings meet DIN 18800. The welders are qualified according to DIN 287.
Constant Hangers and Variable Spring Hangers are hot dip galvanized as standard. Hydraulic Shock and Sway Suppressors are zinc-iron plated as standard. Spring Coils are approx. 100µm polyester coated.
For severe environmental conditions **PSS** offers special surface protections for all kind of application.
The functional efficiency of the **PSS** Constant Hangers, Spring Hangers, Spring Supports and Hydraulic Shock and Sway Suppressors are proven by an electronicallycontrolled test stand. The results are documented by analogous and digitalmeasurements.

Computer Program PSS 2005

The popular computer program for the layout of hangers and supports. **PSS 2005** assists the engineer to design **efficiently, cost selectively and free of mistakes. Cost reductions up to 70% in design expenditures** are possible.

Characteristics:

- **Selection of supports and hangers**
- **Automatic selection of the suitable support** after input of load and movement
- **Automatic selection of the suitable pipe clamps,** if additional input of pipe diameter and temperature is provided
- **Calculation of the rod lengths**
- **Supply of complete drawings including parts list**
- **Interchange and user guidance in English and German**
- **Weight specifications on parts list**
- **Interfacing with other programs possible**
- **Easy to use because of graphical selection menus**
- **Insert of location plan, x, y, z and pipe position also optionaly available**

Edition in german or english language

Required hardware:

- IBM-compatible personal computer or laptop
- VGA-card
- MS-DOS disc operating system

The operation of the program is **easy to handle** and **user friendly**. **PSS 2005** takes the user thru the program thru a **dialog system** and with the help of **graphical menus**. Illogical combinations are not accepted by the program. This makes **PSS 2005** a valuable aid also for **beginners** and **unpractised designers** in the field of support constructions.

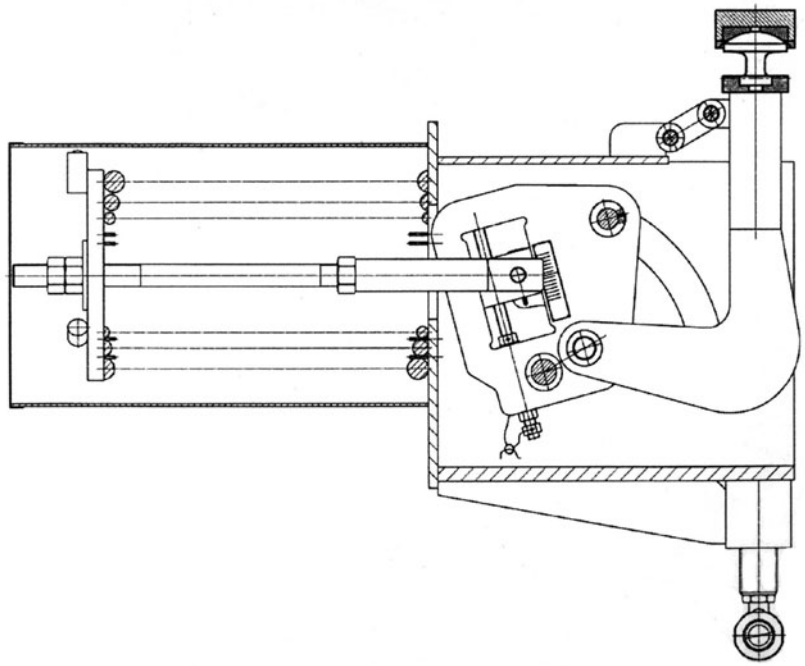
Special Services and Constructions

PSS engineering departement consists of an efficient team of engineers and technicians who are at the disposal of our customers. Concerning pipe lines we offer the following engineering services:

- Preparation of tension analyses for pipe line systems (computer aided)
- Development of pipe support concepts
- Design and calculation of pipe hangers and supports
- Design and supply of special pipe support fabrications and equipment
- Product certification and approvals
- Product after-sales-service extending up to full plant operation

PSS-design engineers have used their long experience successfully in Germany and abroad for:

- Conventional and nuclear power plants
- Chemical and petrochemical industries
- Refineries, offshore plants and district heating plants



Design, calculation and fabrication of special design elements are a point of emphasis in the construction and manufacture of **PSS**. Besides their own standard supports, which are harmonized and qualified by testing **PSS** manufactures also special construction systems for special applications, i.e. extreme temperatures and loads and other unusual conditions. Additionally **PSS** offers the possibility to manufacture according to the standards of their customers.

Verkaufs- und Lieferbedingungen

Wir liefern ausschließlich zu unseren nachstehenden Verkaufs- und Lieferbedingungen. Einkaufsbedingungen des Bestellers gelten nur, wenn wir sie schriftlich anerkannt haben. Nebenabreden und Änderungen sind nur wirksam, wenn sie von uns schriftlich bestätigt werden. Angebote erfolgen stets, soweit sie nicht befristet sind, freibleibend.

1. Umfang der Lieferung

Für den Umfang unserer Lieferungen ist unsere schriftliche Auftragsbestätigung maßgebend.
Maß- und Gewichtsangaben sind nur annähernd. Abweichungen im Rahmen der üblichen Toleranzen sind uns gestattet, ebenso Abweichungen, die handelsüblich oder technisch bedingt sind. An Kostenanschlägen, Zeichnungen und anderen Unterlagen behalten wir uns das Eigentum und die urheberrechtlichen Verwendungsrechte uneingeschränkt vor; sie dürfen Dritten nur mit unserer schriftlichen Zustimmung zugänglich gemacht werden. Die Zeichnungen und anderen Unterlagen sind uns auf Verlangen unverzüglich zurückzugeben, wenn uns der Auftrag nicht erteilt wird. Dies gilt entsprechend für uns zugeleitete Unterlagen des Bestellers.

2. Preise und Zahlungsbedingungen

Unsere Preise gelten – falls nichts anderes vereinbart wurde – ab Werk, ausschließlich Fracht, Verpackung und Mehrwertsteuer, die gesondert berechnet werden.
Zahlungen sind ohne Abzug binnen 30 Tagen nach Rechnungsdatum zu leisten. Wechsel werden nur nach vorheriger Vereinbarung hereingenommen und gelten erst nach Einlösung als Zahlung. Verzugszinsen berechnen wir mit 3% über dem jeweiligen Diskontsatz der Deutschen Bundesbank.
Bei Verzug des Bestellers mit einer zu leistenden Zahlung oder einer Verschlechterung seiner Vermögensverhältnisse, durch die unsere Ansprüche gefährdet werden, sind wir berechtigt, unsere sämtlichen Forderungen gegen ihn durch schriftliche Erklärung sofort fällig zu stellen.
Der Besteller kann nur mit solchen Forderungen aufrechnen, die unbestritten oder rechtskräftig festgestellt sind. Die von uns bestätigten Preise entsprechen der bisherigen Kostenlage. Sie gelten unter der Voraussetzung ungehinderter Auftragsausführung und gleichbleibender Lohn- und Materialkosten. Sollten bis zum Liefertag Kostenänderungen eintreten, behalten wir uns vor, die am Liefertag geltenden Preise zu berechnen. Gehört der Vertag nicht zum Betrieb des Handelsgewerbes des Bestellers, gilt dies nur, falls die Lieferung später als 4 Monate nach Vertragsabschluß erfolgen soll.

3. Eigentumsvorbehalt

Die Lieferung erfolgt unter Eigentumsvorbehalt gemäß § 455 BGB mit den folgenden Erweiterungen (die unter Eigentumsvorbehalt gelieferte Ware wird nachstehend "Vorbehaltsware" genannt)

a) Die Vorbehaltsware verbleibt bis zur Erfüllung sämtlicher uns gegen den Besteller zustehenden Ansprüche aus der Geschäftsverbindung in unserem Eigentum.

b) Wird vom Besteller die Vorbehaltsware mit anderen, uns nicht gehörenden Sachen zu einer neuen Sache verbunden (§ 947 BGB) so überträgt der Besteller für den Fall, dass er das Alleineigentum in Höhe des Anteils, der sich aus dem Verhältnis des Verkaufspreises der Vorbehaltsware zum Werte der anderen Sache z.Z. der Verbindung ergibt. Der Abschluss des betreffenden Kaufvertrages über die Vorbehaltsware zwischen uns und dem Besteller, gilt als Einigung über den Eigentumsübergang. Die Einräumung des Mitbesitzes wird dadurch ersetzt, dass der Besteller die neue Sache für uns in Verwahrung nimmt. Die durch die Verbindung entsehende neue Sache dient zu unserer Sicherheit nur in Höhe des Verkaufspreises der gelieferten Vorbehaltsware. Die neue Sache gilt als Vorbehaltsware im Sinne dieser Bestimmungen.

c) Der Besteller ist zum Weiterverkauf der Vorbehaltsware nur im Rahmen seines ordnungsgemäßen Geschäftsbetriebes und nur unter nachfolgenden Bedingungen berechtigt.

aa) Er hat, wenn er nicht gegen sofortige Barzahlung weiterverkauft, den Eigentumsvorbehalt des Lieferers in der Weise an seinen Kunden weiterzugeben, dass er sich diesem gegenüber selbständig gemäß § 456 BGB das Eigentum bis zur vollen Bezahlung des Kaufpreises vorbehält.

bb) Er tritt uns seine Forderungen gegen seinen Kunden aus dem Weiterverkauf der Vorbehaltsware und zwar gleichgültig, ob die Vorbehaltsware ohne oder nach Verbindung, ob sie an einen oder mehrere Kunden oder allen oder mit anderen, uns nicht gehörenden Waren zusammen weiterverkauft wird, in dem Zeitpunkt ab, in dem er mit seinen Kunden den Kaufvertrag über die Vorbehaltsware abschließt. Es bedarf keiner besonderen Abtretungserklärung für den einzelnen Weiterverkaufsfall. Die abgetretene Forderung dient zur Sicherung unserer Forderungen aus dem Verkauf der Vorbehaltsware.

cc) Er ist berechtigt, die Forderungen aus dem Weiterverkauf trotz der Abtretung einzuziehen. Wir werden diese Forderungen so lange nicht selbst einziehen, als der Besteller uns die Schuldner der abgetretenen Forderungen nebst Forderungsbetrag mitteilt und dem Schuldner die Abtretung anzeigt.

d) Der Eigentumsvorbehalt gemäß den vorstehenden Bestimmungen bleibt auch dann bestehen, wenn die Forderungen gegen den Besteller in eine laufende Rechnung aufgenommen werden und der Saldo gezogen und anerkannt ist.

e) Der Eigentumsvorbehalt ist in der Weise bedingt, dass wenn der Besteller alle Forderungen aus der Geschäftsverbindung mit uns voll bezahlt hat, ohne weiteres das Eigentum an der Vorbehaltsware auf ihn übergeht und ihm die abgetretenen Forderungen zufallen.

f) Wir verpflichten uns , auf Verlangen die uns nach den vorstehenden Bedingungen zustehenden Sicherungen nach unserer Wahl insoweit freizugeben, als ihr realisierbarer Wert die zu sichernden Forderungen um 20% übersteigt.

g) Werden Vorbehaltswaren von dritter Seite gepfändet, so gilt folgendes:

aa) Erfolgt die Pfändung bei dem Bestteller, so hat dieser dem Pfändungsbeamten von dem Eigentumsvorbehalt Kenntnis zu geben und uns sofort durch eingeschriebenen Brief unter Beifügung des Pfändungsprotokolls und einer eidesstattlichen Erklärung des Inhalts, dass die gepfändeten Waren mit den gelieferten Vorbehaltswaren identisch sind, zu benachrichtigen.

bb) Erfolgt die Pfändung bei einem Kunden des Bestellers, so hat der Besteller auf seine Kosten selbständig alle Maßnahmen zu ergreifen, die notwendig sind, um die Freigabe der gepfändeten Vorbehaltsware zu erwirken.

h) Bei Eintritt der Zahlungsunfähigkeit oder Überschuldung ist der Besteller verpflichtet, unverzüglich die gelieferten noch auf seinem Lager vorhandenen Vorbehaltswaren sowie die uns abgetretenen Forderungen auszusondern und uns eine genaue Aufstellung der vorhandenen Vorbehaltswaren und der abgetretenen Forderungen – unter Angabe ihrer Höhe und der Schrift der Schuldner – einzusenden.

i) Wir sind berechtigt, seine auf Lager des Bestellers befindlichen Vorbehaltswaren aus dessen Geschäftsräumen zu entfernen und in eigenen Besitz zu nehmen, wenn der Besteller seinen Verpflichtungen uns gegenüber nicht nachkommt. Zu diesem Zweck gewährt der Besteller uns oder unseren Beauftragten während der Geschäftsstunden Zutritt zu seinen sämtlichen Geschäftsräumen.

4. Lieferfrist/Rechnungslegung

a) Die Lieferfrist beginnt mit der Absendung der Auftragsbestätigung. Die Einhaltung der Frist setzt voraus den rechtzeitigen Eingang sämtlicher vom Besteller zu liefernden Unterlagen, erforderlichen Genehmigung, Freigaben, die rechtzeitige Klarstellung und Genehmigung der Pläne, die Einhaltung der vereinbarten Zahlungsbedingungen und sonstigen Verpflichtungen. Werden diese Voraussetzungen nicht rechtzeitig erfüllt, so wird die Frist angemessen verlängert.

b) Die Frist gilt als eingehalten, wenn die Sendung innerhalb der vereinbarten Lieferfrist zum Versand gebracht oder abgeholt worden ist. Falls die Ablieferung sich aus Gründen, die der Besteller zu vertreten hat, verzögert, so gilt die Frist als eingehalten bei Meldung der Versandbereitschaft innerhalb der vereinbarten Frist.

c) Ist die Nichteinhaltung der Frist nachweislich auf Mobilmachung, Krieg, Aufruhr, Streik, Aussperrung oder den Eintritt unvorhergesehener Hindernisse oder "Höhere Gewalt" die außerhalb unseres Willens liegen, zurückzuführen, so wird die Frist angemessen verlängert. Bei Nichteinhaltung der Frist aus anderen als den in Abs. 1 genannten Gründen kann der Besteller – sofern er glaubhaft macht,

Verkaufs- und Lieferbedingungen

dass ihm aus der Verspätung Schaden erwachsen ist - eine Verzugsentschädigung für jede vollendete Woche der Verspätung v. 1/2 v. H. bis zur Höhe von im ganzen 5 v. H. vom Werte desjenigen Teiles der Lieferungen verlangen, der wegen nicht rechtzeitiger Fertigstellung einzelner dazugehöriger Gegenstände nicht in zweckdienlichen Betrieb genommen werden konnte.

d) Der Besteller kann die Zahlung der Verzugsentschädigung auch dann verlangen, wenn die in Abs. 1 genannten Umstände erst nach verschuldeter Überschreitung der ursprünglich vereinbarten Frist eintreten.
Anderweitige Entschädigungsansprüche des Bestellers sind in allen Fällen verspäteter Lieferung, auch nach Ablauf einer dem Lieferer etwa gesetzten Nachfrist, ausgeschlossen. Dies gilt nicht, soweit in Fällen des Vorsatzes oder der groben Fahrlässigkeit zwingend gehaftet wird.
Das Recht des Bestellers zum Rücktritt nach fruchtlosem Ablauf einer dem Lieferer gesetzten Nachfrist bleibt unberührt.

e) Teillieferungen sind zulässig.

f) Rechnungslegung erfolgt grundsätzlich bei Lieferung. Die Zahlungsfrist gemäß Ziffer 2) beginnt mit dem Tag, auf den die Rechnung ausgestellt ist. Melden wir die Leistung fertig und wird diese vom Besteller aus Gründen, die wir nicht zu vertreten haben, nicht abgenommen, erfolgt die Rechnungslegung mit Datum der Fertigmeldung.

5. Gefahrenübergang

a) Die Gefahr geht auf den Besteller über, auch dann, wenn frachtfreie Lieferung vereinbart worden ist, wenn die Sendung zum Versand gebracht oder abgeholt worden ist. Die Verpackung erfolgt mit bester Sorgfalt. Der Versand erfolgt nach unserem besten Ermessen. Auf Wunsch und Kosten des Bestellers wird die Sendung von uns gegen Bruch-, Transport- und Feuerschäden versichert.

b) Sämtliches Material wird vor dem Versand auf Vollständigkeit und Richtigkeit überprüft. Alle Ansprüche auf beschädigtes oder verlorengegangenes Material sind dem jeweiligen Spediteur zu melden, da unsere Verantwortung mit der Übergabe der Ware an den Spediteur endet.

c) Wenn der Versand auf Wunsch des Bestellers oder aus von ihm zu vertretenden Gründen verzögert wird, so geht die Gefahr für die Zeit der Verzögerung auf den Besteller über; jedoch sind wir verpflichtet, auf Wunsch und Kosten des Bestellers die von ihm verlangte Versicherung zu bewirken.

d) Rücksendungen werden von uns nur dann, wenn wir diesen vorher schriftlich zugestimmt haben, und nur zu den dann vereinbarten Bedingungen angenommen.

e) Sonderanfertigungen können von uns nicht mehr zurückgenommen werden. Für den Fall, dass Aufträge für Sonderanfertigungen, die sich noch in der Herstellung befinden, annulliert werden, müssen wir den Besteller mit den bis zur Annullierung angefallenen Material- und Lohnkosten belasten.

6. Haftung für Mängel

Für Mängel, zu denen auch das Fehlen zugesicherter Eigenschaften zählt, haftet der Lieferer wie folgt:

a) Alle diejenigen Teile sind nach unserer Wahl unentgeltlich nachzubessern oder neu zu liefern, die innerhalb von 6 Monaten vom Tage des Gefahrenüberganges an gerechnet, infolge eines vor dem Gefahrenübergang liegenden Umstandes, insbesondere wegen fehlerhafter Bauart, schlechten Materials oder mangelhafter Ausführung unbrauchbar werden oder deren Brauchbarkeit erheblich beeinträchtigt wurde. Die Feststellung solcher Mängel muss uns unverzüglich schriftlich gemeldet werden.

b) Der Besteller hat die ihm obliegenden Vertragsverpflichtungen, insbesondere die vereinbarten Zahlungsbedingungen einzuhalten. Wenn eine Mängelrüge geltend gemacht wird, dürfen Zahlungen des Bestellers in einem Umfang zurückgehalten werden, die in einem angemessenen Verhältnis zu den aufgetretenen Mängeln stehen. Gehört jedoch der Vertrag zum Betrieb seines Handelsgewerbes, so kann der Besteller Zahlungen nur zurückhalten, wenn eine Mängelrüge geltend gemacht wird, über deren Berechtigung kein Zweifel bestehen kann.

c) Zur Mängelbeseitigung hat der Besteller uns die nach billigem Ermessen erforderliche Zeit und Gelegenheit zu gewähren. Verweigert er diese, so sind wir von der Mängelhaftung befreit.

d) Wenn wir eine uns gestellte angemessene Nachfrist verstreichen lassen, ohne den Mangel zu beheben, kann der Besteller Herabsetzung der Vergütung (Minderung) oder Rückgängigmachung des Vertrages (Wandlung) verlangen.

e) Das Recht des Bestellers, Ansprüche aus Mängeln geltend zu machen, verjährt in allen Fällen in der gesetzlichen Verjährungsfrist. Wird innerhalb dieser Frist keine Einigung erzielt, so können wir und Besteller eine Verlängerung dieser Verjährungsfrist vereinbaren.

f) Die Mängelhaftung bezieht sich nicht auf natürliche Abnutzung, ferner nicht auf Schäden, die nach dem Gefahrenübergang infolge fehlerhafter oder nachlässiger Behandlung übermäßiger Beanspruchung, ungeeigneter Betriebsmittel, mangelhafter Bauarbeiten, ungeeigneten Baugrundes und solcher mechanischer oder anderer Einflüsse entstehen, die nach dem Vertrag nicht vorausgesetzt sind

g) Durch etwa seitens des Bestellers oder Dritter unsachgemäß vorgenommene Änderungen und Instandsetzungsarbeiten wird die Haftung für die daraus entstehenden Folgen aufgehoben.

h) Gehört der Vertrag zum Betrieb des Handelsgewerbes des Bestellers, so beträgt die Gewährleistungsfrist für Nachbesserungen, Ersatzlieferungen und Ersatzleistungen 3 Monate. Sie läuft mindestens bis zum Ablauf der ursprünglichen Gewährleistungsfrist für den Liefergegenstand. Die Frist für die Mängelhaftung verlängert sich um die Dauer der Betriebsunterbrechung, die dadurch eintritt, dass Nachbesserungen und Lieferungen erforderlich werden, für diejenigen Teile, die wegen der Unterbrechung nicht zweckdienlich betrieben werden können.

i) Weitere Ansprüche des Bestellers gegen uns und unsere Erfüllungsgehilfen sind ausgeschlossen, insbesondere ein Anspruch auf Ersatz von Schäden, die nicht an dem Liefergegenstand selbst entstanden sind. Dies gilt nicht, soweit in Fällen des Vorsatzes, der groben Fahrlässigkeit oder des Fehlens zugesicherter Eigenschaften zwingend gehaftet wird.

j) Abs. a) – i) gelten entsprechend für solche Ansprüche des Bestellers auf Nachbesserung, Ersatzlieferung oder Schadensersatz, die durch vor oder nach Vertragsabschluß liegende Vorschläge oder Beratungen oder durch Verletzung vertraglicher Nebenpflichten entstanden sind.

k) Die Feststellung solcher Mängel muss uns bei offensichtlichen Mängeln, insbesondere Stückzahlabweichungen, innerhalb von 14 Tagen ab Empfang der Waren, sonst unverzüglich schriftlich gemeldet werden.

7. Unmöglichkeit und Vertragsanpassung

a) Wird uns oder dem Besteller die Lieferung oder Leistung unmöglich, so gelten die allgemeinen Rechtsgrundsätze mit der folgenden Maßgabe:
Ist die Unmöglichkeit auf unser Verschulden zurückzuführen, so ist der Besteller berechtigt, Schadenersatz zu verlangen. Jedoch beschränkt sich der Schadenersatzanspruch des Bestellers, soweit dies gesetzlich zulässig ist, auf 10 v .H. des Wertes desjenigen Teils der Lieferung welcher wegen der Unmöglichkeit nicht in zweckdienlichen Betrieb genommen werden kann. Das Recht des Bestellers zum Rücktritt vom Vertrag bleibt unberührt.

b) Sofern unvorhergesehene Ereignisse im Sinne von Ziff. 4 Abs. c), die wirtschaftliche Bedeutung oder den Inhalt der Lieferung oder Leistung erheblich verändern oder auf unseren Betrieb erheblich einwirken, wird der Vertrag angemessen angepasst. Soweit dies wirtschaftlich nicht vertretbar ist, steht uns das Recht zu, vom Vertrag zurückzutreten. Haben wir von diesem Rücktrittsrecht Gebrauch gemacht, wollen wir dies nach Erkenntnis der Tragweite des Ereignisses unverzüglich dem Besteller mitteilen, und zwar auch dann, wenn zunächst mit dem Besteller ein Verlängerung der Lieferzeit vereinbart war.

8. Sonstige Schadensersatzansprüche

Anderweitig Schadensersatzansprüche gegen uns und unsere Erfüllungs- und Verrichtungsgehilfen, gleich aus welchem Rechtsgrund, sind ausgeschlossen, soweit dies gesetzlich zulässig ist.

9. Aufträge die der Inspektion unterliegen

Sollten Aufträge zum vom Besteller genannten Inspektionstermin bzw. zu dem von uns bestätigten Bereitstellungstermin nicht abgenommen werden, geht die wirtschaftliche Vergütungsgewalt an den

Verkaufs- und Lieferbedingungen

Besteller über. In diesem Falle sind wir berechtigt, die Ware in Rechnung zu stellen.

10. Geschäftsbedingungen und anwendbares Recht

Sollte eine Bestimmung der Verkaufs- und Lieferbedingungen oder der sonst mit dem Besteller getroffenen Vereinbarungen unwirksam sein oder werden, so berührt dies die Wirksamkeit der übrigen Bestimmungen nicht. Dies gilt nicht, wenn das Festhalten an dem Vertrag eine unzumutbare Härte für eine Partei darstellen würde. Im übrigen gelten ausschließlich die Vorschriften des deutschen Rechts. Die einheitlichen Gesetze über den internationalen Kauf beweglicher Sachen sowie über den Abschluss von internationalen Kaufverträgen über bewegliche Sachen finden keine Anwendung.

11. Technische Änderungen

Im Interesse der ständigen technischen Weiterentwicklung behalten wir uns jederzeit das Recht vor, ohne besondere Nachricht Änderungen (z.B. von Maßen, Gewichten, Designs usw.) vorzunehmen, durchzuführen, bzw. Annullierungen durchzuführen, wodurch Abweichungen gegenüber dem Text bzw. Bildteil des vorliegenden Kataloges möglich sind.

12. Erfüllungsort und Gerichtsstand

Erfüllungsort ist Neunkirchen.
Gerichtstand ist Neunkirchen, wenn de Besteller Vollkaufmann, eine juristische Person des öffentliche Rechts oder ein juristisches Sondervermögen ist, oder seinen Sitz im Ausland hat.

Constant Hangers

Application

Constant Hangers are used where vertical movements should not be restricted by Rigid Hangers and where Spring Hangers can not be used due to the high deviation between installation load and operating load.
Constant Hangers are also used where no great supporting load deviations are allowed in order to avoid additional loadings of the component connections or critical pipe components.

Features

- Constant load throughout the full load and travel range
- Load adjustment by load adjustment screw
- At least ± 15% load adjustability without change of the total travel S_N
- Individual calibration to the requested load by electronic load-travel recorder
- Recording of the test data
- Hot-cold load marking
- Position indicator

Function

By means of the lever arms, lever arm geometries and the spring combinations a constant load at the point of suspension is ensured thoughout the full travel range..
The spring moment (spring force x spring lever arm) and the load moment (supporting load x load arm) are turning around the main pivot.
At upward and downward movement the system variables spring force, spring lever arm and load lever arm ensure the balance of moments between spring moment and load moment in any position. This generates a constant supporting load.

Constant Hanger selection

Constant Hangers are selected with the calculated supporting load F_S and the total travel S_N.
Besides the theoretically ascertained suspension point travel S_S, **PSS** recomments to provide an additional travel reserve S_R of 20% S_S (at least 15mm).
On demand Constant Hangers can also be supplied for extremely long total travels.

Given:
Operating load of the constant Hanger
F_S = 10000 N
Theoretical pipe expansion
Δ L = 130 mm
(Actual travel Δ L ≈ S_S)

Example:
Reserve = 20% S_s or at least 15 mm
$S_N = S_s$ + reserve
S_N = 130 mm + 26 mm
S_N = 156 mm, selected S_N = 165 mm

Result:
S_N = 165 mm
F_S = 10000 N
From the load- and travel tables it follows:
Group: IV, size 37, B = 182 mm

Constant Hangers

Figure

After determination of the hanger size, ascertainment of the figure in consideration of the installation conditions.
PSS offers the horizontal design Figure 58H and the vertical design 58V.

Qualification

Besides the indicated design specifications like ASME III Subsection NF and KTA 3205.3 the Constant hangers were subjected to an experimental test program.

The following tests were performed:

A) Quasi-static tests

- Load test at 2,5 fold nominal load
- Vertical tension
- Diagonal tension at an angle of 4°
- Examination of the load adjustment data

B) Dynamic tests

- 2×10^4 load cycles at ± 5 mm and 5 Hz
- $1{,}8 \times 10^6$ load cycles at ± 0,5 mm and 15 Hz
- 2×10^4 load cycles at ± 5 mm and 5 Hz
- 1×10^4 load cycles at ± 0,4 S_N and 1 Hz

C) Nondestructive examinations

- Visual examination
- Liquid penetrant examination

D) Temperature test

- Temperature test 48 hours at 80° C

E) Failure test

- Failure test up to the failure
  or at least 5-fold nominal load

The devitation from the indications of the manufacturer before and after the tests was lower than ± 5% at vertical tension and lower than ± 6% at diagonal tension. The Constant Hangers met all test requirements without any damage.

Constant Hanger

Type selection

After determination of the figure, selection of the hanger type. Depending on the installation position, i.e. whether the hanger is installed above or below the structure, the types A-E are selected. Type G can be used for vertical installation only.

Travel stop

The functional design of the Constant Hangers permits the incorporation of a travel stop that will lock the hanger against upward and downward movement for temporary conditions of underload or overload, such as may exist during erection, hydrostatic test or chemical clean-out.
The travel stop consists of 2 plates with matched serrations attached to the hanger frame with two or more cap srews and with a socketed piece which engages the position indicator.
The travel stop is installed at the factory to hold the hanger in the „Installation“ position. A series of serrations can be engaged to lock the hanger at any position along the travel range.
The travel stop, which is furnished when specified, is painted red.
The stop must be removed before the piping system is put into operation, but not before the hanger is installed and fully loaded. The travel stop is released by removing the cap screw.

Adjustments

Load adjustment

When the hanger is installed its supporting force should be in balance with the portion of the piping weight assigned to it. Each hanger is individually calibrated before shipment to support the exact load specified. Special instructions for this field recalibration of individual hangers may be obtained from **PSS** representatives.

No less than 15% of this adjustibility is provided either side of the calibrated load for plus or minus field load adjustment. The percentage increase or decrease from the factory calibrated load should be carefully calculated. The calibrated load setting of each hanger is indicated by a narrow, die-stamped in the load adjustment scale. All load adjustments should be made from this reference point with each division on the patented scale equal to 2%. The load adjustment is made by turning the load adjustment bolt. For example: calibrated load 1359 daN, revised load 1250 daN – load is decreased 109 daN or 109/1359 = 8%.

Turn the load adjustment bolt until arrow moves in decrease direction 4 divisions. Field adjustment are generally to be controlled by **PSS** experts.

Constant Hangers

Position adjustment

The Constant Hanger is provided with a travel scale indicating the installation position (white marking) and the operating position (red marking). One division of the marking is equal to 1/10 of the total travel of the Constant Hanger.

In special cases a directly readable scale can be delivered on demand.
The Constant Hanger position is indicated by the indicator bolt.
The Constant Hanger position is adjusted by the turnbuckle until the requested position according to the operating conditions has been reached.

Installation instructions

A) Securely attach the hanger to the building structure at the point where the load coupling is directly over the desired point of attachement.
B) Make certain that the moving parts of the hanger will be unobstructed.
C) Make certain that the rod has enough thread engagement before taking up the load.
D) Turn the load coupling unit the travel stop is free.
E) Prior to the final start-up please remove the travel stop.
F) After the line is in operation, check the hanger for indicated hot position. If necessary, make adjustment by turning the load coupling to bring the indicator to the hot position. No other adjustment is normally required since the load as calibrated at the factory is equal to the load specified to be supported.

Nameplate

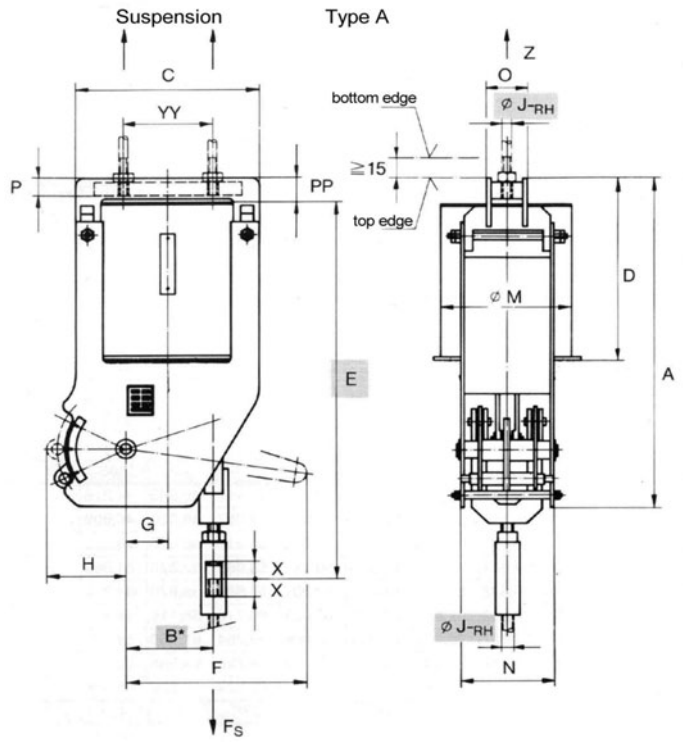
The following informations are given:

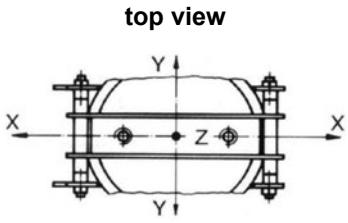
Fig. No.	= Figure number
Type	= Constant Hanger Type
Size	= Size
Ser. No.	= Serial number
Load	= Operating load F_S
TT	= Total travel S_N
AT	= Actual travel S_S
Movement	= Travel direction - downward + upward
Marking	= Position number

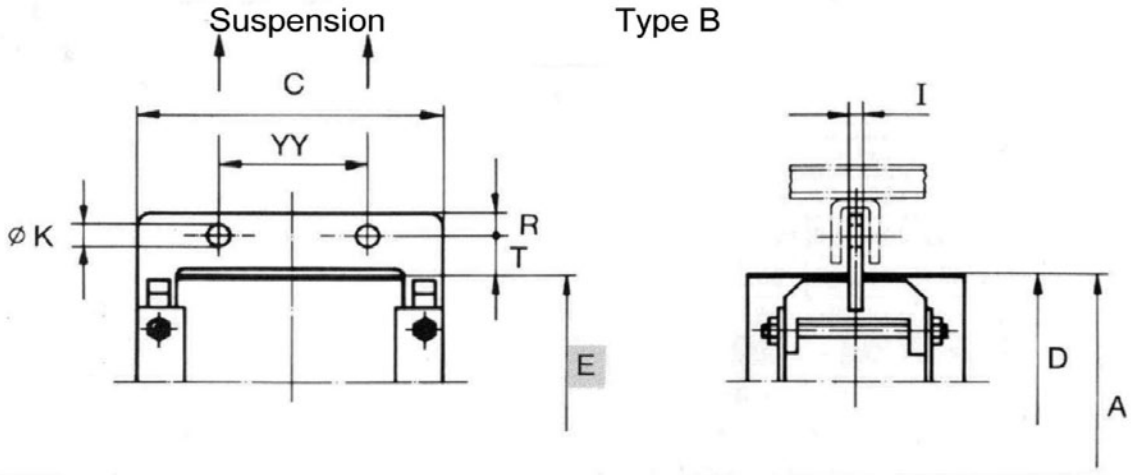
Details for ordering

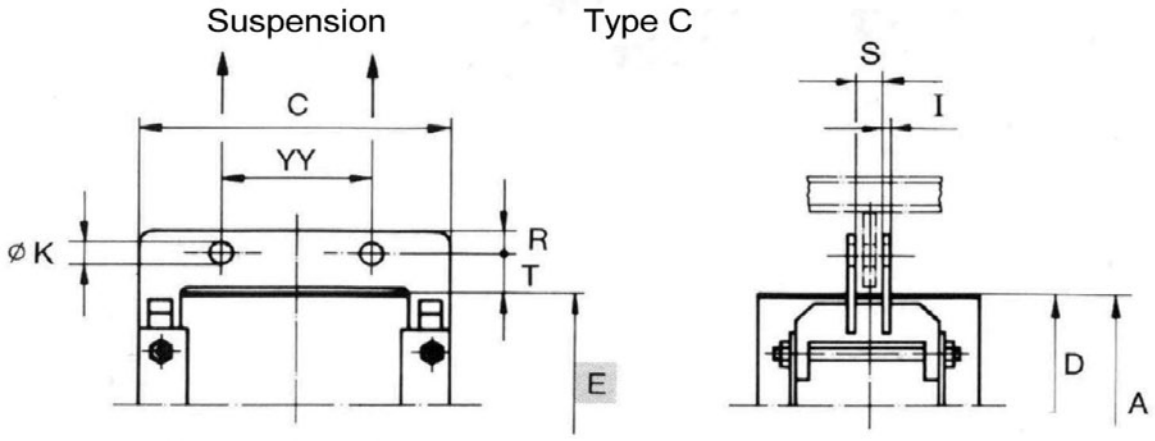
A) Operating load F_S
B) Total travel S_N
C) Actual travel S_S
D) Thread connection ØJ
E) Travel direction up or down
F) Marking
G) C – C dimension for type G

Constant Hanger Fig. 58V - DU, Type A,B,C









Table

Constant Hanger Fig. 58V - DU, Type A,B,C

Fig. 58V-Du, Type A,B,C - common dimensions

Group	Size	Total travel S_N [mm]	10. Digit	C	F	G	H	ØM	N	YY	X	Factor (Mean-value)	ØJ [inch/mm] min.	ØJ [inch/mm] max.	min. GL*
				mm											
I	1 - 9	not applicable													
II	10 - 18	≤ 127	K	320	210	60	127	220	137	190	50	634	1/2"	3/4"	200
		≤ 140	L		326							653	M 12	M 20	
III	19 - 34	≤ 127	K	420	182	78	156	299	192	215	50	799	1/2"	1 1/2"	225
		≤ 140	L		339							817	M 12	M 36	
IV	35 - 49	≤ 152	K	494	227	115	210	356	248	240	50	1130	1/2"	1 3/4"	225
		≤ 165	L		490							1157	M 12	M 42	
V	50 - 63	≤ 203	K	638	339	165	304	482	270	340	50	1464	3/4"	2 1/4"	250
		≤ 216	L		633							1498	M 20	M 56	
VI	64 - 74	≤ 267	K	840	327	208	445	559	308	490	50	1822	1 1/8"	3"	250
		≤ 279	L		466								M 30	M 80x6	
VII	75 - 83	≤ 267	K	995	575	257	445	666	380	465	100	2183	1 1/2"	3"	375
		≤ 279	L									2202	M 36	M 80x6	

* GL = threadlength

Fig. 58V-Du, Type A

Group	Size	Total travel S_N [mm]	10. Digit	A	D	O	P	PP
				mm				
I	1-9	not applicable						
II	10-18	≤ 127	K	516	303	67	30	45
		≤ 140	L					
III	19-34	≤ 127	K	640	380	96	45	65
		≤ 140	L					
IV	35-49	≤ 152	K	952	532	109	60	80
		≤ 165	L					
V	50-63	≤ 203	K	1241	701	182	85	105
		≤ 216	L					
VI	64-74	≤ 267	K	1695	1090	192	135	165
		≤ 279	L					
VII	75-83	≤ 267	K	1903	1233	242	135	163
		≤ 279	L					

Fig. 58V-Du, Type B,C

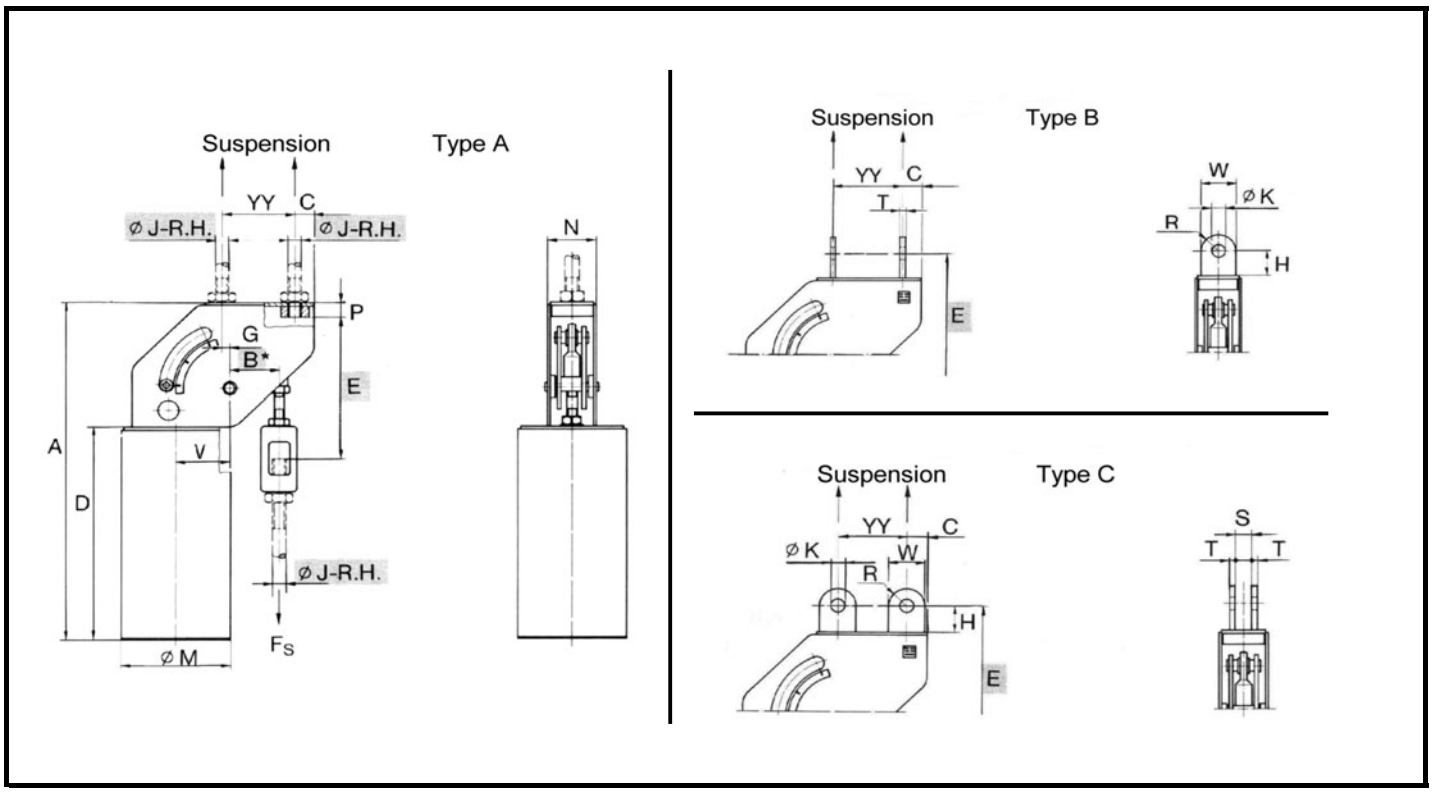
Group	Size	Total travel S_N [mm]	10. Digit	A	D
				mm	
I	1-9	not applicable			
II	10-18	≤ 127	K	473	260
		≤ 140	L		
III	19-34	≤ 127	K	577	317
		≤ 140	L		
IV	35-49	≤ 152	K	874	454
		≤ 165	L		
V	50-63	≤ 203	K	1138	598
		≤ 216	L		
VI	64-74	≤ 267	K	1532	927
		≤ 279	L		
VII	75-83	≤ 267	K	1740	1070
		≤ 279	L		

Fig. 58V-DU, Type A,B,C Threaded rod and lug selection

Nominal load F_N		N	0 - 6900	6901 - 13000	13001 - 18000	18001 - 26000	26001 - 40000	40001 - 60000	60001 - 90000	90001 - 120000	120001 - 160000	160001 - 200000		200001 - 225000
ØJ- RH		inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
		mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6
ØK			18	22	28	33	38	48	54	58	70	78	86	96
R			45	45	45	48	48	51	64	77	77	102	102	102
S			22	27	32	41	46	60	67	73	80	86	92	98
T	Type B and C	10-18	38	38	38	-	-	-	-	-	-	-	-	-
		19-34	43	43	43	44	69	79	-	-	-	-	-	-
		35-49	63	63	63	64	80	87	84	-	-	-	-	-
		50-63	-	-	80	87	87	89	91	102	115	-	-	-
		64-74	-	-	-	-	88	88	93	118	133	133	133	143
		75-83	-	-	-	-	-	125	135	135	150	150	170	180
I	TypeB	10-74	8	12	16	20	20	25	25	25	25	25	25	30
		75-83	-	-	-	-	-	25	25	25	30	30	35	45
	TypeC	10-74	6	8	10	10	16	20	20	20	20	25	25	25
		75-83	-	-	-	-	-	16	16	16	20	20	25	25

mm

Constant Hanger Fig. 58V - DU, Type A,B,C



Group	Size	Total travel SN [mm]	10. Digit	Type A - C A	D	ØM	N	V	A	Type A,B C	P	C	Type A,B C	G	Type C	H	Type B,C A,B	YY	Type B,C C	Type A Factor (Mean value)	Type B,C Factor (Mean value)	Type A bis C ØJ min. inch / mm	Type A bis C ØJ max. inch / mm	Type A bis C min. GL* mm
				mm																				
VIII u. IX	84-94	≤ 241	K	2017	1267	700	266	356	82	105	124	89	82	152	407	381				1030	1264	2"	3 3/4"	425
		≤ 254	L																	990	1224	M48	M95X6	
X bis XIII	95-110	≤ 356	K	2540	1626	610	292	343	89	102	114	190,5	178	152	610	584				1198	1439	2 1/2"	3 3/4"	630
		≤ 140	L																	1386	1627	M64	M95X6	

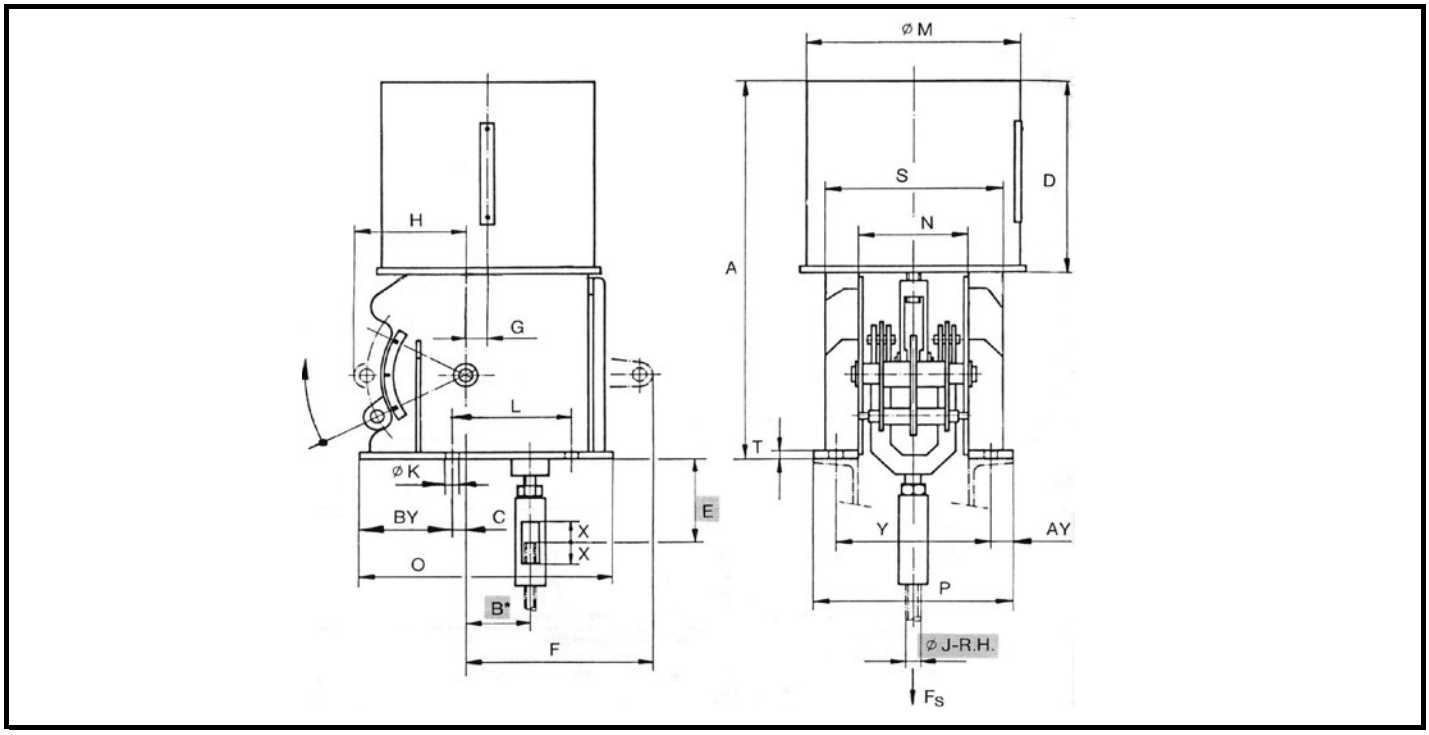
*GL = threadlength

Fig. 58V - DU, Type A,B,C

Threaded rod and lug selection

Nominal load F_N	N	90001 - 120000	120001 - 160000	160001 - 200000		200001 - 225000	225101 - 317100	317101 - 368700
$ØJ_{RH}$	inch / mm	2" M 48	2 1/4" M 56	2 1/2" M 64	2 3/4" M 72x6	3" M 80 x 6	3 1/2" M 90 x 6	3 3/4" M 95 x 6
ØK	↑ mm ↓	58	70	78	86	96	101	106
R		77	77	102	102	102	114	114
S		73	80	86	92	98	112	118
T		25	25	25	25	25	30	45
W		154	154	204	204	204	228	228

Constant Hanger, Fig. 58V - DU, Type E



	Group	Size	Total travel S_N [mm]	10. Digit	A	C	D	F	G	H	ØK	L	ØM	N	O	P	S	T	X	Y	AY	BY	Factor (Mean value)	ØJ [inch/mm] min.	ØJ [inch/mm] max.	ØJ [inch/mm] min. GL*
					mm																					
Fig. 58V - DU, Type E	I	1-9	not applicable																							
	II	10-18	≤ 127 ≥ 140	K L	483	13	260	210 326	60	127	11	110	220	137	255	249	217	10	50	213	18	90	151 170	1/2" M 12	3/4" M 20	200
	III	19-34	≤ 127 ≥ 140	K L	589	25	317	182 339	78	156	11	170	299	192	330	300	292	12	50	262	19	107	210 228	1/2" M 12	1 1/2" M 36	225
	IV	35-49	≤ 152 ≥ 165	K L	894	5	454	227 490	115	210	13	210	356	248	496	370	348	20	50	318	26	178	236 263	1/2" M 12	1 3/4" M 42	225
	V	50-63	≤ 203 ≥ 216	K L	1163	95,5	598	339 633	165	304	23	325	482	270	640	460	410	25	50	370	45	165	301 335	3/4" M 20	2 1/4" M 56	250
	VI	64-74	≤ 267 ≥ 279	K L	1647	104,5	927	327 466	208	445	25	400	559	308	800	500	448	30	50	376	62	205	175	1 1/8" M 30	3" M80x6	250
	VII	75-83	≤ 267 ≥ 279	K L	1770	204,5	1070	575	257	445	25	650	666	380	885	600	560	30	100	490	55	117,5	413 432	1 1/2" M 36	3" M80x6	375

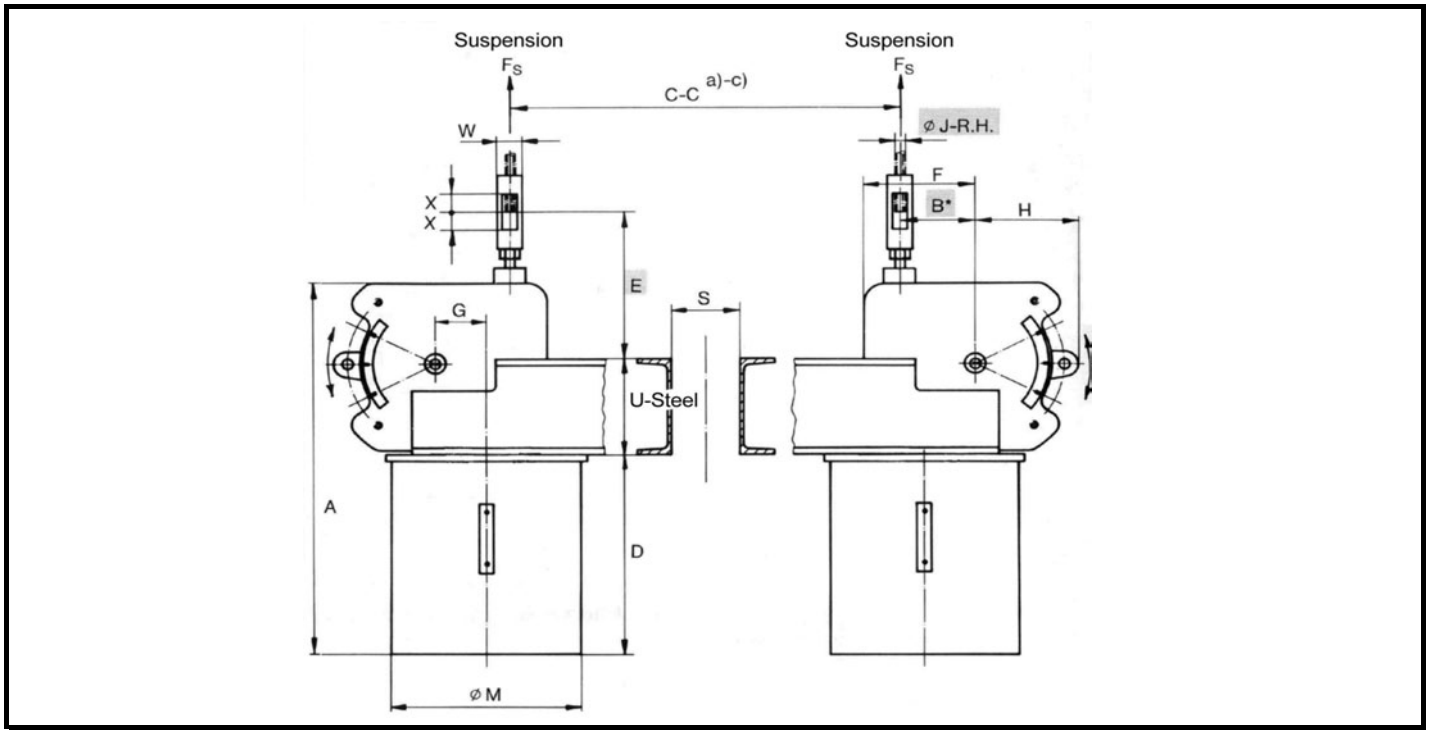
*GL = treadlength

B* see C.H. load travel table

Theaded rod selection

Nominal-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000
Ø J- R_H	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6

Constant Hanger, Fig. 58V - DU, Type G



	Group	Size	Total travel S_N [mm]	10. Digit	A	D	F	G	ØM	H	S	W	X	C - C max.	U-Steel	U-Steel Weight	Σ Weight	Factor (Mean value)	ØJ [inch/mm]		
					◄ mm ►											2xkg/m	kg		min.	max.	min. GL*
Fig. 58V - DU, Type G	I	1-9	not applicable																		
	II	10-18	≤ 127 ≥ 140	K L	473	260	130	60	220	127	137	63	50	1600	120	26,8	107	254 273	1/2" M 12	3/4" M 20	200
	III	19-34	≤ 127 ≥ 140	K L	577	317	168	78	299	156	192	87	50	1500	160	37,6	209	325 343	1/2" M 12	1 1/2" M 36	225
	IV	35-49	≤ 152 ≥ 165	K L	874	454	245	115	356	210	248	129	50	1800	240	66,4	470	436 463	1/2" M 12	1 3/4" M 42	225
	V	50-63	≤ 203 ≥ 216	K L	1138	598	340	165	482	304	270	129	50	1600	300	92,4	1005	566 600	3/4" M 20	2 1/4" M 56	250
	VI	64-74	≤ 267 ≥ 279	K L	1532	927	438	208	559	445	308	177	50	1800	320	119,0	1828	575	1 1/8" M 30	3" M80x6	250
	VII	75-83	≤ 267 ≥ 279	K L	1740	1070	507	257	666	445	380	185	100	1600	380	126,2	1942	733 752	1 1/2" M 36	3" M80x6	375

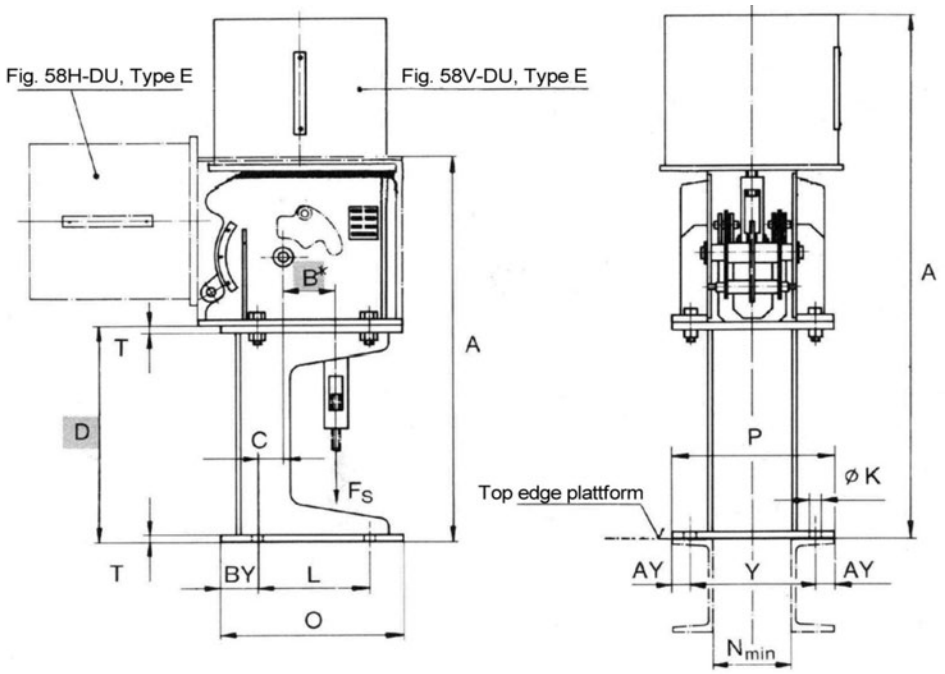
*GL = threadlength

B* see C.H. load travel table

Threaded rod selection

Nominal-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000
Ø J- R_H	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6

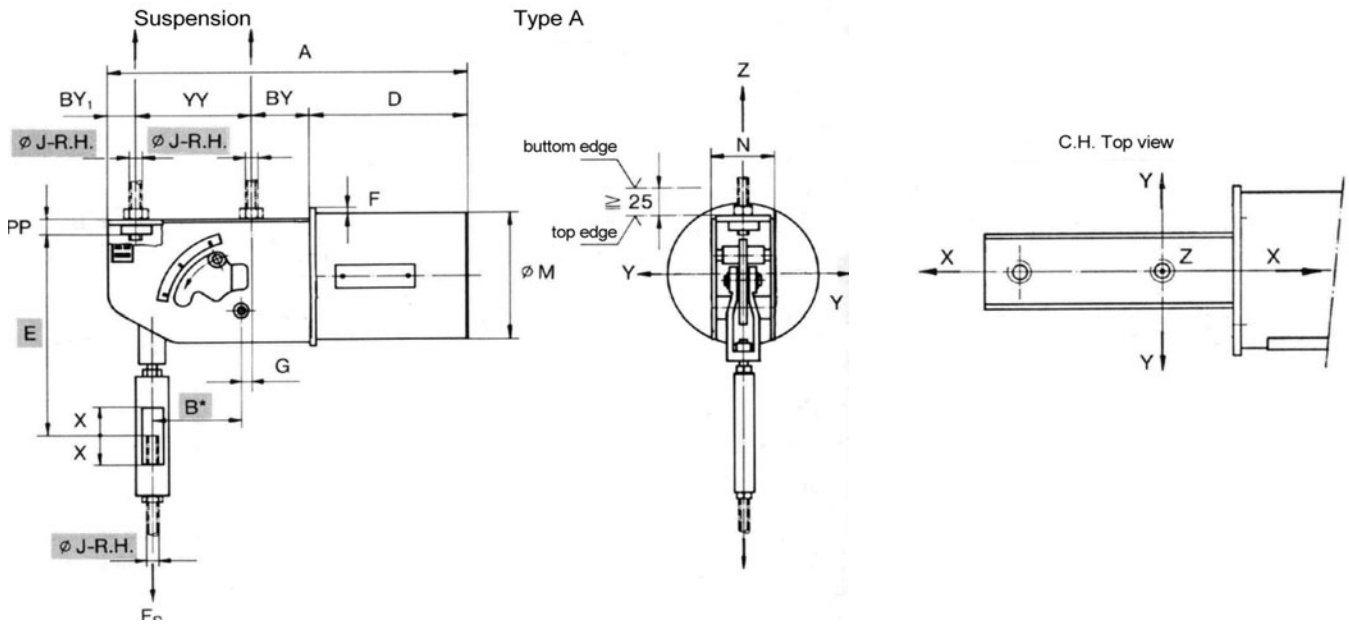
Constant Hanger - saddles, Fig. 58V/H - DU, Type E

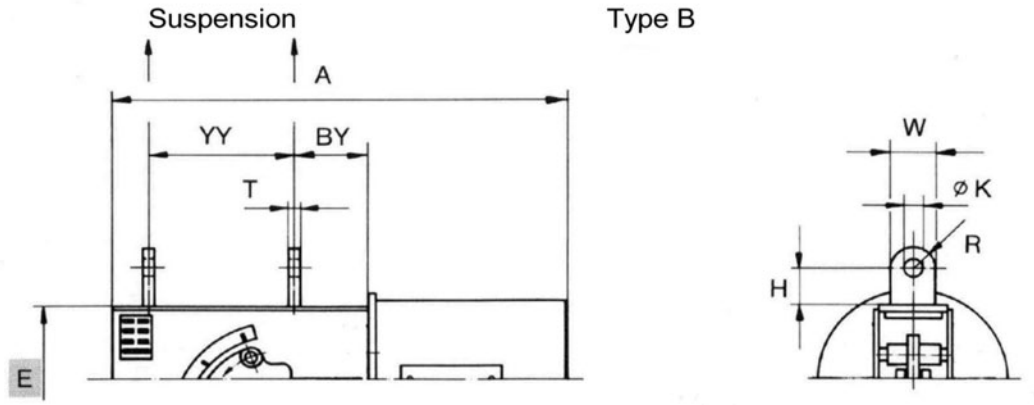


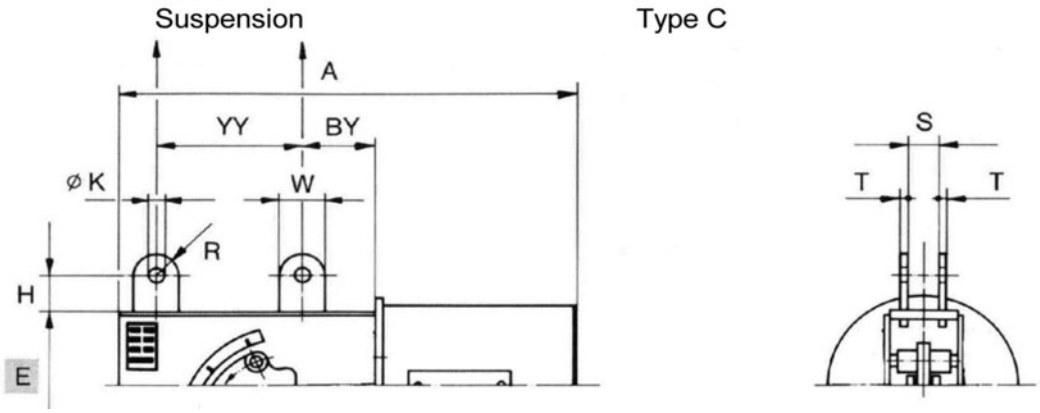
	Group	Size	Total travel S_N [mm]	Fig. 58H - DU												Fig. 58V - DU											
				A	C	D	ØK	L	N_{min}	O	P	T	Y	AY	BY	A	C	D	ØK	L	N_{min}	O	P	T	Y	AY	BY
				mm												mm											
Fig. 58V/H - DU, Type E	I	1-9	≤ 102 ≥ 114	674	36	450	11	170	120	250	200	8	164	18	40	not applicable											
	II	10-18	≤ 127 ≥ 140	700	65	450	11	210	120	290	250	10	214	18	50	933	53	450	11	220	125	290	285	10	249	18	50
	III	19-34	≤ 127 ≥ 140	864	80	550	11	225	184	355	300	12	262	19	60	1139	72	550	11	235	184	355	365	12	327	19	60
	IV	35-49	≤ 152 ≥ 165	1012	85	600	13	290	232	440	370	16	318	26	90	1514	85	620	13	290	232	440	470	16	418	26	90
	V	50-63	≤ 203 ≥ 216	1375	95	800	23	395	255	580	460	20	370	45	115	1963	95	800	23	395	255	580	550	20	460	45	115
	VI	64-74	≤ 267 ≥ 279	1411	130	700	25	500	304	700	520	25	396	62	100	2497	130	850	25	500	304	700	620	25	496	62	100
	VII	75-83	≤ 267 ≥ 279	Design on demand!												Design on demand!											
	VIII-IX	84-94	≤ 241 ≥ 256													not applicable											
	X-XIII	95-110	≤ 356 ≥ 368																								

B* see C.H. load travel table

Constant Hanger Fig. 58H - DU, Type A,B,C







Tabelle

Constant Hanger Fig. 58H - DU, Type A,B,C

Fig. 58H-Du, Type A,B,C - Common dimensions

Group	Size	Total travel S_N [mm]	10. Digit	A	D	F	G	ØM	N	X	ØJ [inch/mm] min.	ØJ [inch/mm] max.	ØJ [inch/mm] min. GL*
				mm									
I	1 - 9	≤ 102	K	440	210	11	36	169	82	50	1/2" M 12	1/2" M 12	200
		≤ 114	L	525									
II	10 - 18	≤ 127	K	593	260	8	18	220	102	50	1/2" M 12	3/4" M 20	200
		≤ 140	L	668			-						
III	19 - 34	≤ 127	K	697	317	8	55	299	126	50	1/2" M 12	1 1/2" M 36	225
		≤ 140	L	817			4						
IV	35 - 49	≤ 152	K	1029	454	22	55	356	144	50	1/2" M 12	1 3/4" M 42	225
		≤ 165	L	1169			25						
V	50 - 63	≤ 203	K	1338	598	14	65	482	179	50	3/4" M 20	2 1/4" M 56	250
		≤ 216	L	1548			-						
VI	64 - 74	≤ 267	K	1755	927	46	30	559	204	50	1 1/8" M 30	3" M 80x6	250
		≤ 279	L										
VII	75 - 83	≤ 267	K	1830	1070	17	151	666	286	100	1 1/2" M 36	3" M 80x6	375
		≤ 279	L										

* GL = threadlength

Fig. 58H-Du, Type A

Group	Size	Total travel S_N [mm]	10. Digit	BY	BY_1	YY	PP	Factor (Mean-value)
				mm				
I	1-9	≤ 102	K	40	50	140	14	377
		≤ 114	L		35	240		393
II	10-18	≤ 127	K	95	48	190	23	424
		≤ 140	L	113	30	265		445
III	19-34	≤ 127	K	85	80	215	36	477
		≤ 140	L	136	44	320		497
IV	35-49	≤ 152	K	200	135	240	42	605
		≤ 165	L	230	40	445		636
V	50-63	≤ 203	K	245	155	340	56	780
		≤ 216	L	310	95	545		818
VI	64-74	≤ 267	K	200	280	350	81	905
		≤ 279	L		140	490		
VII	75-83	≤ 267	K	140	130	490	71	1228
		≤ 279	L		90	530		

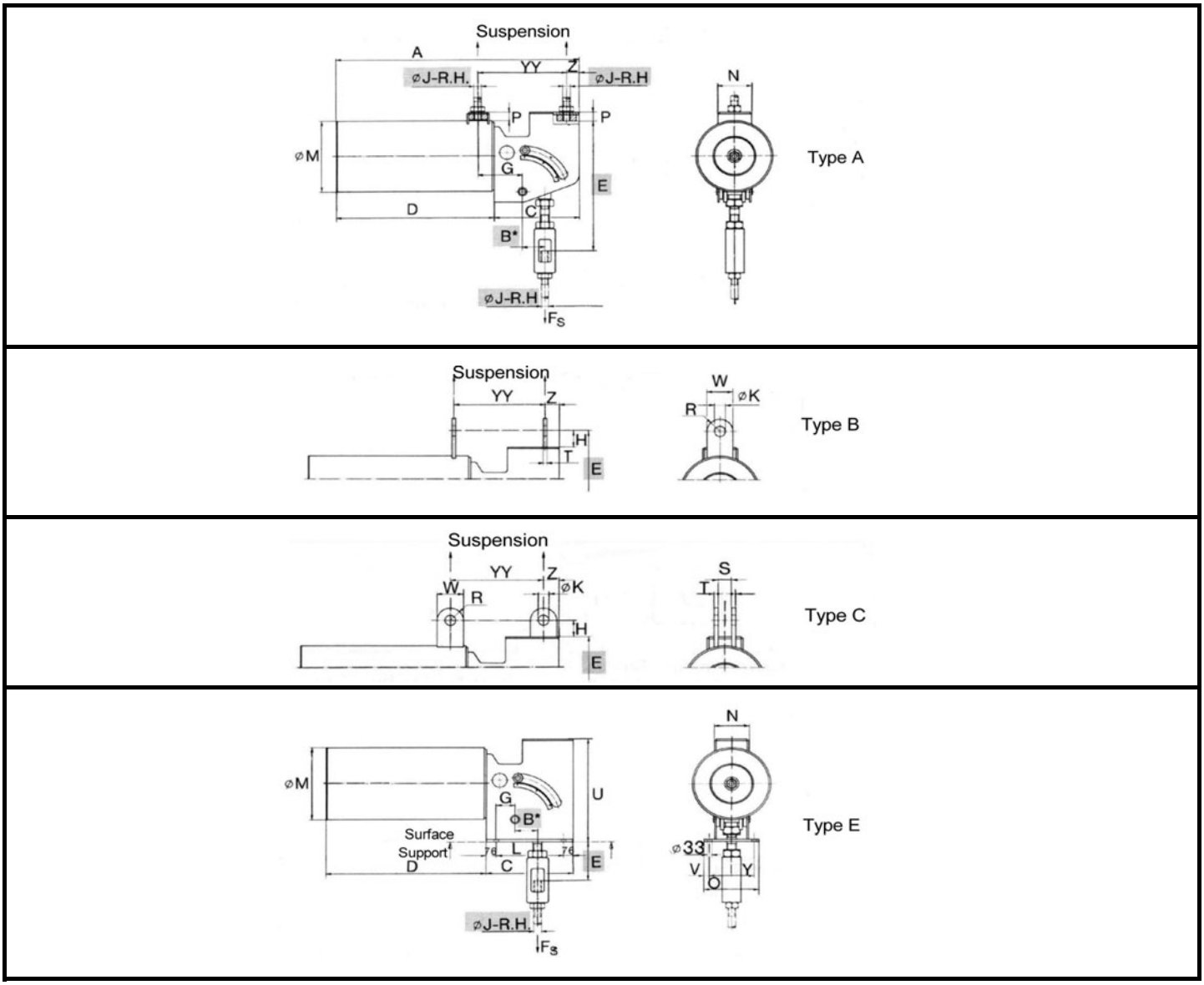
Fig. 58H-Du, Type B,C

Group	Size	Total travel S_N [mm]	10. Digit	BY	YY	Factor (Mean-value)
				mm		
I	1-9	≤ 102	K	45	140	391
		≤ 114	L	39	240	407
II	10-18	≤ 127	K	95	190	447
		≤ 140	L	106	265	468
III	19-34	≤ 127	K	85	215	513
		≤ 140	L	136	320	533
IV	35-49	≤ 152	K	200	240	647
		≤ 165	L	220	445	678
V	50-63	≤ 203	K	245	340	836
		≤ 216	L	310	545	874
VI	64-74	≤ 267	K	200	350	986
		≤ 279	L		490	
VII	75-83	≤ 267	K	175	425	1335
		≤ 279	L		465	

Fig. 58H-DU, Type A,B,C Threaded rod and lug selection

Nennlast F_N	N	0 - 6900	6901 - 13000	13001 - 18000	18001 - 26000	26001 - 40000	40001 - 60000	60001 - 90000	90001 - 120000	120001 - 160000	160001 - 200000		200001 - 225000
ØJ- RH	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6
H	↑ mm ↓	38	38	38	51	76	76	76	102	115	115	115	127
ØK		18	22	28	33	38	48	54	58	70	78	86	96
R		32	32	32	38	38	51	64	77	77	102	102	102
T		6	8	10	10	16	20	25	25	25	25	25	30
W		64	64	64	76	76	102	128	154	154	204	204	204
S		22	27	32	41	46	60	67	73	80	86	92	98

Constant Hanger Fig. 58H - DU, Type A,B,C, E



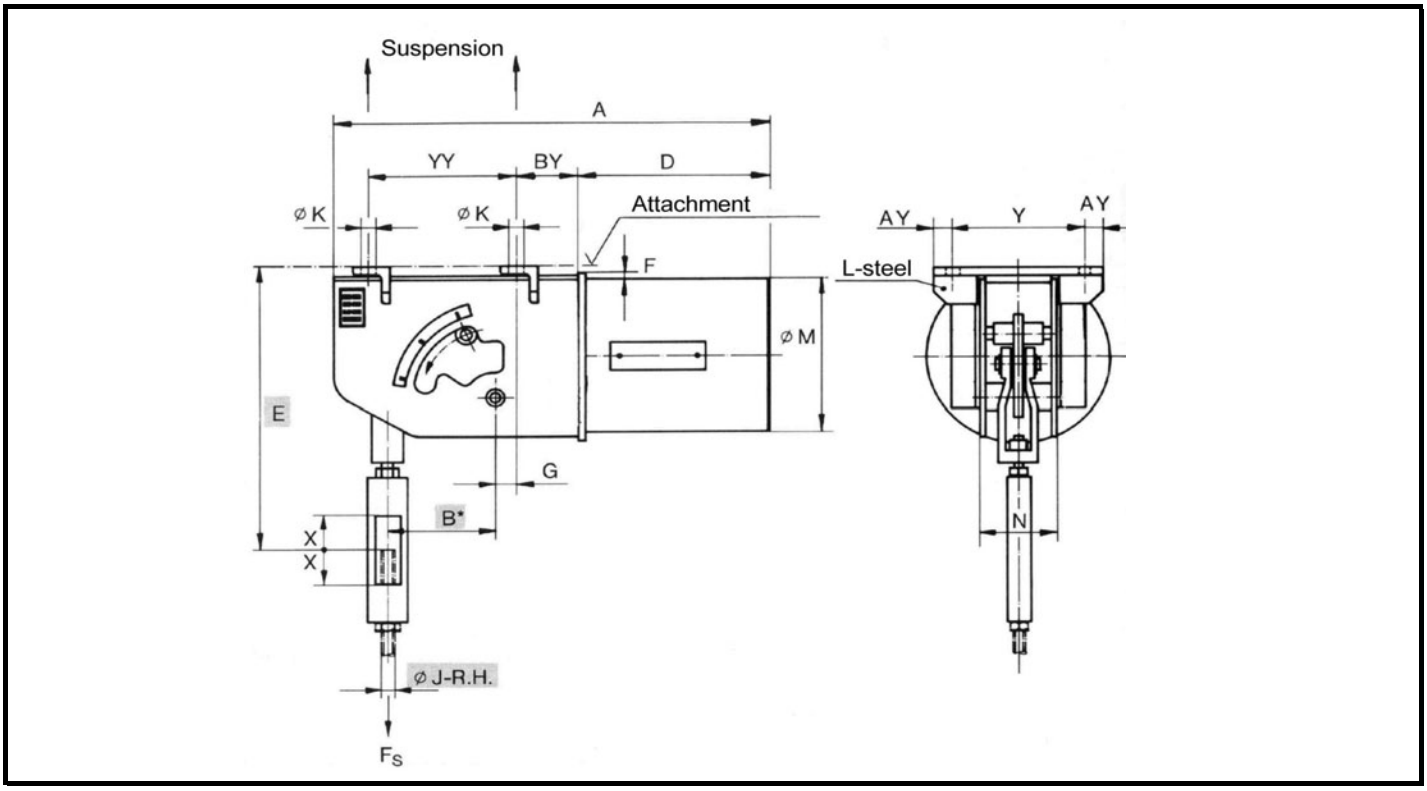
Group	Size	Total travel S_N [mm]	10.Digit	Type A - D: A	C	D	ØM	N	A-C: G	E	A, B: Z	YY	B,C: H	C: Z	YY	A: P	E: L	O	U	V	Y	Type A: Factor (Mean value) mm	Type B,C: Factor (Mean value) mm	Type E: Factor (Mean value) mm	Type A - E: ØJ [inch/mm] min.	ØJ [inch/mm] max.	min. GL mm
				mm																							
VIII	84-94	≤ 241	K	1952	685	1267	700	266	363	158	102,5	712	152	124	699	82	533	426	921	38	350	1266	1500	425	2"	3 3/4"	425
IX		≤ 254	L																			1227	1461	386	M48	M95x6	
X -	95 -	≤ 356	K	2540	914	1626	610	292	730	222	102	1245	152	114	1232	89	762	432	940	32	368	1062	1303	469	2 1/2"	3 3/4"	630
XIII	110	≤ 368	L																			1252	1494	657	M64	M95x6	

* GL = threadlength

Threaded rod and lug selection

Nominal-load F_N	N	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000	225 101 - 317 100	317 101 - 368 700
Ø J_{RH}	inch	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/2"	3 3/4"
	mm	M 48	M 56	M 64	M 72x6	M 80x6	M 90x6	M 95x6
Ø K	▲	58	70	78	86	96	101	106
R	mm	77	77	102	102	102	114	114
S		73	80	86	92	98	112	118
T		25	25	25	25	25	30	45
W	▼	154	154	204	204	204	228	228

Constant Hanger, Fig. 58H - DU, Type D



	Group	Size	Total travel S_N [mm]	10. Digit	A	D	F	G	ØK	ØM	N	Y	AY	BY	YY	X	L-Steel	Fact. Mean-value	ØJ [inch/mm] min.	ØJ [inch/mm] max.	ØJ [inch/mm] min. GL*
					mm																
Fig. 58H - DU, Type D	I	1-9	≤ 102 ≥ 114	K L	440 525	210	11	38	13	169	82	145	20	38	150 250	50	50x7	398 414	1/2" M12	1/2" M12	200
	II	10-18	≤ 127 ≥ 140	K L	593 668	260	8	28 16	18	220	102	180	25	85 97	200 275	50	50x7	454 475	1/"2 M12	3/4" M20	200
	III	19-34	≤ 127 ≥ 140	K L	697 817	317	8	80 30	23	299	126	210	30	60 110	240 345	50	75x12	525 545	1/2" M12	1 1/2" M36	225
	IV	35-49	≤ 152 ≥ 165	K L	1029 1169	454	22	110 95	23	356	144	220	35	145 160	295 500	50	75x12	659 690	1/2" M12	1 3/4" M42	225
	V	50-63	≤ 203 ≥ 216	K L	1338 1548	598	14	115 50	33	482	179	265	40	195 260	390 595	50	100x12	848 886	3/4" M20	2 1/4" M56	250
	VI	64-74	≤ 267 ≥ 279	K L	1755	927	46	70	39	559	204	295	50	160	390 530	50	150x100x12	998	1 1/8" M30	3" M80x6	250
	VII	75-83	≤ 267 ≥ 279	K L	1830	1070	17	151	39	666	286	380	50	119	490	100	150x100x12	1347	1 1/2" M36	3" M80x6	375

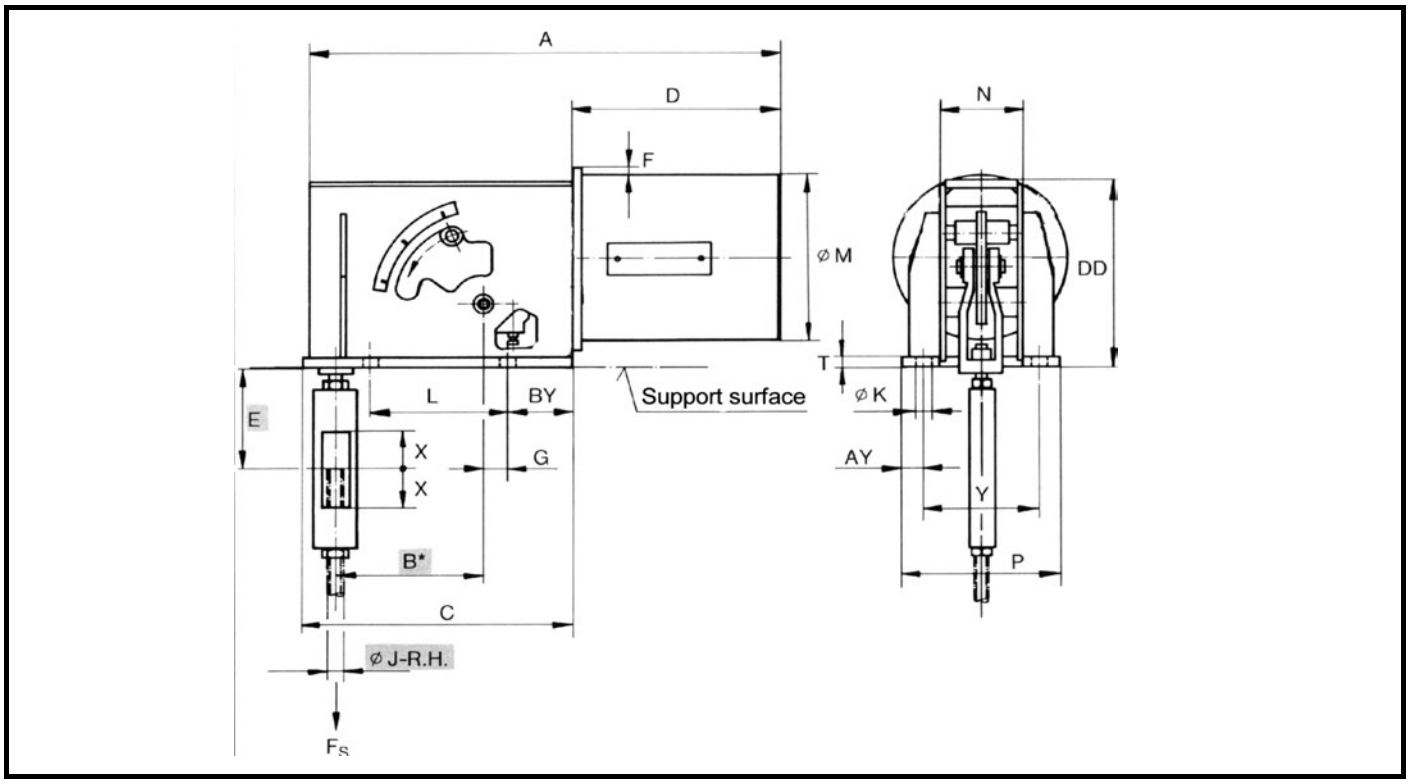
* GL = threadlength

B* see C.H. load travel table

Threaded rod selection

Nominal-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000
$ØJ_{-RH}$	inch mm	1/2" M 12	5/8" M 16	3/4" M 20	1" M 24	1 1/8" M 30	1 1/2" M 36	1 3/4" M 42	2" M 48	2 1/4" M 56	2 1/2" M 64	2 3/4" M 72x6	32 M 80x6

Constant Hanger, Fig. 58H - DU, Type E



	Group	Size	Total travel S_N [mm]	10. Digit	A	C	P	D	F	G	ØK	L	ØM	N	Y	AY	BY	DD	T	X	Factor (Mean-value)	ØJ [inch/mm] min.	ØJ [inch/mm] max.	ØJ [inch/mm] min. GL*
					mm																			
Fig. 58H - DU, Type E	I	1-9	≤ 102	K	440	235	162	210	11	42,5	11	155	169	82	126	18	33,5	224	10	50	167	1/2"	1/2"	200
			≤ 114	L	525	320				50,0		255					26,0				183	M 12	M 12	
	II	10-18	≤ 127	K	593	340	182	260	8	46,5	11	190	220	102	146	18	66,5	250	10	50	197	1/2"	3/4"	200
			≥ 140	L	668	415						265									218	M 12	M 20	
	III	19-34	≤ 127	K	697	390	226	317	8	82,5	11	255	299	126	186	20	57,5	314	12	50	199	1/2"	1 1/2"	225
			≥ 140	L	817	510				75,0		360					65,0				219	M 12	M 36	
	IV	35-49	≤ 152	K	1029	585	274	454	22	120,0	13	295	356	144	214	30	135,0	412	16	50	235	1/2"	1 3/4"	225
			≥ 165	L	1169	725				152,5		500					102,5				266	M 12	M 42	
	V	50-63	≤ 203	K	1338	750	379	598	14	141,5	23	390	482	179	289	45	168,5	575	20	50	261	3/4"	2 1/4"	250
			≥ 216	L	1548	960				139,0		595					171,0				299	M 20	M 56	
	VI	64-74	≤ 267	K	1755	840	464	927	46	44,5	25	445	559	204	304	80	185,5	711	25	50	275	1 1/8"	3"	250
			≥ 279	L						114,5		585					115,5					M 30	M 80x6	
	VII	75-83	≤ 267	K	1830	770	468	1070	17	151,0	25	435	666	286	388	40	119,5	810	30	100	525	1 1/2"	3"	375
			≥ 279	L								575					100,0					M 36	M 80x6	

* GL = threadlength

B* see C.H. load travel table

Threaded rod selection

Nominal-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000	200 001 - 225 000
Ø J- R_H	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6

Constant Hanger Fig. 58H/V - DU, Type A,B,C,D,E,G (Load coupling)

Fig. 58H-DU, Type A-E
Group: I - VII
Size : 1 - 83

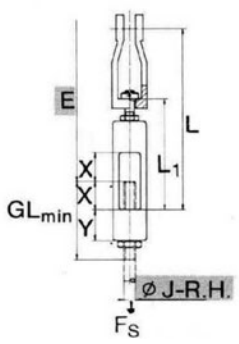


Fig. 58V-DU, Type A-G
Group: II - VII
Size : 10 - 83

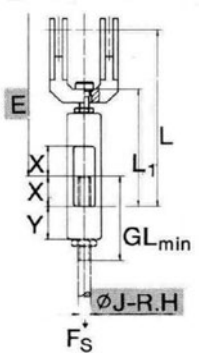
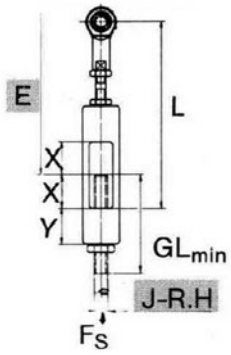


Fig. 58H-DU, Type A-E
Fig. 58V-DU, Type A-C
Group: VIII - XIII
Size : 84 - 110



	Group	Size	Total travel S_N [mm]	Fig. 58H - DU L	Fig. 58H - DU L_1	Fig. 58V - DU L	Fig. 58V - DU L_1	Fig. 58H/V - DU X	Fig. 58H/V - DU Y	Fig. 58H/V - DU ØJ (inch/mm) min.	ØJ max.	min.thread length GL
				mm								
Fig. 58H/V - DU, Type A,B,C,D,E,G (Standard load coupling)	I	1-9	≤ 102 ≥ 114	279	184	-	-	50	55	1/2" M 12	1/2" M 12	200
	II	10-18	≤ 127 ≥ 140	318	194	294	194	50	55	1/2" M 12	3/4" M 20	200
	III	19-34	≤ 127 ≥ 140	330	212	375	230	50	55	1/2" M 12	1 1/2" M 36	225
	IV	35-49	≤ 152 ≥ 165	387	227	450	245	50	55	1/2" M 12	1 3/4" M 42	225
	V	50-63	≤ 203 ≥ 216	450	268	578	268	50	55	3/4" M 20	2 1/4" M 56	250
	VI	64-74	≤ 267 ≥ 279	515	320	665	300	50	55	1 1/8" M 30	3" M 80x6	250
	VII	75-83	≤ 267 ≥ 279	804	439	920	440	100	75	1 1/2" M 36	3" M 80x6	375
	VIII-IX	64-74	≤ 267 ≥ 279	755	-	755	-	100	95	2" M 48	3 3/4" M 95x6	425
	X-XIII	75-83	≤ 267 ≥ 279	945 1180	-	945 1180	-	200	95	2 1/2" M 64	3 3/4" M 95x6	630

Threaded rod selection

Nom.-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000	225 001 - 317 000	317 101 - 368 700
Ø J- R_H	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/2"	3 3/4"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6	M 90x6	M 95x6

Load coupling short

Constant Hanger Fig. 58H/V - DU, Type A,B,C,D,E,G (Load coupling, short)

Fig. 58H-DU
Group: I - VII
Size : 1 - 83

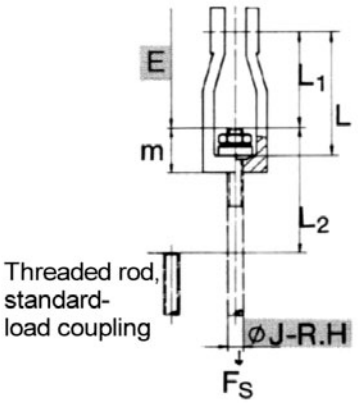
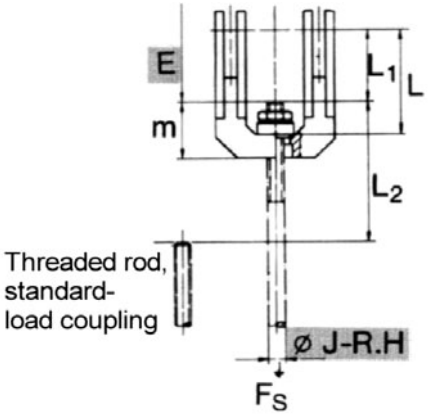


Fig. 58V-DU
Group: II - VII
Size : 10 - 83



	Group	Size	Total travel S_N [mm]	Fig. 58H - DU L [mm]	Fig. 58H - DU L_1 [mm]	Fig. 58H - DU L_2 [mm]	Fig. 58H - DU m [mm]	Fig. 58V - DU L [mm]	Fig. 58V - DU L_1 [mm]	Fig. 58V - DU L_2 [mm]	Fig. 58V - DU m [mm]	Fig. 58H/V - DU ØJ (inch/mm) min.	Fig. 58H/V - DU ØJ (inch/mm) max.	min.thread length GL
Fig. 58H/V - DU, Type A,B,C,D,E,G (Load coupling, short)	I	1-9	≤ 102 ≥ 114	95	80	149	25	-	-	-	-	3/8" M 10	3/8" M 10	50
	II	10-18	≤ 127 ≥ 140	124	106	162	36	100	82	162	40	1/2" M 12	5/8" M 16	75
	III	19-34	≤ 127 ≥ 140	118	86	194	62	145	113	212	77	1/2" M 12	1 1/8" M 30	100
	IV	35-49	≤ 152 ≥ 165	160	124	213	76	205	169	231	91	1/2" M 12	1 1/2" M 36	125
	V	50-63	≤ 203 ≥ 216	182	138	262	124	310	268	260	132	3/4" M 20	1 3/4" M 42	150
	VI	64-74	≤ 267 ≥ 279	195	138	327	147	365	307	308	158	1 1/8" M 30	2 1/4" M 56	200
	VII	75-83	≤ 267 ≥ 279	365	290	414	175	480	305	515	285	1 1/2" M 36	2 1/2" M 64	350

Threaded rod selection

Nom.-load F_N	N	0 - 6 900	6 901 - 13 000	13 001 - 18 000	18 001 - 26 000	26 001 - 40 000	40 001 - 60 000	60 001 - 90 000	90 001 - 120 000	120 001 - 160 000	160 001 - 200 000		200 001 - 225 000	225 001 - 317 000	317 101 - 368 700
Ø J- R_H	inch	1/2"	5/8"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/2"	3 3/4"
	mm	M 12	M 16	M 20	M 24	M 30	M 36	M 42	M 48	M 56	M 64	M 72x6	M 80x6	M 90x6	M 95x6

Variable Spring Hanger

Application

Spring Hangers and Spring Supports are used where vertical movements of the piping are not allowed to be restricted by rigid hangers.

Function

The Variable Spring Hanger consists of a pre-compressed spring coil in a cylindrical casing with a load- and travel indicator. The load to be decreased changes proportionally to the travel corresponding to the spring rate.

Spring Hanger selection

The main selection criterion is the deviation between the cold load and the hot load.
The allowable deviation differs in the individual rules and project specifications.

Two design criterion are generally accepted:

A) The deviation between cold load and hot load is limited to 25% of the operating load (MSS-SP58).

B) The total travel S_N must exceed the calculated travel S_S (theoretical travel) by at least 40%. A reserve ≥ 0,2 S_S is to be provided for each final position (VGB-Rules).

The cold load and the hot load must be within the working range of the respective size.

Figure / Size selection

The Spring Hanger is selected by the support load.
The figure is selected by the travel of support point.

PSS offers five different Spring hangers (depending on the spring rate):

Fig. 82 – movement range 0 – 46 mm

Fig. B268 – movement range 0 – 92 mm

Fig. 98 – movement range 0 – 184 mm

Fig. 401

Fig. B401

Type selection

After determination of the figure, the hanger type has to be selected. Depending on the installation position, i.e. whether the hanger is installed above or below the structure, the types A-E are selected.
Spring Supports type F are installed below the support point.
Type G can be used for vertical pipes only.

Variable Spring Hanger

Qualification

Besides the indicated design instructions like ASME III Subsection NF and KTA 3205.3, the Spring Hangers were subjected to an experimental test program.

The following tests were performed:

A) Quasi-static tests

- load test 2,5-fold nominal load
- vertical tension
- diagonal tension at an angle of 4°
- verification of the travel scale

B) Dynamic tests

- 1×10^3 load cycles ± 20 mm and 1 Hz
- 2×10^4 load cycles ± 5 mm and 5 Hz
- $1{,}8 \times 10^6$ load cycles ± 15 mm and 15 Hz
- 2×10^4 load cycles ± 5 mm and 5 Hz
- 1×10^3 load cycles ± 20 mm and 1 Hz

C) Nondestructive axaminations

- visual examination
- liquid penetrant examination

D) Failure test

- failure test up to at least 5-fold nominal load

The deviation from the indications of the manufacturer before and after the tests was lower than ± 5% at vertical tension and lower than ± 6% at diagonal tension. The Spring Hangers passed all tests without damages.

Travel stop

If indicated in the order, the Spring Hangers are adjusted at the factory to the specified installation load. The upper travel stop carries the spring load in the unloaded condition. The lower travel stop carries increased loads (e.g. hydraulic test of a steam line) in the installation position. The travel stops must be removed before the piping is put into operation, but not before the Variable Spring Hanger is installed and fully loaded.
If for example a water-bearing pipe is emptied it is recommended to use the upper travel stop in order to carry the difference load (medium weight).

Variable Spring Hanger

Adjustment

Type A, B, C, E, and G are adjusted with an integrated turnbuckle. Type D is adjusted by the upper nut at the threaded rod. The adjustment of the type F is performed by turning the load column.

Please ensure that the min.thread engagement is observed.

Installation instruction

Securely attach the hanger to the structure. Turn the turnbuckle until the Variable Spring Hanger or load column of the spring support resp. reaches the desired cold load marking. No other adjustment is necessary. If desired, the Variable Spring Hanger can be delivered locked to the cold load. The travel stops must be removed before the piping is put into operation.

To facilitate the installation of the Spring Hangers, the Spring Hanger body can be provided with installation lugs at extra cost.

Nameplate

Besides the figure number, the size and the type the nameplate must show the following Spring Hanger data:

Mark.-No.	= Position No.
H.L.	= Hot load F_W
C.L.	= cold load F_K
Travel	= Calculated travel S_S
Direction	= Travel direction
	– downward
	+ upward

At the load scale the cold load (white marking) and the hot load (red marking) is marked.

Details for ordering

A) Hot load F_W
B) Cold load F_K
C) Calculated travel S_S
D) Travel direction – downward, + upward
E) Gewindeart metrisch oder zoll
F) C – C for type G
G) Marking

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Table for the determination of the Spring Hanger size 0 - 11

Working range (mm)					Size												Spring travel (mm)				
					0	1	2	3	4	5	6	7	8	9	10	11					
					← Nominal load (N) →												Fig. 468	Fig. 368	Fig.98	Fig. B 268	Fig.82
					187	273	349	453	601	814	1079	1431	1920	2590	3347	4358	0	0	0	0	0
					200	**292**	**373**	**484**	**642**	**869**	**1152**	**1526**	**2051**	**2767**	**3573**	**4656**	**20**	**15**	**10**	**5**	**2,5**
Fig.82	Fig.B 268	Fig.98	Fig. 368	Fig. 468	213	310	396	514	682	924	1225	1622	2183	2945	3799	4955	40	30	20	10	5
0	**0**	**0**	**0**	**0**	**226**	**329**	**420**	**545**	**723**	**979**	**1298**	**1718**	**2315**	**3122**	**4026**	**5253**	**60**	**45**	**30**	**15**	**7,5**
2,5	5	10	15	20	239	347	443	575	764	1034	1370	1813	2446	3300	4251	5552	80	60	40	20	10
5	**10**	**20**	**30**	**40**	**252**	**365**	**467**	**606**	**804**	**1089**	**1443**	**1908**	**2577**	**3477**	**4478**	**5850**	**100**	**75**	**50**	**25**	**12,5**
7,5	15	30	45	60	265	384	490	636	845	1144	1516	2003	2709	3654	4704	6149	120	90	60	30	15
10	**20**	**40**	**60**	**80**	**278**	**402**	**514**	**667**	**885**	**1199**	**1589**	**2099**	**2840**	**3832**	**4930**	**6447**	**140**	**105**	**70**	**35**	**17,5**
12,5	25	50	75	100	291	420	537	697	926	1254	1662	2194	2972	4009	5156	6746	160	120	80	40	20
15	**30**	**60**	**90**	**120**	**304**	**439**	**561**	**728**	**966**	**1309**	**1735**	**2290**	**3103**	**4187**	**5382**	**7044**	**180**	**135**	**90**	**45**	**22,5**
17,5	35	70	105	140	317	457	585	759	1007	1364	1808	2385	3235	4364	5608	7343	200	150	100	50	25
20	**40**	**80**	**120**	**160**	**330**	**475**	**608**	**789**	**1048**	**1419**	**1880**	**2480**	**3366**	**4541**	**5834**	**7641**	**220**	**165**	**110**	**55**	**27,5**
22,5	45	90	135	180	343	494	632	820	1088	1474	1953	2576	3497	4719	6060	7939	240	180	120	60	30
25	**50**	**100**	**150**	**200**	**356**	**512**	**655**	**850**	**1129**	**1529**	**2026**	**2671**	**3629**	**4896**	**6286**	**8238**	**260**	**195**	**130**	**65**	**32,5**
27,5	55	110	165	220	369	531	679	881	1170	1584	2099	2767	3760	5074	6512	8536	280	210	140	70	35
30	**60**	**120**	**180**	**240**	**382**	**549**	**702**	**911**	**1210**	**1639**	**2172**	**2862**	**3892**	**5251**	**6739**	**8835**	**300**	**225**	**150**	**75**	**37,5**
					395	568	726	942	1251	1694	2245	2957	4023	5428	6965	9133	320	240	160	80	40
					408	**586**	**750**	**972**	**1291**	**1749**	**2317**	**3053**	**4155**	**5606**	**7191**	**9432**	**340**	**255**	**170**	**85**	**42,5**
					420	610	785	1015	1360	1825	2430	3240	4340	5785	7520	9830	368	276	184	92	46
					← Spring rate (N/mm) →																
				468	**0,65**	**0,93**	**1,18**	**1,53**	**2,03**	**2,75**	**3,65**	**4,78**	**6,58**	**8,88**	**11,30**	**14,93**	468				
			368		**0,87**	**1,23**	**1,57**	**2,03**	**2,70**	**3,67**	**4,87**	**6,37**	**8,77**	**11,83**	**15,07**	**19,90**		368			
		98			**1,3**	**1,85**	**2,35**	**3,05**	**4,05**	**5,5**	**7,3**	**9,55**	**13,15**	**17,75**	**22,6**	**29,85**			98		
	B 268				**2,6**	**3,7**	**4,7**	**6,1**	**8,1**	**11,0**	**14,6**	**19,1**	**26,3**	**35,5**	**45,2**	**59,7**				B 268	
82					**5,2**	**7,4**	**9,4**	**12,2**	**16,2**	**22**	**29,2**	**38,2**	**52,6**	**71**	**90,4**	**119,4**					82

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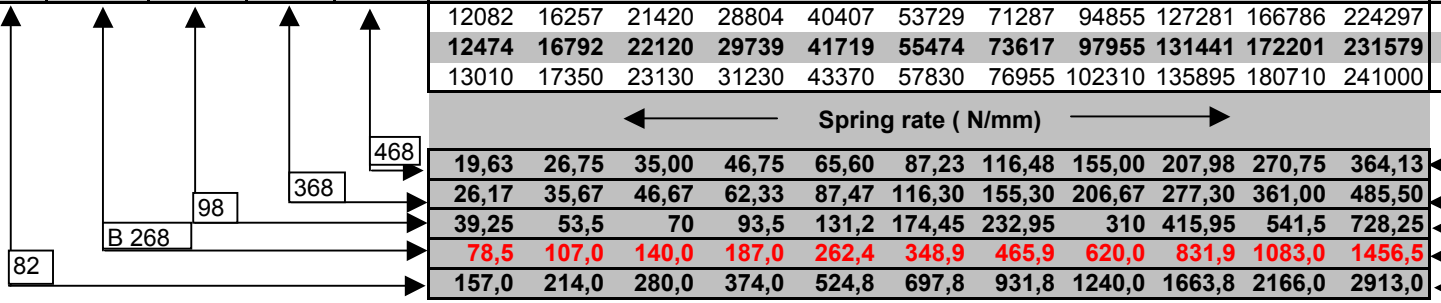
Table for the determination of the Spring Hanger size 12 - 22

Working range (mm)					Size											Spring travel (mm)				
					12	13	14	15	16	17	18	19	20	21	22					
					← Nominal load (N) →											Fig. 468	Fig. 368	Fig. 98	Fig. B 268	Fig. 82
					5806	7701	10220	13841	19417	25818	34013	45258	60729	80144	107779	0	0	0	0	0
					6198	**8236**	**10920**	**14776**	**20729**	**27562**	**36343**	**48358**	**64889**	**85559**	**115061**	**20**	**15**	**10**	**5**	**2,5**
Fig. 82	Fig.B 268	Fig. 98	Fig. 368	Fig. 468	6591	8771	11620	15712	22041	29307	38672	51458	69048	90974	122344	40	30	20	10	5
0	**0**	**0**	**0**	**0**	**6983**	**9305**	**12320**	**16647**	**23353**	**31051**	**41002**	**54557**	**73208**	**96389**	**129626**	**60**	**45**	**30**	**15**	**7,5**
2,5	5	10	15	20	7375	9840	13020	17582	24665	32796	43332	57657	77367	101804	136908	80	60	40	20	10
5	**10**	**20**	**30**	**40**	**7767**	**10375**	**13720**	**18517**	**25977**	**34540**	**45661**	**60757**	**81527**	**107220**	**144191**	**100**	**75**	**50**	**25**	**12,5**
7,5	15	30	45	60	8160	10910	14420	19452	27288	36285	47991	63857	85686	112635	151473	120	90	60	30	15
10	**20**	**40**	**60**	**80**	**8552**	**11444**	**15120**	**20387**	**28600**	**38029**	**50321**	**66957**	**89846**	**118050**	**158755**	**140**	**105**	**70**	**35**	**17,5**
12,5	25	50	75	100	8944	11979	15820	21323	29912	39774	52650	70056	94005	123465	166038	160	120	80	40	20
15	**30**	**60**	**90**	**120**	**9336**	**12514**	**16520**	**22258**	**31224**	**41518**	**54980**	**73156**	**98165**	**128880**	**173320**	**180**	**135**	**90**	**45**	**22,5**
17,5	35	70	105	140	9729	13049	17220	23193	32536	43263	57310	76256	102324	134295	180603	200	150	100	50	25
20	**40**	**80**	**120**	**160**	**10121**	**13583**	**17920**	**24128**	**33848**	**45007**	**59639**	**79356**	**106484**	**139710**	**187885**	**220**	**165**	**110**	**55**	**27,5**
22,5	45	90	135	180	10513	14118	18620	25063	35160	46751	61969	82456	110643	145125	195167	240	180	120	60	30
25	**50**	**100**	**150**	**200**	**10905**	**14653**	**19320**	**25999**	**36472**	**48496**	**64298**	**85555**	**114803**	**150540**	**202450**	**260**	**195**	**130**	**65**	**32,5**
27,5	55	110	165	220	11298	15188	20020	26934	37784	50240	66628	88655	118962	155955	209732	280	210	140	70	35
30	**60**	**120**	**180**	**240**	**11690**	**15722**	**20720**	**27869**	**39096**	**51895**	**68958**	**91755**	**123122**	**161371**	**217014**	**300**	**225**	**150**	**75**	**37,5**
					12082	16257	21420	28804	40407	53729	71287	94855	127281	166786	224297	320	240	160	80	40
					12474	**16792**	**22120**	**29739**	**41719**	**55474**	**73617**	**97955**	**131441**	**172201**	**231579**	**340**	**255**	**170**	**85**	**42,5**
					13010	17350	23130	31230	43370	57830	76955	102310	135895	180710	241000	9830	276	184	92	46
					← Spring rate (N/mm) →															
					19,63	**26,75**	**35,00**	**46,75**	**65,60**	**87,23**	**116,48**	**155,00**	**207,98**	**270,75**	**364,13**					
					26,17	**35,67**	**46,67**	**62,33**	**87,47**	**116,30**	**155,30**	**206,67**	**277,30**	**361,00**	**485,50**					
					39,25	**53,5**	**70**	**93,5**	**131,2**	**174,45**	**232,95**	**310**	**415,95**	**541,5**	**728,25**					
					78,5	**107,0**	**140,0**	**187,0**	**262,4**	**348,9**	**465,9**	**620,0**	**831,9**	**1083,0**	**1456,5**					
					157,0	**214,0**	**280,0**	**374,0**	**524,8**	**697,8**	**931,8**	**1240,0**	**1663,8**	**2166,0**	**2913,0**					



Variable Spring Hang. Fig. 368 and Fig. 468 Type A, B, C, D, E, G - size 0 - 22

Fig. 368, Type A, B, C, E u. G, Gr. 0- 22

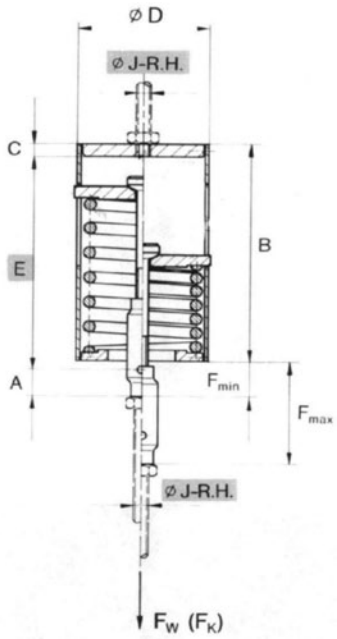
Size	Ø J-RH		Type A - G					Type B und C						Type D		Typ E	Typ A-C G	Type G			
			B	C	ØD	F_{min}	F_{max}	$ØD_1$	P	R	S	T	T_1	K	L	A_1	A	$C\text{-}C_{max}$	G	H	S1
	inch	mm	mm																		
0	3/8	M 10	577	12	102	40	316	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
1	3/8	M 10	640	12	102	40	316	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
2	3/8	M 10	690	12	102	40	316	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
3	3/8	M 10	748	12	102	40	316	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
4	3/8	M 10	781	12	102	40	316	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
5	3/8	M 10	570	12	115	40	316	14	38	32	25	6	6	25	100	25	25	2900	50	60	20
6	1/2	M 12	576	12	115	45	321	18	38	32	30	6	6	30	100	30	30	2100	50	60	20
7	1/2	M 12	621	12	115	45	321	18	38	32	30	6	6	30	100	30	30	1600	50	60	20
8	1/2	M 12	666	12	115	45	321	18	38	32	30	6	6	30	100	30	30	1200	50	60	20
9	5/8	M 16	787	16	168	50	326	22	38	32	35	8	8	35	100	35	35	2300	75	80	30
10	5/8	M 16	856	16	168	50	326	22	38	32	35	8	8	35	100	35	35	1700	75	80	30
11	5/8	M 16	800	16	168	50	326	22	38	32	40	8	8	35	100	35	35	1300	75	80	30
12	5/8	M 16	796	16	168	50	326	22	38	32	40	8	8	35	100	35	35	2300	100	120	30
13	3/4	M 20	998	20	168	55	331	28	38	32	45	10	10	45	100	40	40	1700	100	120	30
14	1	M 24	963	20	168	55	331	33	51	38	45	10	10	50	100	40	40	1300	100	120	30
15	1 1/8	M 30	1101	25	178	60	336	38	76	38	50	16	16	65	100	45	45	980	100	120	35
16	1 1/2	M 36	1099	30	220	65	341	48	76	51	60	20	16	75	100	55	55	1700	100	180	55
17	1 1/2	M 36	1441	30	220	65	341	48	76	51	70	20	16	75	100	55	55	1300	100	180	55
18	1 3/4	M 42	1182	35	324	75	351	54	76	64	75	25	20	90	100	65	65	3500	100	300	70
19	2	M 48	1597	40	324	80	356	58	102	77	80	25	20	100	100	70	70	2600	100	300	70
20	2 1/4	M 56*	1849	45	324	90	366	70	115	77	85	25	20	115	100	80	80	2000	100	300	70
21	2 1/2	M 64*	1959	55	324	95	371	78	115	102	90	25	20	130	100	90	90	2300	100	380	80
22	3	M 80x6	2376	65	324	105	381	96	127	102	100	30	25	160	100	95	95	1700	100	380	80

Fig. 468, Type A, B, C, E u. G, Gr. 0- 22

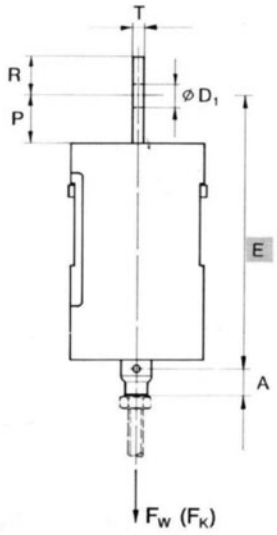
Size	Ø J-RH		Type A - G					Type B und C						Type D		Typ E	Typ A-C G	Type G			
			B	C	ØD	F_{min}	F_{max}	$ØD_1$	P	R	S	T	T_1	K	L	A_1	A	$C\text{-}C_{max}$	G	H	S1
	inch	mm	mm																		
0	3/8	M 10	766	12	102	40	408	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
1	3/8	M 10	850	12	102	40	408	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
2	3/8	M 10	917	12	102	40	408	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
3	3/8	M 10	994	12	102	40	408	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
4	3/8	M 10	1038	12	102	40	408	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
5	3/8	M 10	747	12	115	40	408	14	38	32	25	6	6	25	100	25	25	2900	50	60	20
6	1/2	M 12	753	12	115	45	413	18	38	32	30	6	6	30	100	30	30	2100	50	60	20
7	1/2	M 12	813	12	115	45	413	18	38	32	30	6	6	30	100	30	30	1600	50	60	20
8	1/2	M 12	873	12	115	45	413	18	38	32	30	6	6	30	100	30	30	1200	50	60	20
9	5/8	M 16	1030	16	168	50	418	22	38	32	35	8	8	35	100	35	35	2300	75	80	30
10	5/8	M 16	1122	16	168	50	418	22	38	32	35	8	8	35	100	35	35	1700	75	80	30
11	5/8	M 16	1047	16	168	50	418	22	38	32	40	8	8	35	100	35	35	1300	75	80	30
12	5/8	M 16	1042	16	168	50	418	22	38	32	40	8	8	35	100	35	35	2300	100	120	30
13	3/4	M 20	1305	20	168	55	423	28	38	32	45	10	10	45	100	40	40	1700	100	120	30
14	1	M 24	1258	20	168	55	423	33	51	38	45	10	10	50	100	40	40	1300	100	120	30
15	1 1/8	M 30	1436	25	178	60	428	38	76	38	50	16	16	65	100	45	45	980	100	120	35
16	1 1/2	M 36	1427	30	220	65	433	48	76	51	60	20	16	75	100	55	55	1700	100	180	55
17	1 1/2	M 36	1883	30	220	65	433	48	76	51	70	20	16	75	100	55	55	1300	100	180	55
18	1 3/4	M 42	1529	35	324	75	443	54	76	64	75	25	20	90	100	65	65	3500	100	300	70
19	2	M 48	2079	40	324	80	448	58	102	77	80	25	20	100	100	70	70	2600	100	300	70
20	2 1/4	M 56*	2412	45	324	90	458	70	115	77	85	25	20	115	100	80	80	2000	100	300	70
21	2 1/2	M 64*	2550	55	324	95	463	78	115	102	90	25	20	130	100	90	90	2300	100	380	80
22	3	M 80x6	3098	65	324	105	473	96	127	102	100	30	25	160	100	95	95	1700	100	380	80

Variable Spring Hanger Fig. 82 Type A, B, C, D, E, G - size 0 - 22

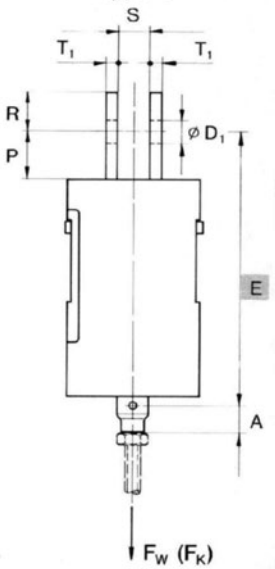
Type A



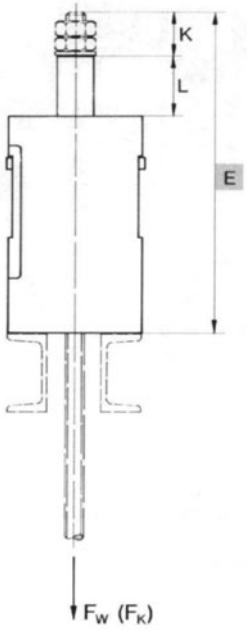
Type B



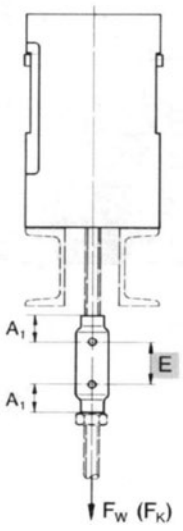
Type C



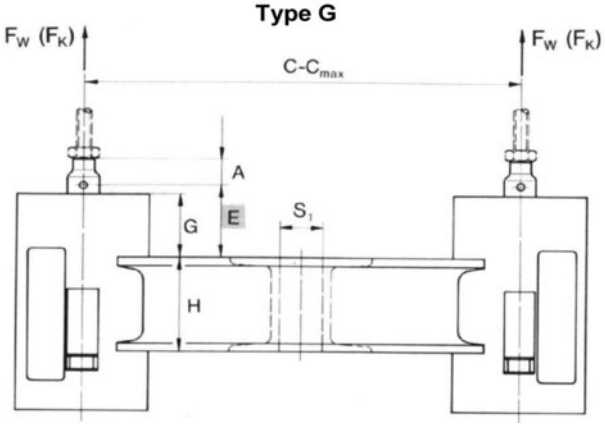
Type D



Type E



Type G



Table

Variable Spring Hanger Fig. 82 Type A, B, C, D, E, G - size 0 - 22

Fig. 82 Type A, B, C, D, E und G, Gr. 0 - 22

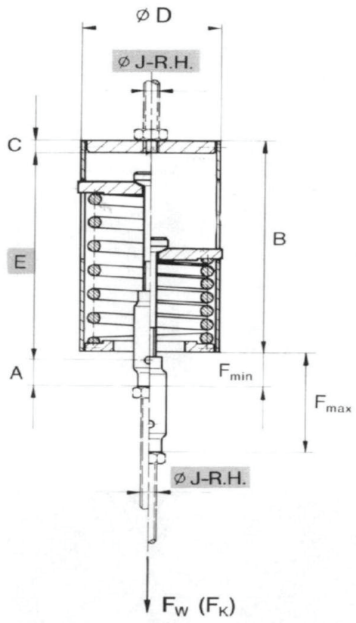
Size	Ø J-RH inch	Ø J-RH mm	Spring rate N/mm	Nominal load from - to kN		E Type A (mm)	E Type B,C (mm)	E Type D (mm)	E Type E (mm)	E Type G (mm)	Weight Type A (kg)	Weight Type B (kg)	Weight Type C (kg)	Weight Type D (kg)	Weight Type E (kg)	Weight Type G (kg)
0	3/8	M 10	5,2	0,23	0,38	186	236	258	75	55	3,0	3,2	3,4	2,8	2,8	15,3
1	3/8	M 10	7,4	0,33	0,55	178	228	250	75	55	3,0	3,2	3,4	2,8	2,8	15,2
2	3/8	M 10	9,4	0,42	0,70	198	248	270	75	55	3,2	3,4	3,6	3,0	3,0	15,7
3	3/8	M 10	12,2	0,55	0,91	204	254	276	75	65	4,8	5,0	5,2	4,6	4,6	18,6
4	3/8	M 10	16,2	0,72	1,21	187	237	259	75	65	4,5	4,7	4,9	4,3	4,3	18,0
5	3/8	M 10	22,0	0,97	1,63	171	221	243	75	65	4,5	4,7	4,9	4,3	4,3	18,0
6	1/2	M 12	29,2	1,30	2,17	185	235	262	65	65	4,9	5,1	5,3	4,7	4,7	18,8
7	1/2	M 12	38,2	1,72	2,86	187	237	264	65	65	5,1	5,3	5,5	4,9	4,9	19,2
8	1/2	M 12	52,6	2,32	3,89	200	250	277	65	65	7,6	7,8	8,0	7,4	7,4	24,0
9	5/8	M 16	71,0	3,12	5,25	195	249	281	100	90	15,1	15,4	15,6	14,7	14,6	44,5
10	5/8	M 16	90,4	4,03	6,74	213	267	299	100	90	16,9	17,2	17,4	16,5	16,4	48,1
11	5/8	M 16	119,4	5,25	8,83	185	239	271	100	90	20,3	20,6	20,8	19,9	19,8	54,5
12	5/8	M 16	157,0	6,98	11,69	203	257	289	100	115	22,9	23,2	23,4	22,5	22,4	67,4
13	3/4	M 20	214,0	9,31	15,72	243	301	343	120	115	27,9	28,2	28,5	27,2	27,1	77,4
14	1	M 24	280,0	12,32	20,72	241	312	346	175	115	29,6	30,1	30,5	28,5	28,7	80,9
15	1 1/8	M 30	374,0	16,64	27,86	288	389	413	165	120	38,3	39,3	40,2	36,6	36,7	98,4
16	1 1/2	M 36	524,8	23,35	39,09	314	420	459	185	120	46,8	48,6	50,2	43,9	43,7	130,0
17	1 1/2	M 36	697,8	31,05	51,90	350	456	495	185	120	52,6	54,4	56,0	49,7	49,3	141,0
18	1 3/4	M 42	931,8	41,00	68,95	329	440	494	200	125	105,0	109,0	111,0	100,0	99,0	276,0
19	2	M 48	1240,0	54,56	91,76	402	544	582	215	125	135,0	140,0	145,0	127,0	127,0	336,0
20	2 1/4	M 56*	1663,8	73,20	123,12	449	609	649	195	120	146,0	151,0	156,0	134,0	137,0	358,0
21	2 1/2	M 64*	2166,0	96,39	161,37	458	628	688	245	120	178,0	186,0	193,0	159,0	161,0	446,0
22	3	M 80x6	2913,0	129,63	217,01	559	751	824	110	130	227,0	237,0	245,0	196,0	203,0	547,0

Fig. 82 Type A, B, C, D, E und G, Gr. 0 - 22

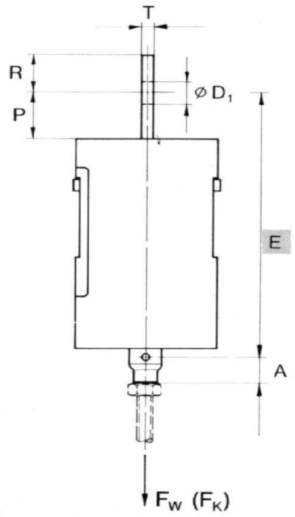
Size	Ø J-RH inch	Ø J-RH mm	Type A - G B (mm)	C	ØD	F_{min}	F_{max}	Type B und C $ØD_1$	P	R	S	T	T_1	Type D K	L	Typ E A_1	Typ A-C G A	Type G $C\text{-}C_{max}$	G	H	S1
0	3/8	M 10	183	12	89	40	86	14	38	32	25	6	6	25	50	25	25	2000	40	60	20
1	3/8	M 10	175	12	89	40	86	14	38	32	25	6	6	25	50	25	25	2000	40	60	20
2	3/8	M 10	195	12	89	40	86	14	38	32	25	6	6	25	50	25	25	2000	40	60	20
3	3/8	M 10	201	12	115	40	86	14	38	32	25	6	6	25	50	25	25	2000	50	60	20
4	3/8	M 10	184	12	115	40	86	14	38	32	25	6	6	25	50	25	25	2000	50	60	20
5	3/8	M 10	168	12	115	40	86	14	38	32	25	6	6	25	50	25	25	2900	50	60	20
6	1/2	M 12	182	12	115	45	91	18	38	32	30	6	6	30	50	30	30	2100	50	60	20
7	1/2	M 12	184	12	115	45	91	18	38	32	30	6	6	30	50	30	30	1600	50	60	20
8	1/2	M 12	197	12	140	45	91	18	38	32	30	6	6	30	50	30	30	1200	50	60	20
9	5/8	M 16	196	16	178	50	96	22	38	32	35	8	8	35	50	35	35	2300	50	80	30
10	5/8	M 16	214	16	178	50	96	22	38	32	35	8	8	35	50	35	35	1700	50	80	30
11	5/8	M 16	186	16	220	50	96	22	38	32	40	8	8	35	50	35	35	1300	50	80	30
12	5/8	M 16	204	16	220	50	96	22	38	32	40	8	8	35	50	35	35	2300	40	120	30
13	3/4	M 20	248	20	220	55	101	28	38	32	45	10	10	45	50	40	40	1700	75	120	30
14	1	M 24	246	20	220	55	101	33	51	38	45	10	10	50	50	40	40	1300	75	120	30
15	1 1/8	M 30	298	25	220	60	106	38	76	38	50	16	16	65	50	45	45	980	75	120	35
16	1 1/2	M 36	334	30	220	65	111	48	76	51	60	20	16	75	50	55	55	1700	75	180	55
17	1 1/2	M 36	370	30	220	65	111	48	76	51	70	20	16	75	50	55	55	1300	75	180	55
18	1 3/4	M 42	354	35	324	75	121	54	76	64	75	25	20	90	50	65	65	3500	40	300	70
19	2	M 48	432	40	324	80	126	58	102	77	80	25	20	100	50	70	70	2600	50	300	70
20	2 1/4	M 56*	484	45	324	90	136	70	115	77	85	25	20	115	50	80	80	2000	75	300	70
21	2 1/2	M 64*	508	55	324	95	141	78	115	102	90	25	20	130	50	90	90	2300	75	380	80
22	3	M 80x6	614	65	324	105	151	96	127	102	100	30	25	160	50	95	95	1700	100	380	80

Variable Spring Hanger Fig. 268 Type A, B, C, D, E, G - size 0 - 22

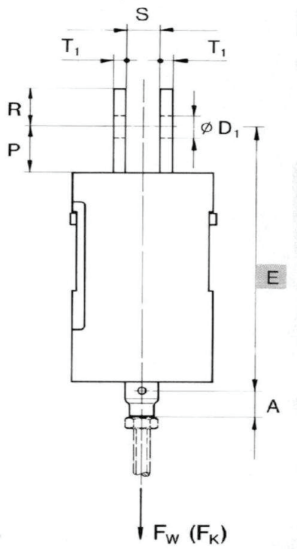
Type A



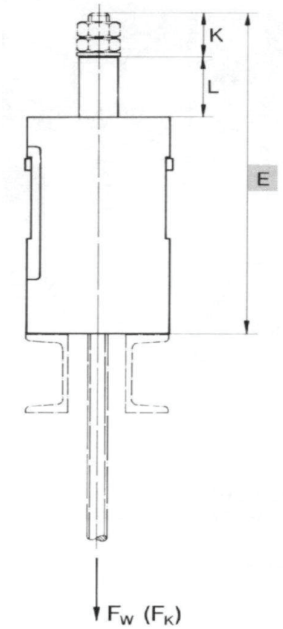
Type B



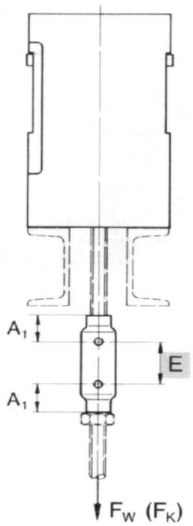
Type C



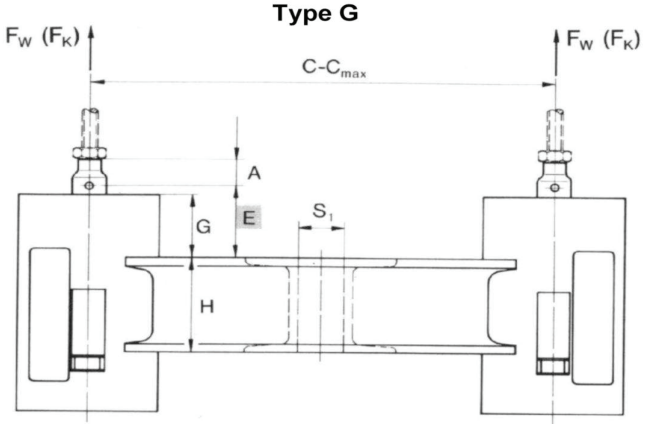
Type D



Type E



Type G



Table

Variable Spring Hanger Fig. 268 Type A, B, C, D, E, G - size 0 - 22

Fig. B268 Type A, B, C, D, E, G, Size 0 - 22

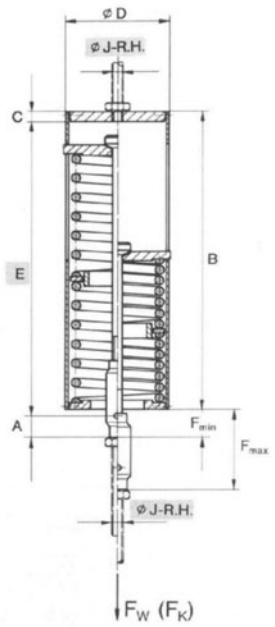
Size	Ø J-RH		Spring rate	Nominal load from - to		E					Weight					
						Type A	Type B,C	Type D	Type E	Type G	Type A	Type B	Type C	Type D	Type E	Type G
	inch	mm	N/mm	kN		mm					kg					
0	1/2	M 12	2,6	0,23	0,38	202	252	324	75	55	4,4	4,6	4,8	4,3	4,1	17,9
1	1/2	M 12	3,7	0,33	0,55	223	273	345	75	55	4,5	4,7	4,9	4,4	4,2	18,1
2	1/2	M 12	4,7	0,42	0,70	239	289	361	75	55	4,8	5,0	5,2	4,7	4,5	18,7
3	1/2	M 12	6,1	0,55	0,91	259	309	381	75	65	4,8	5,0	5,2	4,7	4,5	18,7
4	1/2	M 12	8,1	0,72	1,21	270	320	392	75	65	5,4	5,6	5,8	5,3	5,1	19,9
5	1/2	M 12	11,0	0,97	1,63	219	269	341	75	65	5,2	5,4	5,6	5,1	4,9	19,5
6	1/2	M 12	14,6	1,30	2,17	225	275	352	65	65	5,0	5,2	5,4	4,9	4,7	19,1
7	1/2	M 12	19,1	1,72	2,86	240	290	367	65	65	5,2	5,4	5,6	5,1	4,9	19,5
8	1/2	M 12	26,3	2,32	3,89	255	305	382	65	65	5,9	6,1	6,3	5,8	5,6	20,9
9	5/8	M 16	35,5	3,12	5,25	300	354	436	100	90	17,1	17,4	17,6	16,7	16,4	48,7
10	5/8	M 16	45,2	4,03	6,74	323	377	459	100	90	16,4	16,7	16,9	16,0	15,7	47,3
11	5/8	M 16	59,7	5,25	8,83	305	359	441	100	90	18,1	18,4	18,6	17,7	17,4	50,7
12	5/8	M 16	78,5	6,98	11,69	303	357	439	100	115	17,1	17,4	17,6	16,7	16,4	56,7
13	3/4	M 20	107,0	9,31	15,72	379	437	529	120	115	23,9	24,2	24,5	23,2	22,7	70,4
14	1	M 24	140,0	12,32	20,72	368	439	523	175	115	24,8	50,2	50,6	23,7	23,5	72,2
15	1 1/8	M 30	187,0	16,64	27,86	421	522	596	165	120	36,5	37,5	38,4	34,4	33,9	96,1
16	1 1/2	M 36	262,4	23,35	39,09	423	529	618	185	120	57,9	59,7	61,3	54,1	54,3	151,0
17	1 1/2	M 36	348,9	31,05	51,90	537	643	732	185	120	71,6	73,4	75,0	67,0	67,2	179,0
18	1 3/4	M 42	465,9	41,00	68,95	463	574	678	200	125	127,0	130,0	133,0	120,0	119,0	319,0
19	2	M 48	620,0	54,56	91,76	603	745	833	215	125	179,0	184,0	188,0	169,0	169,0	422,0
20	2 1/4	M 56*	831,9	73,20	123,12	688	848	938	195	120	216,0	221,0	226,0	200,0	202,0	496,0
21	2 1/2	M 64*	1083,0	96,39	161,37	727	897	1007	245	120	250,0	257,0	264,0	276,0	271,0	590,0
22	3	M 80x6	1456,5	129,63	217,01	877	1124	1192	110	130	324,0	332,0	341,0	359,0	361,0	740,0

Fig. B268 Type A, B, C, D, E, G, Size 0 - 22

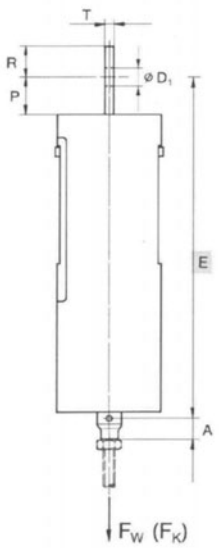
Size	Ø J-RH		Type A - G					Type B and C						Type D		Type E	Type A-C, G	Type G			
			B	C	ØD	F_{min}	F_{max}	$ØD_1$	P	R	S	T	T_1	K	L	A_1	A	$C\text{-}C_{max}$	G	H	S1
	inch	mm	mm																		
0	1/2	M 12	199	12	102	40	132	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
1	1/2	M 12	220	12	102	40	132	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
2	1/2	M 12	236	12	102	40	132	14	38	32	25	6	6	25	100	25	25	2000	40	60	20
3	1/2	M 12	256	12	102	40	132	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
4	1/2	M 12	267	12	102	40	132	14	38	32	25	6	6	25	100	25	25	2000	50	60	20
5	1/2	M 12	216	12	115	40	132	14	38	32	25	6	6	25	100	25	25	2900	50	60	20
6	1/2	M 12	222	12	115	45	137	18	38	32	30	6	6	30	100	30	30	2100	50	60	20
7	1/2	M 12	237	12	115	45	137	18	38	32	30	6	6	30	100	30	30	1600	50	60	20
8	1/2	M 12	252	12	115	45	137	18	38	32	30	6	6	30	100	30	30	1200	50	60	20
9	5/8	M 16	301	16	168	50	142	22	38	32	35	8	8	35	100	35	35	2300	75	80	30
10	5/8	M 16	324	16	168	50	142	22	38	32	35	8	8	35	100	35	35	1700	75	80	30
11	5/8	M 16	306	16	168	50	142	22	38	32	40	8	8	35	100	35	35	1300	75	80	30
12	5/8	M 16	304	16	168	50	142	22	38	32	40	8	8	35	100	35	35	2300	100	120	30
13	3/4	M 20	384	20	168	55	147	28	38	32	45	10	10	45	100	40	40	1700	100	120	30
14	1	M 24	373	20	168	55	147	33	51	38	45	10	10	50	100	40	40	1300	100	120	30
15	1 1/8	M 30	431	25	178	60	152	38	76	38	50	16	16	65	100	45	45	980	100	120	35
16	1 1/2	M 36	443	30	220	65	157	48	76	51	60	20	16	75	100	55	55	1700	100	180	55
17	1 1/2	M 36	557	30	220	65	157	48	76	51	70	20	16	75	100	55	55	1300	100	180	55
18	1 3/4	M 42	488	35	324	75	167	54	76	64	75	25	20	90	100	65	65	3500	100	300	70
19	2	M 48	633	40	324	80	172	58	102	77	80	25	20	100	100	70	70	2600	100	300	70
20	2 1/4	M 56*	723	45	324	90	182	70	115	77	85	25	20	115	100	80	80	2000	100	300	70
21	2 1/2	M 64*	777	55	324	95	187	78	115	102	90	25	20	130	100	90	90	2300	100	380	80
22	3	M 80x6	932	65	324	105	197	96	127	102	100	30	25	160	100	95	95	1700	100	380	80

Variable Spring Hanger Fig. 98 Type A, B, C, D, E, G - size 0 - 22

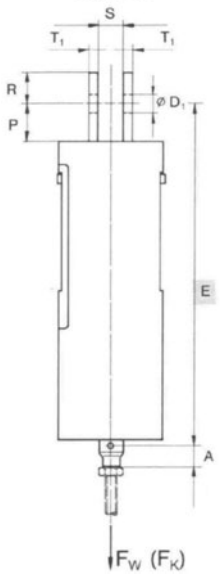
Type A



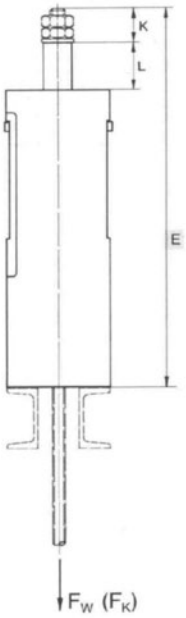
Type B



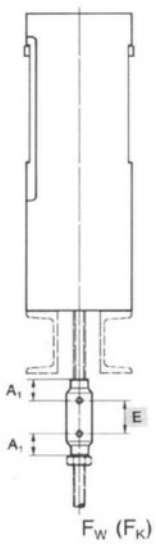
Type C



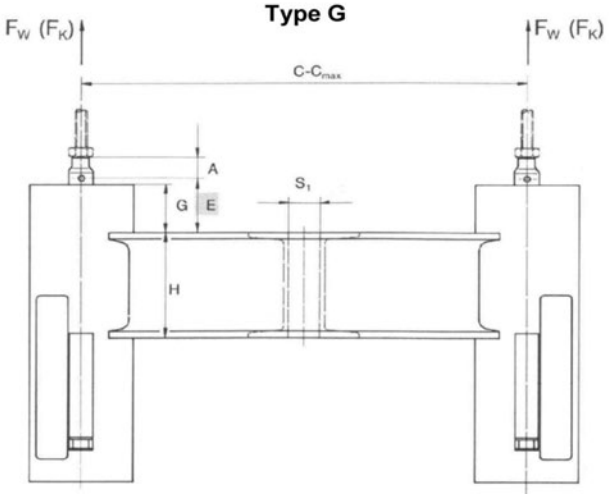
Type D



Type E



Type G



Table

Variable Spring Hanger Fig. 98 Type A, B, C, D, E, G - size 0 - 22

Fig. 98 Type A, B, C, D, E und G, Gr. 0 - 22

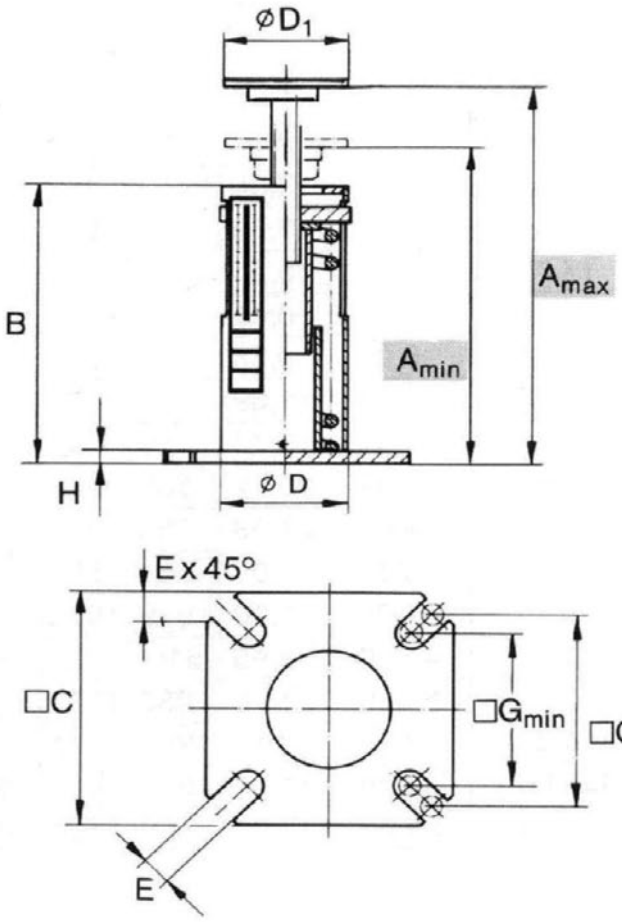
Size	Ø J-RH inch	Ø J-RH mm	Spring rate N/mm	Nominal load from kN	Nominal load to kN	E Type A (mm)	E Type B,C (mm)	E Type D (mm)	E Type E (mm)	E Type G (mm)	Weight Type A (kg)	Weight Type B (kg)	Weight Type C (kg)	Weight Type D (kg)	Weight Type E (kg)	Weight Type G (kg)
0	3/8	M 10	1,30	0,23	0,38	391	441	613	75	55	7,1	7,3	7,5	7,2	6,7	23,3
1	3/8	M 10	1,85	0,33	0,55	433	483	655	75	55	7,1	7,3	7,5	7,2	6,7	23,3
2	3/8	M 10	2,35	0,42	0,70	466	516	688	75	55	7,8	8,0	8,2	7,9	7,4	24,7
3	3/8	M 10	3,05	0,55	0,91	505	555	727	75	65	7,8	8,0	8,2	7,9	7,4	24,7
4	3/8	M 10	4,05	0,72	1,21	527	577	749	75	65	9,0	9,2	9,4	9,1	8,6	27,1
5	3/8	M 10	5,50	0,97	1,63	396	446	618	75	65	8,6	8,8	9,0	8,7	8,2	26,4
6	1/2	M 12	7,30	1,30	2,17	402	452	629	65	65	8,2	8,4	8,6	8,3	7,7	25,5
7	1/2	M 12	9,55	1,72	2,86	432	482	659	65	65	8,5	8,7	8,9	8,6	8,0	26,1
8	1/2	M 12	13,15	2,32	3,89	462	512	689	65	65	9,9	10,1	10,3	9,9	9,3	28,9
9	5/8	M 16	17,75	3,12	5,25	543	597	779	100	90	27,2	27,5	27,7	27,1	26,2	68,9
10	5/8	M 16	22,60	4,03	6,74	589	643	825	100	90	26,1	26,4	26,6	25,9	25,0	66,7
11	5/8	M 16	29,85	5,25	8,83	552	606	788	100	90	29,3	29,6	29,8	29,2	28,3	73,2
12	5/8	M 16	39,25	6,98	11,69	549	603	785	100	115	27,4	27,7	27,9	27,2	26,3	77,3
13	3/4	M 20	53,50	9,31	15,72	686	744	936	120	115	39,4	39,7	40,0	38,7	37,5	101,0
14	1	M 24	70,00	12,32	20,72	663	734	918	175	115	40,8	41,3	41,7	39,7	38,5	104,0
15	1 1/8	M 30	93,50	16,64	27,86	756	857	1031	165	120	60,2	61,2	62,1	57,7	55,4	144,0
16	1 1/2	M 36	131,20	23,35	39,09	751	857	1046	185	120	92,3	94,1	96,7	87,9	85,6	222,0
17	1 1/2	M 36	174,45	31,05	51,90	979	1085	1274	185	120	120,0	122,0	123,0	114,0	111,0	275,0
18	1 3/4	M 42	232,95	41,00	68,95	810	921	1125	200	125	198,0	201,0	204,0	190,0	185,0	460,0
19	2	M 48	310,00	54,56	91,76	1085	1227	1415	215	125	297,0	302,0	306,0	284,0	280,0	660,0
20	2 1/4	M 56*	415,95	73,20	123,12	1251	1411	1601	195	120	366,0	372,0	376,0	344,0	341,0	799,0
21	2 1/2	M 64*	541,50	96,39	161,37	1318	1488	1698	245	120	415,0	423,0	430,0	380,0	377,0	921,0
22	3	M 80x6	728,25	129,63	217,01	1599	1791	2014	110	130	566,0	576,0	590,0	509,0	495,0	1225,0

Fig. 98 Type A, B, C, D, E und G, Gr. 0 - 22

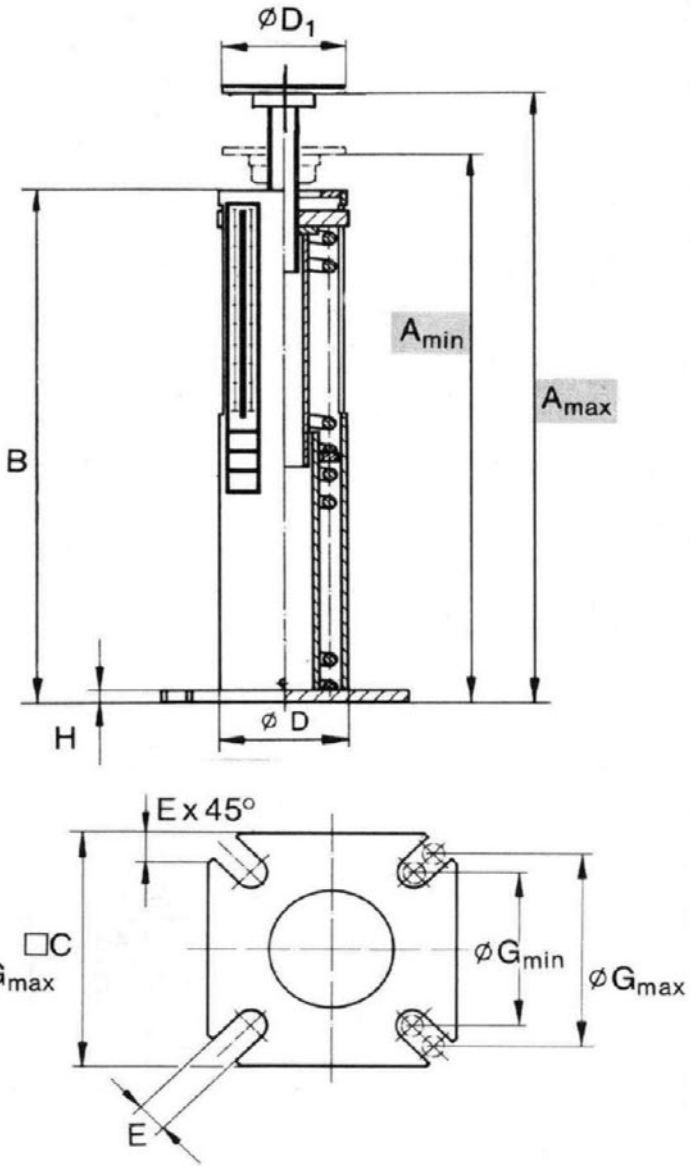
Size	Ø J-RH inch	Ø J-RH mm	Type A - G B (mm)	C	ØD	F_{min}	F_{max}	Type B und C $ØD_1$ (mm)	P	R	S	T	T_1	Type D K (mm)	L	Typ E A_1 (mm)	Typ A-C G A	Type G $C\text{-}C_{max}$ (mm)	G	H	S1
0	3/8	M 10	388	12	102	40	224	14	38	32	25	6	6	25	200	25	25	2000	40	60	20
1	3/8	M 10	430	12	102	40	224	14	38	32	25	6	6	25	200	25	25	2000	40	60	20
2	3/8	M 10	463	12	102	40	224	14	38	32	25	6	6	25	200	25	25	2000	40	60	20
3	3/8	M 10	502	12	102	40	224	14	38	32	25	6	6	25	200	25	25	2000	50	60	20
4	3/8	M 10	524	12	102	40	224	14	38	32	25	6	6	25	200	25	25	2000	50	60	20
5	3/8	M 10	393	12	115	40	224	14	38	32	25	6	6	25	200	25	25	2900	50	60	20
6	1/2	M 12	399	12	115	45	229	18	38	32	30	6	6	30	200	30	30	2100	50	60	20
7	1/2	M 12	429	12	115	45	229	18	38	32	30	6	6	30	200	30	30	1600	50	60	20
8	1/2	M 12	459	12	115	45	229	18	38	32	30	6	6	30	200	30	30	1200	50	60	20
9	5/8	M 16	544	16	168	50	234	22	38	32	35	8	8	35	200	35	35	2300	75	80	30
10	5/8	M 16	590	16	168	50	234	22	38	32	35	8	8	35	200	35	35	1700	75	80	30
11	5/8	M 16	553	16	168	50	234	22	38	32	40	8	8	35	200	35	35	1300	75	80	30
12	5/8	M 16	550	16	168	50	234	22	38	32	40	8	8	35	200	35	35	2300	100	120	30
13	3/4	M 20	691	20	168	55	239	28	38	32	45	10	10	45	200	40	40	1700	100	120	30
14	1	M 24	668	20	168	55	239	33	51	38	45	10	10	50	200	40	40	1300	100	120	30
15	1 1/8	M 30	766	25	178	60	244	38	76	38	50	16	16	65	200	45	45	980	100	120	35
16	1 1/2	M 36	771	30	220	65	249	48	76	51	60	20	16	75	200	55	55	1700	100	180	55
17	1 1/2	M 36	999	30	220	65	249	48	76	51	70	20	16	75	200	55	55	1300	100	180	55
18	1 3/4	M 42	835	35	324	75	259	54	76	64	75	25	20	90	200	65	65	3500	100	300	70
19	2	M 48	1115	40	324	80	264	58	102	77	80	25	20	100	200	70	70	2600	100	300	70
20	2 1/4	M 56*	1286	45	324	90	274	70	115	77	85	25	20	115	200	80	80	2000	100	300	70
21	2 1/2	M 64*	1368	55	324	95	279	78	115	102	90	25	20	130	200	90	90	2300	100	380	80
22	3	M 80x6	1654	65	324	105	289	96	127	102	100	30	25	160	200	95	95	1700	100	380	80

Variable Spring Hanger Fig. B268, 98 and 82, Type F - size 0 - 22

Spring Support Fig. B268 and 82, Type F
Size 0-22



Spring Support Fig. 98, Type F
Size 0-22



Table

Variable Spring Hanger Fig. B268, 98 and 82, Type F - size 0 - 22

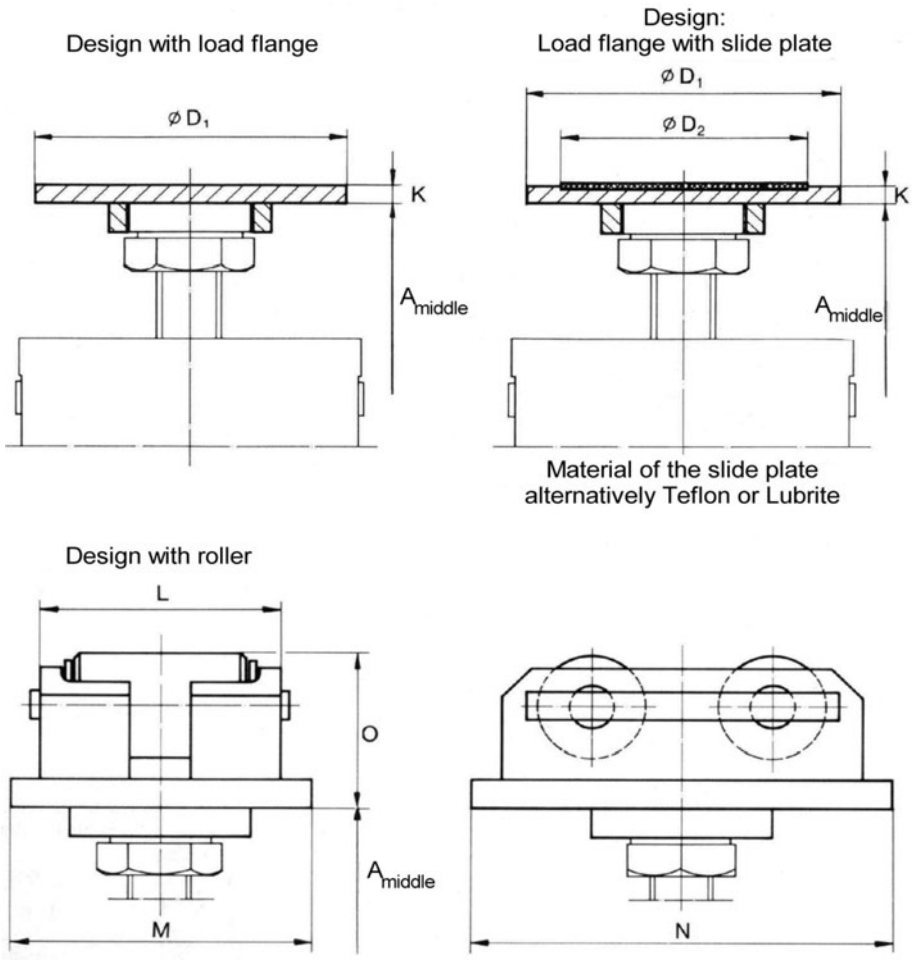
Fig. B268,98 und 82, Type F

Size	Fig. 82,98,B268 Nominal load from - to [kN]		Fig. 82	Fig. 98	Fig. B268	Fig. 82								
			Spring rate N / mm			A_{min}	A_{max}	B	□ C	ØD	$ØD_1$	$□G_{min}$	$□G_{max}$	Weight kg
						mm								
0	0,23	0,38	5,2	1,30	2,6	209	222	169	170	89	90	100	130	5,2
1	0,33	0,55	7,4	1,85	3,7	201	214	161	170	89	90	100	130	5,3
2	0,42	0,70	9,4	2,35	4,7	221	234	181	170	89	90	100	130	5,5
3	0,55	0,91	12,2	3,05	6,1	227	240	187	190	115	110	126	158	7,0
4	0,72	1,21	16,2	4,05	8,1	214	227	174	190	115	110	126	158	7,6
5	0,98	1,63	22,0	5,50	11,0	198	211	158	190	115	110	126	158	7,7
6	1,30	2,17	29,2	7,30	14,6	207	220	167	190	115	110	126	158	7,8
7	1,72	2,86	38,2	9,55	19,1	209	222	169	190	115	110	126	158	8,1
8	2,32	3,89	52,6	13,15	26,3	222	235	182	190	140	140	136	158	10,0
9	3,12	5,25	71,0	17,75	35,5	224	237	184	250	178	170	163	205	19,7
10	4,03	6,74	90,4	22,60	45,2	242	255	202	250	178	170	163	205	21,5
11	5,25	8,83	119,4	29,85	59,7	214	227	174	336	220	210	200	298	30,3
12	6,98	11,69	157,0	39,25	78,5	232	245	192	336	220	210	200	298	32,9
13	9,31	15,72	214,0	53,50	107,0	262	275	222	336	220	210	200	298	36,5
14	12,32	20,72	280,0	70,00	140,0	260	273	220	336	220	210	200	298	37,6
15	16,65	27,86	374,0	93,50	187,0	292	305	252	336	220	210	200	298	43,4
16	23,35	39,09	524,8	131,20	262,4	317	330	277	336	220	210	200	298	52,5
17	31,05	51,90	697,8	174,45	348,9	353	366	313	336	220	210	200	298	58,3
18	41,00	68,95	931,8	232,95	465,9	326	339	286	440	324	320	283	402	115,0
19	54,56	91,76	1240,0	310,00	620,0	394	407	354	440	324	320	283	402	143,0
20	73,21	123,12	1663,8	415,95	831,9	436	449	396	440	324	320	283	402	156,0
21	96,39	161,37	2166,0	541,50	1083,0	440	453	400	440	324	320	283	402	179,0
22	129,63	217,01	2913,0	728,25	1456,5	521	534	481	440	324	320	283	402	213,0

Fig. B268,98 und 82, Type F

Size	Fig. 82,98,B268		Fig. 98, B268					Fig. 98				Fig. 268			
	E	H	□ C	ØD	$ØD_1$	$□G_{min}$	$□G_{max}$	A_{min}	A_{max}	B	Weight kg	A_{min}	A_{max}	B	Weight kg
	mm		mm					mm				mm			
0	18	6	190	102	100	126	158	474	524	374	11,6	235	260	185	7,6
1	18	6	190	102	100	126	158	516	566	416	11,6	256	281	206	7,6
2	18	6	190	102	100	126	158	549	599	449	12,4	272	297	222	8,0
3	22	6	190	102	100	126	158	588	638	488	12,4	292	317	242	8
4	22	10	190	102	100	126	158	614	664	514	14,7	307	332	257	9,8
5	22	10	190	115	110	126	158	513	563	413	13,7	256	281	206	9,1
6	22	10	190	115	110	126	158	514	564	414	13,1	257	282	207	8,8
7	22	10	190	115	110	126	158	544	594	444	13,5	272	297	222	9,1
8	22	10	190	115	110	126	158	574	624	474	15,0	287	312	237	9,8
9	22	12	230	168	170	155	195	632	682	532	33,3	339	364	289	21,6
10	22	12	230	168	170	155	195	678	728	578	32,5	362	387	312	21,3
11	22	12	230	168	170	155	195	641	691	541	41,2	344	369	294	26,5
12	22	12	230	168	170	155	195	638	688	538	39,5	342	367	292	25,8
13	22	12	230	168	170	155	195	765	815	665	54,4	408	433	358	34,0
14	22	12	230	168	170	155	195	742	792	642	54,4	397	422	347	33,9
15	22	12	250	178	170	163	205	820	870	720	71,6	435	460	385	43,0
16	22	16	336	220	210	200	298	814	864	714	103,0	436	461	386	64,7
17	22	16	336	220	210	200	298	1042	1092	942	132,0	550	575	500	79,8
18	22	20	440	324	320	283	402	867	917	767	218,0	470	495	420	142,0
19	22	20	440	324	320	283	402	1137	1187	1037	320,0	605	630	555	194,0
20	22	20	440	324	320	283	402	1298	1348	1198	402,0	685	710	635	237,0
21	22	20	440	324	320	283	402	1360	1410	1260	435,0	719	744	669	251,0
22	22	20	440	324	320	283	402	1621	1671	1521	558,0	849	874	799	313,0

Variable Spring Hanger, Fig. B268, 82 and 98, Type F - size 0 - 22



	Size	Design with load flange				Design with roller				Weight	
		ØD1		ØD2	K	L	M	N	O	load flange	roller
		Fig. 82	Fig. B268 Fig. 98								
		mm								kg	
Fig. B268, 82 und 98, Type F, Gr. 0-22	0	90	100	79	6	80	100	140	54	0,4	1,8
	1	90	100	79	6	80	100	140	54	0,4	1,8
	2	90	100	79	6	80	100	140	54	0,4	1,8
	3	110	100	79	6	80	100	140	54	0,4	1,8
	4	110	100	79	6	80	100	140	54	0,4	1,8
	5	110	110	79	6	80	100	140	54	0,4	1,8
	6	110	110	79	6	80	100	140	54	0,4	1,8
	7	110	110	79	6	80	100	140	54	0,4	1,8
	8	140	110	79	6	80	100	140	54	0,8	1,8
	9	170	170	139	12	140	160	200	65	2,2	10,0
	10	170	170	139	12	140	160	200	65	2,2	10,0
	11	210	170	139	12	140	160	200	65	4,0	10,0
	12	210	170	139	12	140	160	200	65	4,0	10,0
	13	210	170	139	12	140	160	200	65	4,0	10,0
	14	210	170	139	12	140	160	200	65	4,0	10,0
	15	210	210	139	12	140	160	200	65	4,0	10,0
	16	210	210	189	12	185	210	260	87	4,0	21,0
	17	210	320	189	12	185	210	260	87	4,0	21,0
	18	320	320	299	12	210	240	330	115	8,1	36,0
	19	320	320	299	12	210	240	330	115	8,1	36,0
	20	320	320	299	12	210	240	330	115	8,1	36,0
	21	320	320	299	12	210	240	330	115	8,1	36,0
	22	320	320	299	12	210	240	330	115	8,1	36,0

Sway Strut

Application

Sway Struts are used as compression-tension element mainly to reduce dynamic loads. Sway Struts can also be used as pipe guide in order to avoid expensive steel constructions.

Features

- Application for compression and tensile loads
- Almost no mechanical gap
- Adjustability of the total length in order to compensate installation tolerances of the building structure
- Variable angular position at the suspension point
- Slenderness ratio ≤ 150

Design

The type and the size of the Sway Strut are determined by means of the nominal load and the requested total length.

Deflection

Cross to the bolt axis max. ± 70°
In the bolt axis ± 5°

Qualification

Besides the design instructions like ASME III Subsection NF and KTA 3205.3, the Sway Struts are subjected to an experimental test program according to KTA 3205.3.

The following tests are performed:

A) Dimension control

- Eccentricity
- Measurement of the free motion

B) Dynamic tests at 10Hz

- 1,5 x F_N 2,5 x 10^1 load cycles
- 1,0 x F_N 3,3 x 10^3 load cycles
- 0,5 x F_N 4,7 x 10^4 load cycles
- 0,1 x F_N 3,3 x 10^5 load cycles

C) Nondestructive examination

- Liquid penetrant test

D) Failure at 150°

- tensile load at 5° deflection
- compression load at 0° deflection

E) Additional tests

In order to ensure for emergency condition the 1,5-fold nominal load and for faulted condition the 1,7-fold nominal load, the following tests were performed:

$$\text{Test load} = \frac{\text{failure load compression x 1,7 x 1,2}}{2,5}$$

Nameplate

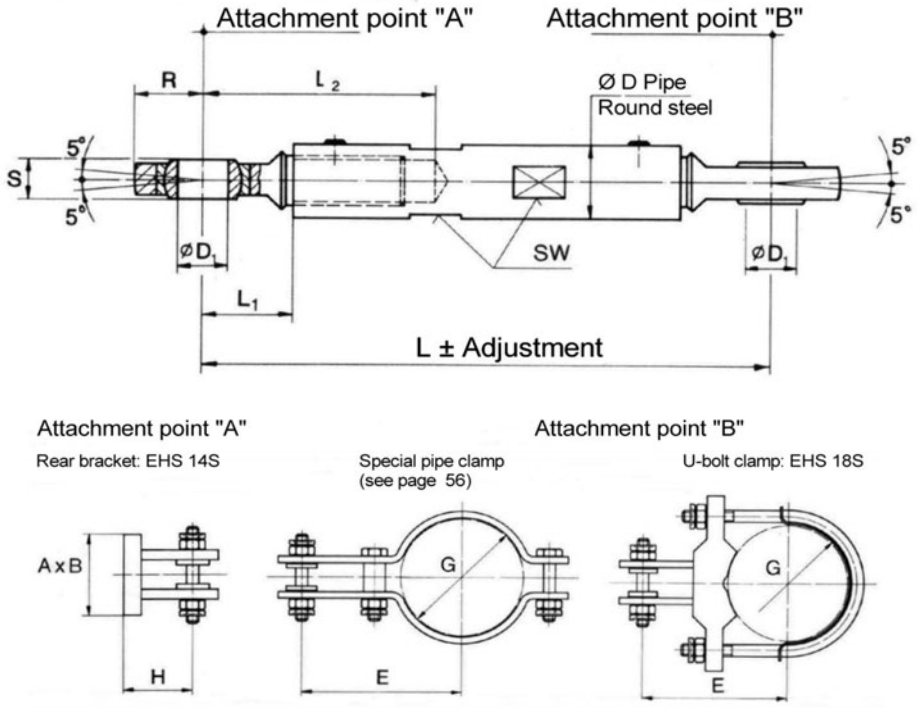
The following informations are given:

Fig.No.	= Figure number
Type	= Sway Strut type
Size	= Size
Ordering length	= Ordering length
Customer marking	= Customer marking
Pos.-No.	= Postition No.
M_A [Nm]	= Torque moment (for typ E2 only)

Details for ordering

Order no. Code according to the respective type sheets

Sway Strut, Fig. 211L, Type E1 - size A-I

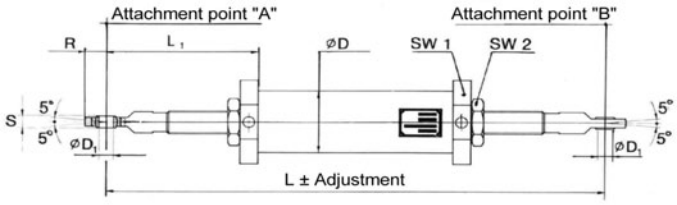


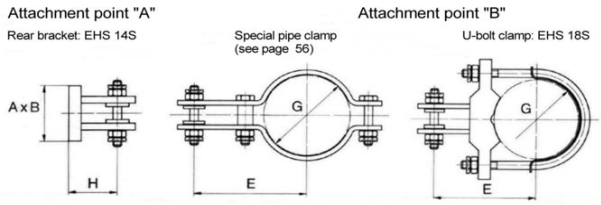
Sway Strut total weight = fixed parts weight + pipe weight portion (Rd.bar)
Pipe weight part (Rd.bar) = pipe weight (Rd.bar) kg / m x (L - 2 x L1)

	Size	Nom.load at 150°C kN	L min.	L max.	L_1	L_2	ØD	ØD1	R	S	SW	Σ Ad - justment	Weight Fix.parts kg	Weight Pipe kg/m
			mm											
Fig. 211L, Type E1	1	5	135	500	31,0	71,0	20	12	17,0	10	17	± 10	0,26	Ro. 1,85 Rd. 2,48
	2	13	150	500	36,5	81,5	20	15	20,0	12	17	± 15	0,35	Ro. 1,71 Rd. 2,47
	3	32	180	550	45,0	100,0	30	20	26,5	16	27	± 20	0,90	Ro. 4,03 Rd. 5,55
	4	45	230	550	53,5	123,5	34	25	32,0	20	27	± 25	1,65	4,62
	5	78	250	600	60,0	140,0	45	30	36,5	22	36	± 30	3,02	8,51
	6	130	330	750	95,0	205,0	61	45	51,0	32	50	± 50	8,35	14,8
	7	234	425	850	122,5	252,5	77	60	67,5	44	65	± 55	17,56	23,7
	8	380	500	900	142,5	282,5	102	70	80,0	49	90	± 65	29,1	47,5
	9	600	570	1000	165,0	320,0	108	80	90,0	55	90	± 70	39,93	51,4

The L_{min} / L_{max} dimension includes the total adjustment of the Sway Strut

Sway Strut, Fig. 211L, Type E2 - size A-I





Sway Strut total weight = fixed parts weight + pipe weight portion (Rd.bar)
Pipe weight part (Rd.bar) = pipe weight (Rd.bar) kg / m x (L - 2 x L1)

	Size	Nom.load at 150°C kN	L min.	L max.	L_1	ØD	$ØD_1$	R	S	SW2	SW1	Σ Ad - justment	Weight Fix. parts kg	Weight Pipe kg/m
			◄ mm ►											
Fig. 211L, Type E2	1	3									36	± 90 ± 200		
	2	5	440 680	750 2000	125 180	60	12	17,0	10	75	36	± 90 ± 200	2,32 3,22	5,0
	3	13	440 700	750 2500	135 191	60	15	20,0	12	75	36	± 90 ± 150/–200	2,54 3,35	5,0
	4	32	500 850	940 3000	180 235	76	20	26,5	16	90	75	± 90 ± 200	8,64 12,34	12,1
	5	45	500 850	940 3000	192 252	76	25	32,0	20	90	75	± 90 ± 200	9,14 13,04	12,1
	6	78	540 870	980 3000	213 268	76	30	36,5	22	90	75	± 90 ± 200	10,14 13,94	12,1
	7	130	690 1020	1050 3000	283 345	102	45	51,0	32	120	95	± 90 ± 200	24,69 31,99	22,6
	8	180										± 90 ± 200		22,6
	9	234	800 1050	1100 3000	310 365	140	60	67,5	44	170	105	± 90 ± 200	46,38 53,88	32,0
	10	390	850 1100	1130 3000	335 390	140	70	80,0	49	170	105	± 90 ± 200	52,58 59,98	32,0
	11	600	950 1200	1230 3000	375 430	168	80	90,0	55	185	115	± 90 ± 200	80,73 90,03	39,0
	12	750	1150	4000	346	168	90	105,0	60	185	155	± 200		65,1
	13	900	1200	4000	335	178	90	105,0	60	185	155	± 200		69,1
	14	1000	1200	4000	340	178	100	120,0	70	185	155	± 200		69,1
	15	1250	1420	4000	355	219	110	127,5	70	245	200	± 200		108,0
	16	1750	1420	4000	370	245	120	142,5	85	255	200	± 200		136,0
	17	2000	1680	5000	410	273	140	165,5	90	300	255	± 200		154,0
	18	2500	1720	5000	425	298	160	183,0	105	340	255	± 200		170,0
	19	3000	1820	6000	475	406	180	210,5	105	350	365	± 200		237,0
	20	4000	1950	6000	500	457	200	228,0	130	400	365	± 200		268,0

The L_{min} / L_{max} dimension includes the total adjustment of the Sway Strut

Sway Strut, Special Pipe Clamp, Fig. 211L, 200A, 201A - pipe size 15 - 900

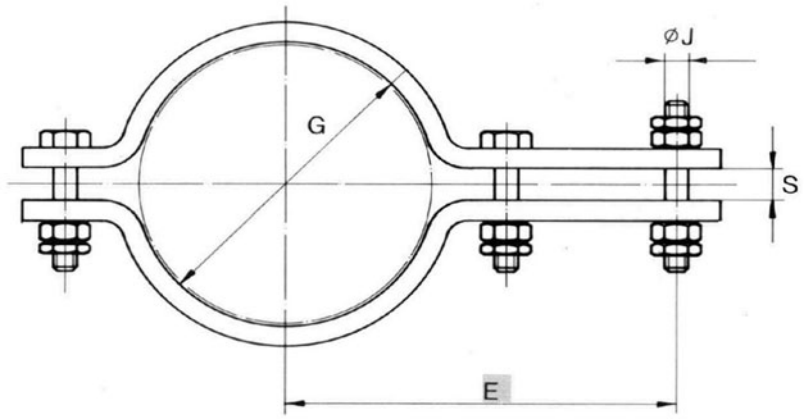


Fig. 211L, 200A, 201A

Pipe size inch	Pipe size mm	ØG mm	E [mm] for Sway Strut Size, Fig. 211L: Size A	Size B	Size C	Size D	Size E	Size F	Size G	Size H	Size I
			E [mm] for Hydr. Snubber Size, Fig. 200A/201A: -	Size 1 1/2"	-	Size 2 1/2"	Size 3 1/4"	Size 4"	Size 5"	Size 6"	Size 8"
1/2	15	22	80	85	-	-	-	-	-	-	-
3/4	20	27	85	90	-	-	-	-	-	-	-
1	25	34	95	100	115	-	-	-	-	-	-
1 1/4	32	43	100	105	120	-	-	-	-	-	-
1 1/2	40	49	105	110	125	-	-	-	-	-	-
2	50	61	110	120	135	-	-	-	-	-	-
2 1/2	65	77	120	130	150	160	180	-	-	-	-
3	80	90	130	140	160	175	190	-	-	-	-
3 1/2	90	102	135	145	170	185	200	-	-	-	-
4	100	115	145	155	180	200	220	-	-	-	-
5	125	141	155	165	190	210	235	-	-	-	-
6	150	169	175	185	210	230	260	280	300	310	340
8	200	220	195	215	240	260	290	300	330	340	380
10	250	274	225	245	270	290	325	335	360	370	420
12	300	325	250	270	295	315	350	360	390	405	450
14	350	360	270	290	315	335	370	380	420	430	480
16	400	411	310	330	355	375	410	420	450	455	500
18	450	463	330	350	375	395	435	445	480	490	550
20	500	514	360	380	405	425	465	480	520	530	570
22	550	565	400	420	450	475	515	530	570	575	610
24	600	617	430	450	480	505	540	545	590	595	650
28	700	719	480	500	530	555	590	595	630	635	690
30	750	769	-	550	-	590	625	630	670	675	730
32	800	822	-	600	-	630	665	670	710	715	750
34	850	873	-	650	-	670	705	710	750	755	780
36	900	924	-	700	-	720	755	760	800	800	810

Figure sizes 211L	200A 201A	Pipe size from / to [mm] 211L	200A 201A	Nominal-load F_N [kN]	ØJ mm	S mm
Size A	-	15 - 700	-	5	12	15
Size B	1 1/2"	15 - 700	90 - 900	13	15	18
Size C	-	25 - 700	-	32	20	30
Size D	2 1/2"	65 - 900	90 - 900	45	25	35
Size E	3 1/4"	65 - 900	90 - 900	78	30	40
Size F	4"	150 - 700	150 - 900	130	45	55
Size G	5"	150 - 700	150 - 900	234	60	70
Size H	6"	150 - 700	150 - 900	380	70	80
Size I	8"	150 - 700	150 - 900	600	80	90

Hydraulic Shock and Sway Suppressors (Snubbers)

Applications

PSS hydraulic shock- and sway suppressors are used to prevent damage to appliances, pipework, pressure vessels, valves and pumps which might otherwise be caused by dynamic forces applied suddenly. These include dynamic loading occurring during operation (water hammer, pipe bursts or shocks caused by safety-valves blowing off), and on the other hand by external influences (earthquakes, explosions and wind loads). In addition, the PSS snubbers can be used as **oscillation-dampers** for oscillating pipework and plant components, provided the amplitude exceeds 0.5 mm.

By using the snubbers the dynamic displacement is reduced to a minimum. Movements caused by temperature alteration are not obstructed by the snubbers.

Function

On imposition of a dynamic load moving the piston faster than the response velocity preset by PSS, the snubber valve closes and the snubber absorbs the force. The overflow valve or the bypass valve has the task of limiting the piston movement to the specified nominal loading.

Construction features

PSS snubbers can be installed in any desired position. The fluid level in the snubbers can be easily and reliably observed from the relative positions of the pistons rods.

PSS snubbers are modular designed. Matching and alterations to suit requirements are very easy to accomplish. This is how special solutions can be offered so quickly, in accordance with the customer's requirements.

The PSS snubber has two independently-operating pairs of valves, accessible externally. By this means the snubber can be optimised to the customer's requirements on the test-bench (response velocity, bypass velocity and reaction travel). Even after installation, adjustment is possible if required. Due to the independently-operating lock-up valves, the PSS snubbers also have adequate power when working in tension and compression directions at high frequency rates. When changing direction, the second valve can react before the first valve has returned to its starting position.

The PSS snubbers have only very little frictional and starting resistances, because friction areas are very small. We placed a high priority on low friction when selecting the sealing materials.
The initial pressure in the system required for tightness is very low. The seals are all made of high quality materials and have a very long service life.

Hydraulic Shock and Sway Suppressors (Snubbers)

When the PSS snubbers were designed, the following standards were taken into account:

VGB - Power-Tech guideline R510L
KTA - Nuclear Safety Standards Commission 3205.3
BS 3974, Part 1
ANSI B31.1
MSS SP 58
MSS SP 69
SVDB guidelines
ASME Section III, Sub-section NF

Models available

PSS hydraulic snubbers are available as a standard model, and as a special model designed for low-temperature and offshore uses.

Standard model
- Housing parts coated with extremely corrosion-resistant zinc-iron coating 10 - 15 µm.
- Piston rods coated all round with 40 µm electroless nickel and the shaft additionally coated with 20 µm of hard chrome.

Special model
- Housing parts of 1.4301 stainless steel and additionally galvanised with 15 µm nickel coating.
- Piston rods are made of chloride-resistant stainless steel with a 10 µm hard chrome coating on the shaft.

Further material combinations and special coatings are available at the customer's request.

Standard settings and test values at room temperature
in accordance with KTA 3205.3 and VGB-R510L:

Starting resistance:	max 2 % of the nominal load (or 300 N for snubbers with a nom. load less or equal
Frictional resistance:	15 kN)
	max 2 % of the nominal load
Response velocity:	(or 200 N for snubbers with a nom. load less or equal
Bypass velocity:	10 kN)
Piston rod travel Sa:	3 - 6 mm/s
Piston rod travel Sb:	0.2 - 2.0 mm/s
Temperature:	> 0.5 mm (lost motion) < amount + / - 0.02 nominal travel (peak to peak) max. operating temperature 80° C
Deflections:	(short-time operating temperature for a duration at max. 3 hours 150° C) max. deflection cross to the bolt axis: ± 70° max. deflection in the bolt axis: min. ± 5°

Hydraulic Shock and Sway Suppressors (Snubbers)

Allowable Loads

Cylinder - bore size (inches)	Figure	Figure with extension	1 x F_N Load case H* [kN] A / B** Normal / Upset	1,5 x F_N Load case HZ* [kN] C** Emergency	1,7 x F_N Load case HS* [kN] D** Faulted
1/4, 1/2, 1	200A	201A	7	10	12
1 1/2	200A,200B	201A,201B	13	20	22
2 1/2	200A,200B	201A,201B	45	68	77
3 1/4	200A,200B	201A,201B	78	117	133
4	200A	201A	121	182	206
5	200A	201A	202	303	343
6	200A	201A	303	455	515
8 1/2	202B	203	590	885	1003
10	202B	203	835	1253	1419
12	202B	203	1200	1800	2040
14	202B	203	1730	2595	2941
17	202B	203	2470	3705	4199
20 1/2	202B	203	3610	5415	6137
24 1/2	202B	203	5130	7695	8721
29 1/2	202B	203	7510	11265	12767
35 1/2	202B	203	10815	16223	18385
43	202B	203	16155	24233	27463

* = KTA Nuclear Safety Standards Commission 3205.3

** = ASME Section III, Sub-section NF

Hydraulic Shock and Sway Suppressors (Snubbers)

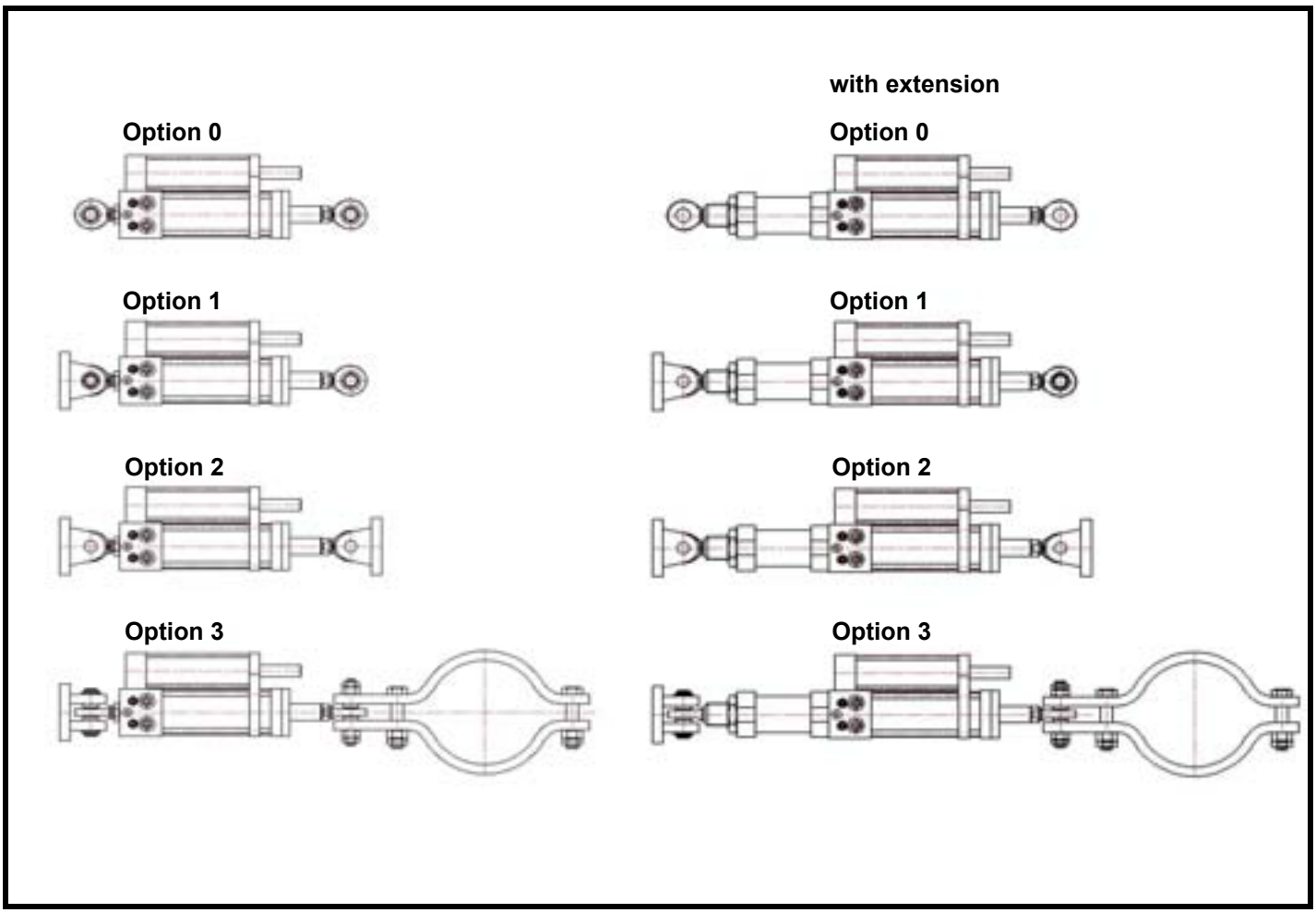


Fig. 200A, 200B, 202

Option 0: snubber body with 2 rod eyes,

Option 1: snubber body with 2 rod eyes
1 rear bracket EHS 14 S at the fixpoint

Option 2: snubber body with 2 rod eyes
2 rear brackets EHS 14 S

Option 3: snubber body with 2 rod eyes
1 rear bracket EHS 14 S at the fixpoint
1 special dynamic pipe clamp

Fig. 201A, 201B, 203 (with extension)

Option 0: snubber body with 2 rod eyes,
1 extension piece

Option 1: snubber body with 2 rod eyes
1 rear bracket EHS 14 S at the fixpoint
1 extension piece

Option 2: snubber body with 2 rod eyes
2 rear brackets EHS 14 S
1 extension piece

Option 3: snubber body with 2 rod eyes
1 rear bracket EHS 14 S at the fixpoint
1 extension piece
1 special dynamic pipe clamp

Hydraulic Shock and Sway Suppressors (Snubbers)

Technical Data Fig. 200A / 201A

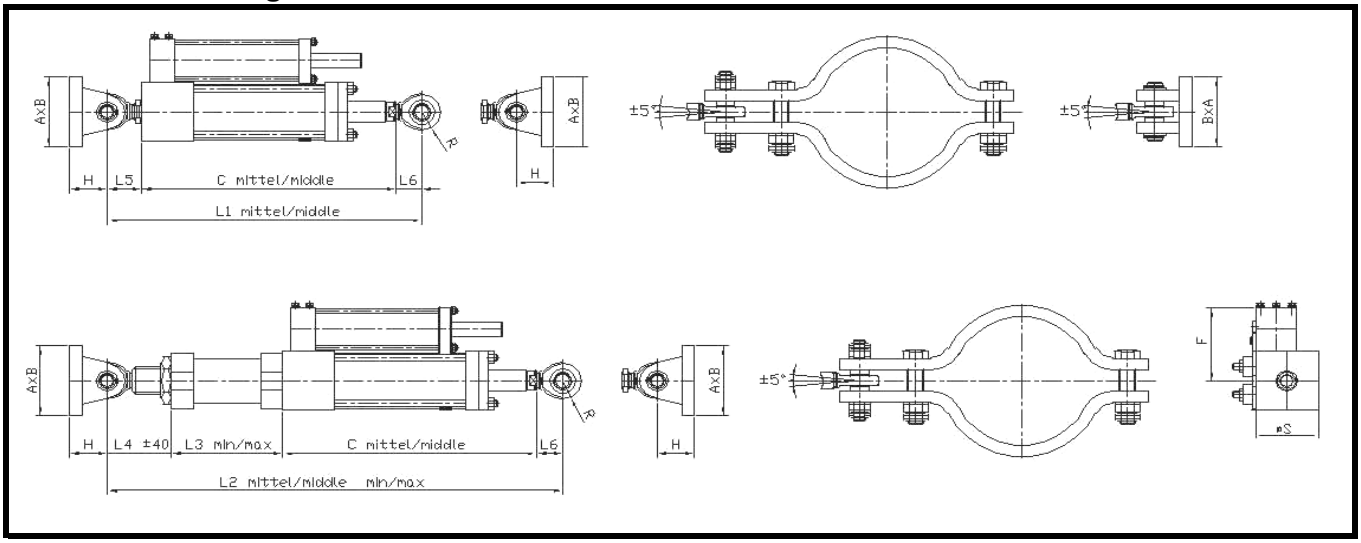


Fig. 200A / 201A			C	L_1	L_2 middle		L_3		L_4	A	B	H	ØD	L_5	L_6	R	F	S	K	EHS
Size	N.load	Stroke	middle	middle	min.	max.	min.	max.	±40											14 S
	kN	mm	mm																	Size
1 1/2"	13	127	386	489	719	1500	152	933	120	65	80	40	15	42	61	20,0	106,0	70	12	B
		254	576	679	909			743												
2 1/2"	45	127	408	505	784	2000	178	1394	157	120	120	60	25	56	41	32,0	121,0	100	20	D_1
		254	599	696	975			1203									145,0			
3 1/4"	78	127	440	547	840	2500	177	1837	178	140	140	70	30	62	45	36,5	160,0	130	22	E_1
		254	631	738	1031			1646									180,0			
4"	121	127	447	609	963	3000	212	2249	233	180	180	85	45	91	71	51,0	167,5	145	32	F_1
		254	638	800	1154			2058									187,5			
5"	202	127	471	689	1066	3000	250	2184	250	260	240	120	60	123	95	67,5	205,0	170	44	G_1
		254	662	880	1257			1993												
6"	303	127	510	761	1145	3000	250	2105	275	340	280	140	70	141	110	80,0	220,0	210	49	H
		254	700	951	1335			1915												
		254	742	1036	1442			1818												

special strokes on request

Hydraulic Shock and Sway Suppressors (Snubbers)

Technical Data Fig. 200B / 201B

Fig. 200B

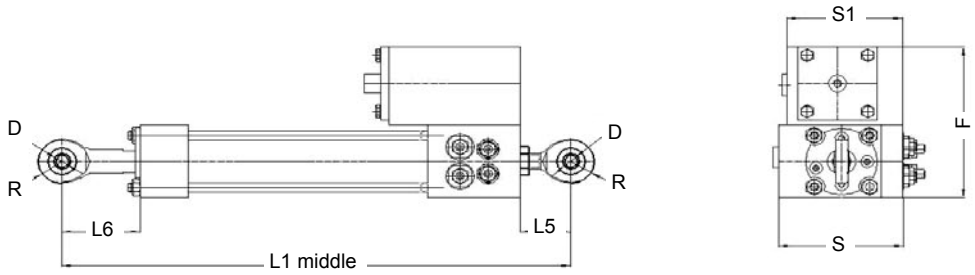
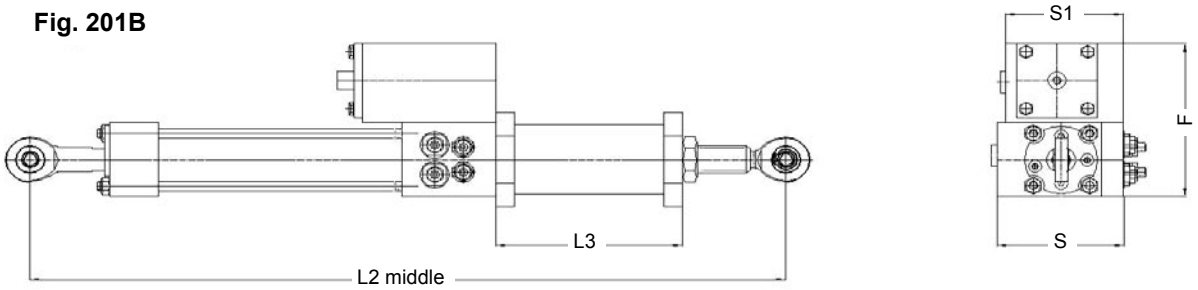


Fig. 201B



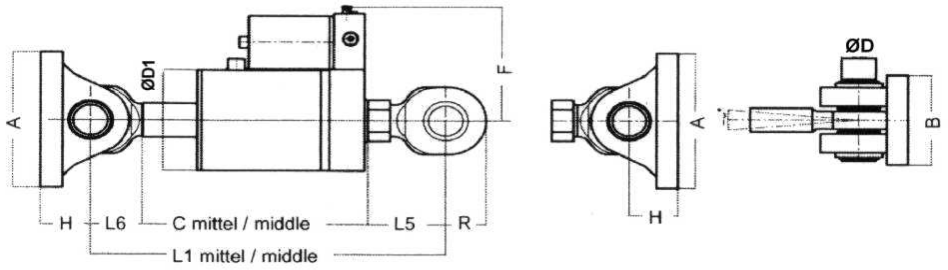
Size	N.load	Stroke		L1 midd.	L2 middle		L3		ØD	L5	L6	R	F	S	S1	weight
	kN	inch	mm	min.	min.	max.	min.	max.	mm							kg
1 1/2"	13	5"	127,0	489	641	1500	35	1011	15	45,5	61	20	135	103	96	13,5
		10"	254,0	679	831			821								15,0
2 1/2"	45	5"	127,0	505	683	2000	40	1495	25	50	57,5	32	200	115	105	26,5
		10"	254,0	696	874			1304								28,6
		15"	381,0	887	1113			1065								30,7
		20"	508,0	1078	1304			874								32,8
3 1/4 "	78	5"	127,0	547	770	2500	177	1907	30	63,5	65	37	240	135	130	37,1
		10"	254,0	738	961			1716								41,6
		15"	381,0	929	1152			1525								47,7
		20"	508,0	1120	1343			1334								52,3

special strokes on request

Hydraulic Shock and Sway Suppressors (Snubbers)

Technical Data Fig. 202 / 203

Figur 202



Figur 203

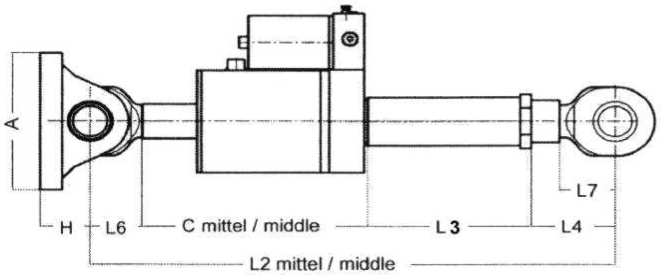


Fig. 202 / 203			C	L_1	L_2 ±40 middle		L_3		L_4	L5	L6	L7	A	B	H	ØD	R	F	ØD1
Size	N.load	Stroke	middle	middle	min.	max.	min.	max.	±40										
	kN	mm	mm																
8,5"	590	127	464,5	766,5	715,5	3081,5	95	2300	196	150,0	156	156	360	240	145	80	90,0	303	268
		254	591,5	893,5	842,5	3008,5	95	2100											
10"	835	127	511,5	856,5	821,5	3396,5	125	2500	225	185,0	160	160	400	320	170	90	100,0	350	310
		254	702,0	1047,0	948,5	3343,5	125	2320											
12"	1200	127	555,5	876,5	870,5	3718,5	140	2800	215	173,0	148	148	420	320	205	110	130,0	374	360
		254	746,0	1067,0	997,5	3665,5	140	2620											
14"	1730	127	604,5	966,5	945,5	4107,0	155	3100	235	194,5	170	170	450	350	220	120	137,5	410	420
		254	795,0	1157,0	1072,5	4054,0	155	2920											

sizes 17" up to 43" on request

Pipe clamp, Pipe guide, Insulation saddle

Application

PSS Accessories are used as connection between pipe and hanger and between hanger and construction. Rigid supports are consisting of accessories only.
The design of the accessories which are connected directly with the piping or which are subjected to temperature influences due to medium pipe/convection-temperature is based upon the hot yield strength.

Compared with the medium temperature the design temperature can be reduced as foolows:

a) Parts within the insulation:

for parts connected with the component: **$T = T_M - 20$ [Degree C]**
for bolts and nuts: **$T = T_M - 30$ [Degree C]**

b) Parts outside the insulation:

for constructions directly connected with the adjacent parts:
$T = 0{,}5 \times (T_M - 10)$ [Degree C]
however no less than 80 degree C

for adjacent bolts and nuts:
$T = 0{,}33 \times (T_M - 10)$ [Degree C]
however no less than 80 degree C

T_M = Medium temperature

for all other parts up to the contact surface of the steel parts: 80 degree C

The nominal loads of the accessories are based upon a design temperature of 80 Degree C/353 K or on the design temperature specified in the type sheets.

For higher temperatures the nominal loads indicated in the dimension table are to be reduced with the corresponding temperature corrective factor on catalogue next page.

Temperature corrective factors

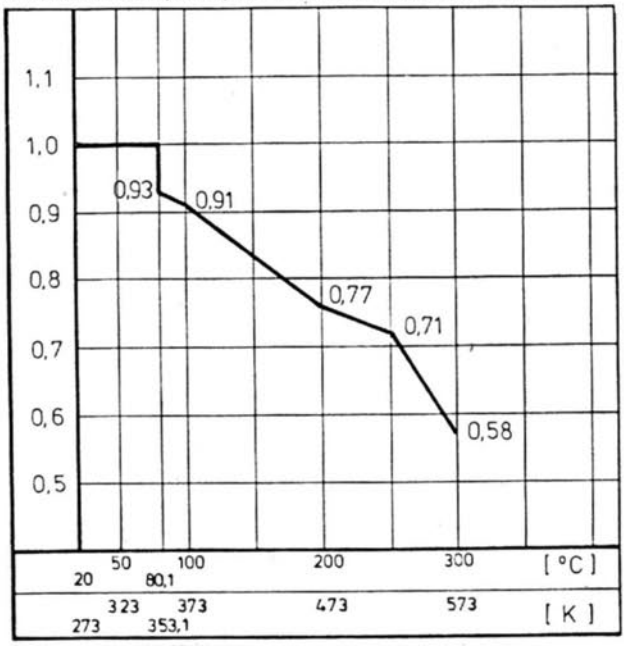
Application:

Pipe clamps and pipe accessories with a temperature > 80 degree C (shown is the weakest material of a combination with rounded temperature factors).

Application example at a pipe clamp, Fig 212 L, Pipe size 200		
RSt 37-2: FN at 300°C FN 300°C = FN 80°C x factor = 8,2 x 0,58 = 4,756 = 4,7 kN	**13CrMo44:** FN at 500°C $FN\ 500°C = \frac{FN\ 300°C \times 0,60}{0,74}$ $= \frac{8,6 \times 0,60}{0,74}$ = 6,972 = 7,0 kN	**X6CrNiTi1810:** FN at 300°C $FN\ 300°C = \frac{FN\ 550°C \times 0,66}{0,57}$ $= \frac{4,7 \times 0,66}{0,57}$ = 5,442 = 5,4 kN
RSt 37-2: FN at 250°C FN 250°C = FN 80°C x factor = 8,2 x 0,71 = 5,822 = 5,8 kN	**13CrMo44:** FN at 200°C $FN\ 200°C = \frac{FN\ 300°C \times 0,82}{0,74}$ $= \frac{8,6 \times 0,82}{0,74}$ = 9,529 = 9,5 kN	**X6CrNiTi1810:** FN at 200°C $FN\ 200°C = \frac{FN\ 550°C \times 0,76}{0,57}$ $= \frac{4,7 \times 0,76}{0,57}$ = 6,266 = 6,2 kN

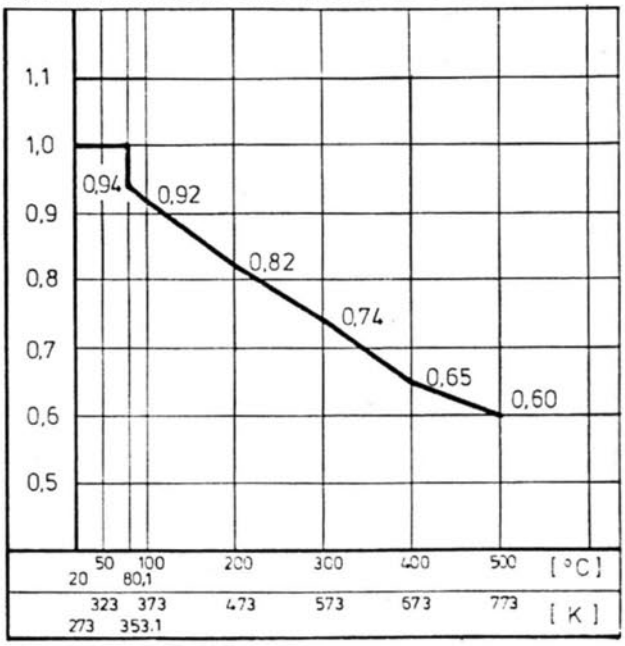
Temperature mean values are to be interpolated acc. to the pictures!

Pipe clamp made of RSt 37-2, bolt made of 8.8
Pipe clamp made of RSt 37-2, bolt made of 34CrNiMo6
Material: St 35.8, C 35, 42 CrMo 4, St 50-2, St 52-3, St 60 K



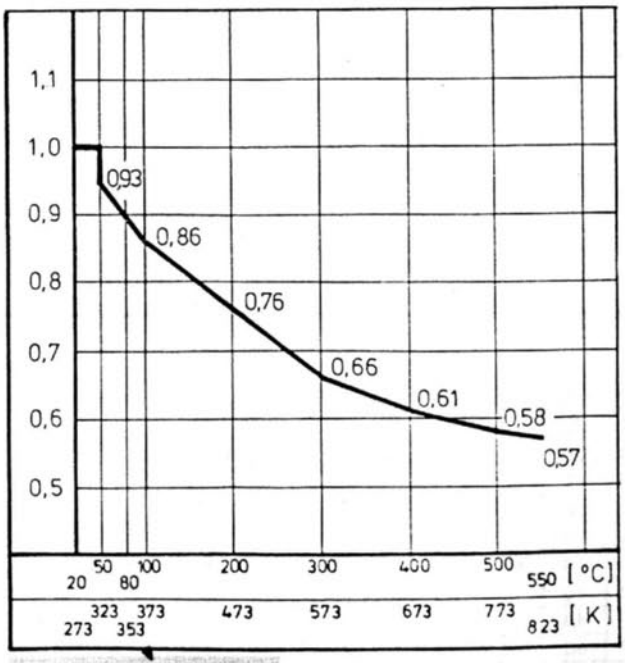
Pict. 46 RSt 37-2

Pipe clamp made of 13 CrMo 44, bolt made of 24 CrMo 5
Pipe clamp made of 13 CrMo 44, bolt made of 21 CrMo V 57



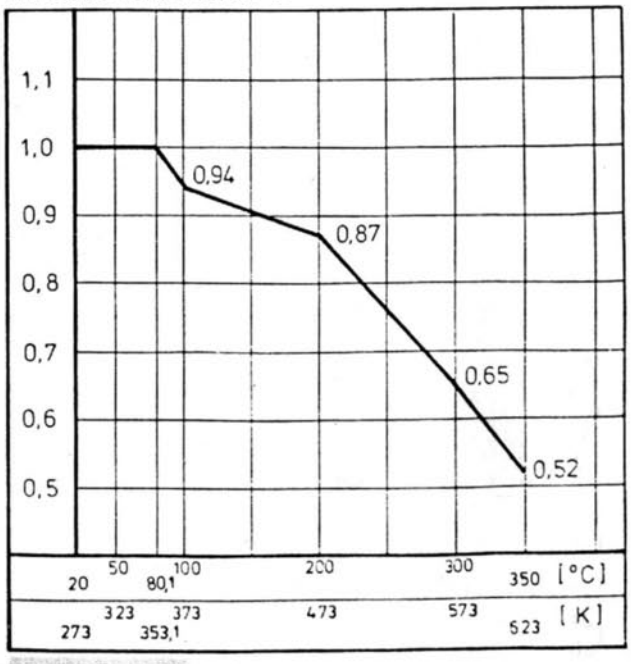
Pict. 47 13 CrMo 44

Pipe clamp made of X6 CrNiTi 1810
bolt made of X 22 CrMo V12 1



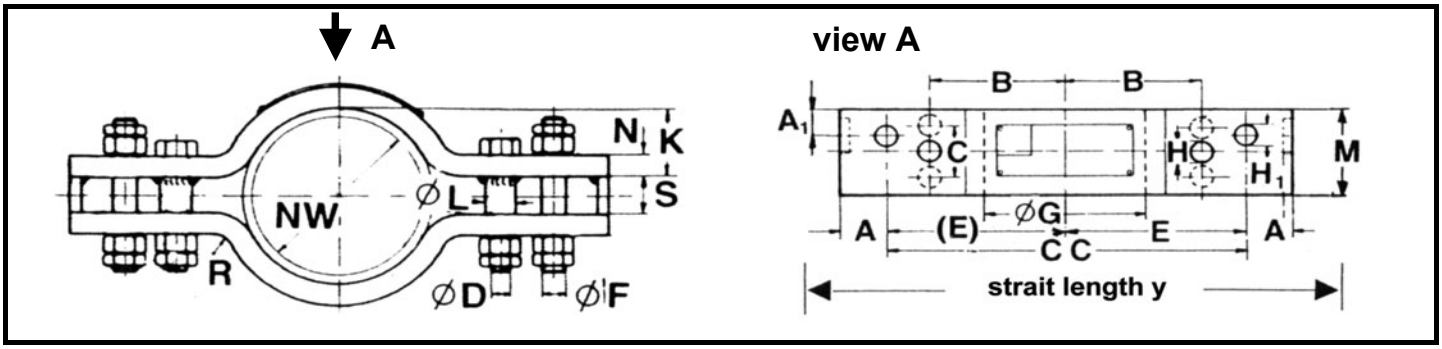
Pict. 48 X 6 CrNiTi 1810

Material: C 22.8, C 35, CK 45



Pict. 49 C 22.8

Fig. 40, Pipe clamp, pipe size 65 - 600



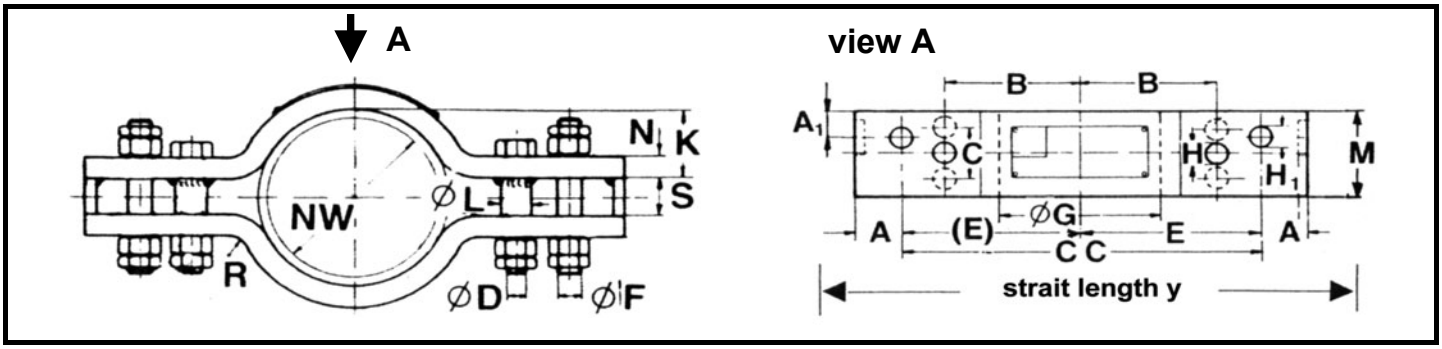
Pipe size inch	mm	ØG mm	Nom. load N	C-C max.	C	K	R	A_1	A	E	B	≈ Y	$ØH_1$	ØH	M x N Clamp	ØD Screw	ØF Bolt	S	ØL Dist.pipe	Weig. kg
				◄ mm ►																
$2^1/_2$	65	77	5890 3670 2670	300 460 600	-	26,0	15	32	50	150 230 300	82	417 577 717	18	14	100 x 15	M12 x 80	M16 x 120	25	26,9 x 5,6	11,0 15,0 18,5
3	80	90	5890 3670 2670	300 460 600	-	32,5	15	32	50	150 230 300	90	428 588 728	18	14	100 x 15	M12 x 80	M16 x 120	25	26,9 x 5,6	11,5 15,0 18,5
4	100	115	9120 5340 3780	300 460 600	-	41,5	15	35	50	150 230 300	105	430 590 730	22	18	130 x 15	M16 x 90	M20 x 130	32	38 x 8,8	15,5 20,5 24,5
6	150	169	16000 10900 8000 64000	460 600 760 900	-	65,5	20	38	64	230 300 380 450	152	637 777 977 1077	26	26	150 x 20	M24 x 120	M24 x 160	38	38,7 x 5	34,0 40,5 48,5 55,0
8	200	220	22000 17100 16700 10000	480 600 760 910	100	87,5	25	38	64	240 300 380 455	185	675 795 935 1105	39	26	200 x 25	M24 x 140	M36 x 200	45	38,7 x 5	61,5 71,0 82,5 96,0
10	250	274	- 27550 19600 15400	- 600 760 910	-	105,0	30	45	76	- 300 380 455	230	- 832 992 1142	39	39	150 x 30	M36 x 180	M36 x 230	64	60,3 x 8,8	- 71,0 82,5 93,5
12	300	325	34000 27400 21100 17100	680 760 910 1060	100	130,5	30	45	76	340 380 455 530	260	937 1017 1167 1317	45	39	200 x 30	M36 x 180	M42 x 250	64	60,3 x 8,8	108,0 115,5 130,0 141,5
14	350	360	47400 39800 29800 23900 20000	700 760 910 1060 1220	125	148,0	30	50	76	350 380 455 530 610	270	974 1034 1184 1334 1494	45	39	250 x 30	M36 x 180	M42 x 250	64	60,3 x 8,8	135,0 142,5 160,0 178,0 197,5
16	400	411	49400 40500 32300 26500	810 910 1060 1220	150	173,5	30	50	76	405 455 530 610	311	1111 1211 1361 1521	45	39	300 x 30	M36 x 180	M42 x 250	64	60,3 x 8,8	178,0 192,5 214,0 237,0
18	450	463	59200 52000 40900 35100	860 910 1060 1220	150	193,5	30	64	108	430 455 530 610	338	1243 1293 1443 1603	52	39	360 x 30	M36 x 200	M48 x 270	76	60,3 x 8,8	237,0 245,5 271,5 299,0
20	500	514	67800 51800 41800 35100	940 1060 1220 1370	150	216,0	40	70	108	470 530 610 685	368	1339 1459 1619 1769	62	45	300 x 40	M42 x 240	M56 x 320	82	70 x 12,5	292,0 315,0 346,5 374,5
24	600	617	71600 56000 46300 39100	1060 1220 1370 1520	150	267,5	40	76	108	530 610 685 760	420	1513 1673 1823 1973	70	52	300 x 40	M48 x 240	M64 x 340	82	76,1 x 10	337,5 368,0 397,0 426,0

Fig. 40

Material
S235JRG2 / 573K; 13 Cr Mo 45 / 773K; X10 Cr NI Ti 189 / 825K

Design
black or hot dip galvanized

Fig. 40L, Pipe clamp, pipe size 65 - 600

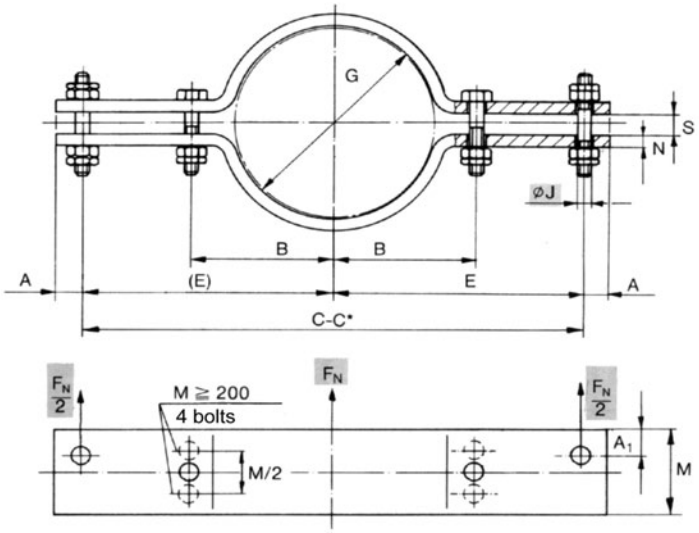


Pipe size inch	Pipe size mm	ØG mm	Nom. load N	C-C	C	K	R	A_1	A	E	B	≈ Y	$ØH_1$	ØH	M x N Clamp	ØD Screw	ØF Bolt	S	ØL Dist.pipe	Weig. kg
				◄ mm ►																
Fig. 40L																				
$2^1/_2$	65	77	2900	300	-	26,0	12	32	50	150	82	417	18	14	80 x 12	M12 x 75	M16 x 110	25	26,9 x 5,6	7,0
			1800	460						230		577								9,5
			1300	600						300		717								11,5
3	80	90	2900	300	-	32,5	12	32	50	150	90	423	18	14	80 x 12	M12 x 75	M16 x 110	25	26,9 x 5,6	7,0
			1800	460						230		583								9,5
			1300	600						300		723								11,5
4	100	115	4600	300	-	41,5	12	35	50	150	105	431	22	18	90 x 12	M16 x 90	M20 x 130	32	38 x 8,8	8,5
			2700	460						230		591								11,5
			1900	600						300		731								14,0
6	150	169	8000	460	-	65,5	15	38	64	230	152	640	26	26	150 x 15	M24 x 110	M24 x 150	38	38,7 x 5	25,5
			5500	600						300		780								30,5
			4000	760						380		940								35,5
			3200	900						450		1080								40,5
8	200	220	11000	480	-	87,5	20	38	64	240	185	678	26	26	150 x 20	M24 x 130	M24 x 170	45	38,7 x 5	35,5
			8600	600						300		798								41,5
			8300	760						380		958								49,0
			5000	910						455		1108								56,5
10	250	274	-	-	-	105,0	20	45	76	-	230	-	39	39	180 x 20	M36 x 160	M36 x 220	64	60,3 x 8,8	-
			13800	600						300		837								58,5
			9800	760						380		997								68,0
			7700	910						455		1147								76,5
12	300	325	17000	680	-	130,5	25	45	76	340	260	940	39	39	150 x 25	M36 x 170	M36 x 230	64	60,3 x 8,8	67,0
			13700	760						380		1020								72,0
			10600	910						455		1170								81,0
			8600	1060						530		1320								90,0
14	350	360	23700	700	-	148,0	25	50	76	350	270	978	39	39	180 x 25	M36 x 170	M36 x 230	64	60,3 x 8,8	81,0
			19900	760						380		1038								85,5
			14900	910						455		1188								96,0
			12000	1060						530		1338								107,0
			10000	1220						610		1498								118,5
16	400	411	24700	810	-	173,5	30	50	76	405	311	1111	45	39	180 x 30	M36 x 180	M42 x 260	64	60,3 x 8,8	110,0
			20300	910						455		1211								119,0
			16200	1060						530		1361								132,0
			13300	1220						610		1521								145,5
18	450	463	29600	860	100	193,5	30	64	108	430	338	1243	45	39	200 x 30	M36 x 190	M42 x 270	76	60,3 x 8,8	139,0
			26000	910						455		1293								144,0
			20500	1060						530		1443								158,5
			17600	1220						610		1603								173,5
20	500	514	33900	940	125	216,0	30	70	108	470	368	1346	45	45	250 x 30	M42 x 220	M42 x 280	82	70 x 12,5	187,0
			25900	1060						530		1466								201,5
			20900	1220						610		1626								220,5
			17600	1370						685		1776								238,5
24	600	617	35800	1060	125	267,5	30	76	108	530	420	1521	45	45	250 x 30	M42 x 220	M42 x 280	82	70 x 12,5	208,0
			28000	1220						610		1681								227,0
			23200	1370						685		1831								245,0
			19600	1520						760		1981								263,0

Material
S235JRG2 / 573K; 13 Cr Mo 45 / 773K; X10 Cr NI Ti 189 / 825K

Design
black or hot dip galvanized

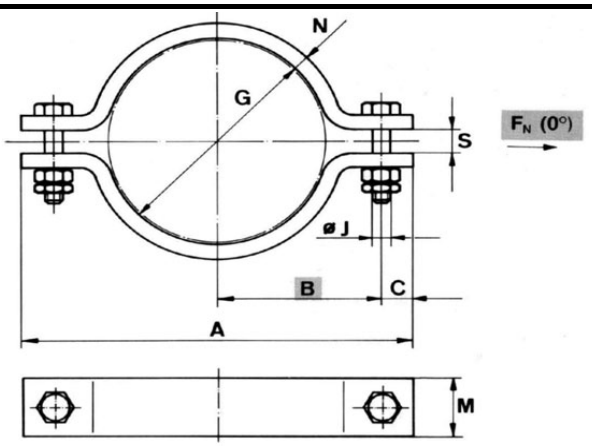
Fig. 40 S, Pipe clamp, pipe size 15 - 700



	Pipe size		ØG	C-C	A	A_1	B	E	ØJ	M	N	S	* Nominal load F_N [kN]					Weight
	inch	mm	◄ mm ►										S235JRG2		13 CrMo 45		X6CrNiTi	kg
													80°C	300°C	300°C	500°C	500-550°C	
Fig. 40S	1/2	15	22	240	20	20	35	120	M 12	40	6	15	1,1	0,7	1,2	1,0	0,7	1,3
	1	25	34	260	20	20	45	130	M 12	60	6	15	1,6	1,0	1,8	1,4	1,0	2,1
	2	50	61	320	20	20	65	160	M 12	60	10	15	3,7	2,2	4,1	3,3	2,2	3,9
	3	80	90	380	20	20	90	190	M 12	100	10	15	5,9	3,6	6,6	5,4	3,6	7,6
	4	100	116	480	40	40	120	240	M 16	150	15	18	15,7	9,7	17,6	14,4	9,7	23,7
	5	125	141	520	40	40	135	260	M 16	150	15	18	15,1	9,3	17,0	13,8	9,3	25,5
	6	150	170	660	40	40	160	330	M 16	150	20	18	20,2	12,4	22,7	18,5	12,4	41,9
	8	200	222	720	40	40	200	360	M 16	200	20	18	27,2	16,8	30,6	24,9	16,8	58,8
	10	250	276	780	70	70	230	390	M 24	200	30	30	57,5	35,5	64,8	52,7	35,5	103,0
	12	300	328	840	70	70	260	420	M 24	200	30	30	56,6	35,0	63,7	51,9	35,0	112,0
	14	350	360	900	70	70	280	450	M 24	250	30	30	68,8	42,5	77,5	63,1	42,5	150,0
	16	400	411	960	70	70	310	480	M 24	250	30	30	67,8	41,9	76,4	62,2	41,9	160,0
	18	450	462	1020	70	70	330	510	M 24	300	30	30	81,5	50,4	91,8	74,7	50,4	202,0
	20	500	513	1100	85	85	380	550	M 36	300	40	40	132,0	81,6	148,7	121,1	81,6	305,0
	22	550	565	1200	85	85	410	600	M 36	300	40	40	123,0	76,0	138,6	112,8	76,0	329,0
	24	600	612	1300	85	85	440	650	M 36	300	40	40	114,0	70,5	128,4	104,5	70,5	359,0
	28	700	714	1400	85	85	500	700	M 36	300	40	40	114,3	70,7	128,8	104,8	70,7	388,0

* Correction factors for imdiate temperature see catalogue page 65, pict. 46 - 48

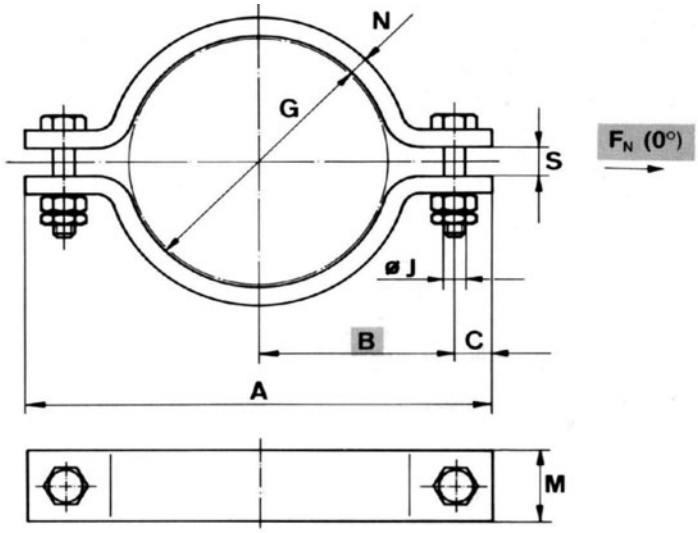
Fig. 212 L, 212 M, Pipe clamp, pipe size 15 - 1200



	Pipe size		ØG	A	B	C	ØJ	M	N	S	* Nominal load F_N [kN]					Weight
	inch	mm	mm								S235JRG2		13 CrMo 45		X6CRNiTi 18-10	kg
											80°C	300°C	300°C	500°C	500-550°C	
Fig. 212L	1/2	15	22	86	28	15	M 10	30	5	7	6,9	4,2	6,9	5,6	6,5	0,3
	3/4	20	27	96	33	15	M 10	30	5	7	6,9	4,2	6,9	5,6	6,4	0,3
	1	25	34	102	36	15	M 10	30	5	7	6,9	4,2	6,9	5,6	5,2	0,4
	1 1/4	32	43	112	41	15	M 10	30	5	7	6,9	4,2	6,9	5,6	4,2	0,4
	1 1/2	40	49	118	44	15	M 10	30	5	7	6,6	3,8	6,9	5,6	3,8	0,4
	2	50	61	144	54	18	M 12	40	6	9	6,9	4,2	6,9	5,6	6,0	0,8
	2 1/2	65	77	158	61	18	M 12	40	6	9	6,9	4,2	6,9	5,6	4,9	0,9
	3	80	89	172	68	18	M 12	40	6	9	6,9	4,2	6,9	5,6	4,4	1,0
	3 1/2	90	102	208	80	24	M 16	50	8	11	14,3	8,2	15,0	12,2	8,2	1,9
	4	100	115	226	89	24	M 16	50	8	11	13,0	7,5	13,7	11,1	7,5	2,1
	5	125	140	252	102	24	M 16	50	8	11	11,3	6,5	11,9	9,6	6,5	2,3
	6	150	169	280	116	24	M 16	50	8	11	9,9	5,7	10,3	8,4	5,7	2,6
	8	200	220	332	142	24	M 16	50	8	11	8,2	4,7	8,6	7,0	4,7	3,1
	10	250	273	408	174	30	M 20	60	8	14	8,0	4,6	8,4	6,8	4,6	4,7
	12	300	324	458	199	30	M 20	60	8	14	7,1	4,1	7,5	6,1	4,1	5,3
	14	350	356	492	216	30	M 20	60	8	14	6,7	3,8	7,0	5,7	3,8	5,7
	16	400	407	570	249	36	M 24	70	10	18	10,6	6,1	11,1	9,0	6,1	9,6
	18	450	457	620	274	36	M 24	70	10	18	9,8	5,6	10,3	8,4	5,6	10,5
	20	500	508	672	300	36	M 24	70	10	18	9,2	5,3	9,6	7,8	5,3	11,4
	22	550	565	780	345	45	M 30	90	15	25	22,2	12,7	23,2	18,9	12,7	24,7
	24	600	616	830	370	45	M 30	90	15	25	20,4	12,0	21,9	17,8	12,0	26,4
	28	700	719	940	425	45	M 30	90	15	25	18,8	10,8	19,7	16,0	10,8	30,0
	30	750	770	990	450	45	M 30	90	15	25	17,9	10,3	18,8	15,3	10,3	31,6
	32	800	821	1040	475	45	M 30	90	15	25	17,2	9,9	18,0	14,7	9,9	33,3
	34	850	873	1144	518	54	M 36	100	20	35	31,0	17,8	32,5	26,4	17,8	53,7
	36	900	924	1198	545	54	M 36	100	20	35	29,8	17,2	31,3	25,5	17,2	56,3
	40	1000	1027	1300	596	54	M 36	100	20	35	27,7	15,9	29,1	23,7	15,9	61,3
	48	1200	1233	1508	700	54	M 36	100	20	35	24,5	14,1	25,7	20,9	14,1	71,5
Fig. 212 M	2	50	61	174	63	24	M 16	40	8	12	17,9	10,3	18,7	15,2	10,3	1,4
	2 1/2	65	77	192	72	24	M 16	40	8	12	14,6	8,4	15,3	12,5	8,4	1,5
	3	80	89	204	78	24	M 16	40	8	12	13,0	7,4	13,6	11,1	7,4	1,6
	3 1/2	90	102	242	91	30	M 20	50	10	15	21,8	12,5	22,8	18,6	12,5	2,9
	4	100	115	256	98	30	M 20	50	10	15	19,7	11,3	20,7	16,8	11,3	3,1
	5	125	140	284	112	30	M 20	60	10	15	20,3	11,7	21,3	17,3	11,7	3,9
	6	150	169	314	127	30	M 20	70	10	15	20,5	11,8	21,5	17,5	11,8	5,0
	8	200	220	416	172	36	M 24	80	15	20	41,7	24,0	43,8	35,6	24,0	10,8
	10	250	273	462	195	36	M 24	80	15	20	35,4	20,4	37,1	30,2	20,4	12,2
	12	300	324	514	221	36	M 24	80	15	20	31,5	18,1	33,1	26,9	18,1	13,7
	14	350	356	548	238	36	M 24	80	15	20	29,5	16,9	30,9	25,1	16,9	14,7
	16	400	407	644	277	45	M 30	100	20	25	55,8	32,1	58,5	47,6	32,1	28,3
	18	450	457	696	303	45	M 30	100	20	25	51,6	29,7	54,1	44,0	29,7	30,8
	20	500	508	748	329	45	M 30	100	20	25	48,0	27,6	50,3	40,9	27,6	33,3
	22	550	565	832	362	54	M 36	150	20	30	61,2	35,8	65,3	53,1	35,8	56,0
	24	600	616	884	388	54	M 36	150	20	30	58,6	33,7	61,5	50,0	33,7	59,8
	28	700	719	990	441	54	M 36	150	20	30	52,6	30,2	55,1	44,9	30,2	67,5
	30	750	770	1042	467	54	M 36	150	20	30	50,2	28,9	52,7	42,9	28,9	71,3
	32	800	821	1092	492	54	M 36	150	20	30	48,1	27,7	50,5	41,1	27,7	75,0
	34	850	873	1200	537	63	M 42	150	25	35	68,1	39,2	71,4	58,1	39,2	102,2
	36	900	924	1250	562	63	M 42	150	25	35	65,6	37,7	68,8	56,0	37,7	106,8
	40	1000	1027	1354	614	63	M 42	150	25	35	60,9	35,0	63,9	52,0	35,0	116,3
	48	1200	1233	1562	718	63	M 42	150	25	35	53,8	30,9	56,4	45,9	30,9	135,4

* Correction factors for imdiate temperature see catalogue page 65, pict. 46 - 48

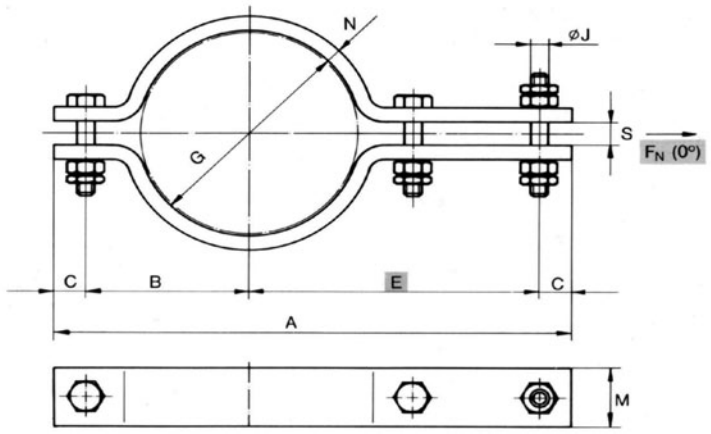
Fig. 212 S, Pipe clamp, pipe size 15 - 1200



	Pipe size		ØG	A	B	C	ØJ	M	N	S	* Nominal load F_N [kN]					Weig.
	inch	mm	mm								S235JRG2		13 GrMo 45		X6CrNiTi	kg
											80° C	300° C	300° C	500° C	500-550° C	
Fig. 212S	1/2	15	22	96	37	11	M 12	20	5	15	6,4	3,7	6,7	5,5	3,7	0,3
	3/4	20	27	102	40	11	M 12	20	5	15	6,4	3,7	6,7	5,5	3,7	0,3
	1	25	34	112	45	11	M 12	20	5	15	6,4	3,7	6,7	5,5	3,7	0,4
	1 1/4	32	43	144	52	20	M 12	30	8	18	11,1	6,4	7,6	6,2	5,5	0,7
	1 1/2	40	49	154	57	20	M 12	30	8	18	11,1	6,4	7,6	6,2	5,5	0,8
	2	50	61	176	68	20	M 12	30	8	18	11,1	6,4	7,6	6,2	5,5	0,9
	2 1/2	65	77	200	80	20	M 16	65	10	18	24,4	14,0	16,7	13,6	12,2	2,7
	3	80	90	214	87	20	M 16	65	10	18	24,4	14,0	16,7	13,6	12,2	2,9
	3 1/2	90	102	240	100	20	M 16	65	10	18	24,4	14,0	16,7	13,6	12,2	3,2
	4	100	116	282	112	29	M 24	65	15	30	51,4	29,5	35,2	28,6	25,7	6,1
	5	125	141	308	125	29	M 24	80	15	30	51,4	29,5	35,2	28,6	25,7	7,9
	6	150	170	358	150	29	M 24	80	15	30	51,4	29,5	35,2	28,6	25,7	9,1
	8	200	222	408	175	29	M 24	80	20	30	42,6	24,5	31,6	25,8	23,1	13,8
	10	250	276	466	195	38	M 24	90	20	30	42,6	24,5	31,6	25,8	23,1	17,7
	12	300	328	542	233	38	M 30	100	25	40	64,0	36,8	47,6	38,7	34,7	29,1
	14	350	360	588	253	41	M 30	125	25	40	64,0	36,8	47,6	38,7	34,7	38,7
	16	400	411	638	278	41	M 36	180	25	40	110,7	63,7	82,2	66,9	60,0	61,8
	18	450	462	728	323	41	M 36	180	25	40	110,7	63,7	82,2	66,9	60,0	70,1
	20	500	513	794	353	44	M 36	200	25	40	110,7	63,7	82,2	66,9	60,0	84,7
	22	550	565	834	373	44	M 36	200	25	40	110,7	63,7	82,2	66,9	60,0	89,9
	24	600	612	888	400	44	M 36	200	25	40	110,7	63,7	82,2	66,9	60,0	96,2
	28	700	714	994	453	44	M 36	200	25	40	110,7	63,7	82,2	66,9	60,0	109,0
	30	750	770	1050	481	44	M 36	200	25	40	106,7	61,4	82,2	66,9	60,0	115,9
	32	800	815	1096	504	44	M 36	200	25	40	105,1	60,5	82,2	66,9	60,0	121,4
	34	850	873	1160	536	44	M 36	200	25	40	97,7	56,2	82,2	66,9	56,2	128,9
	36	900	918	1198	555	44	M 36	200	25	40	96,7	55,6	82,2	66,9	55,6	134,0
	40	1000	1019	1302	607	44	M 36	200	25	40	90,6	52,1	82,2	66,9	52,1	146,5
	48	1200	1223	1508	710	44	M 36	200	25	40	80,7	46,4	82,2	66,9	46,4	171,8

* Correction factors for imdiate temperature see catalogue page 65, pict. 46 - 48

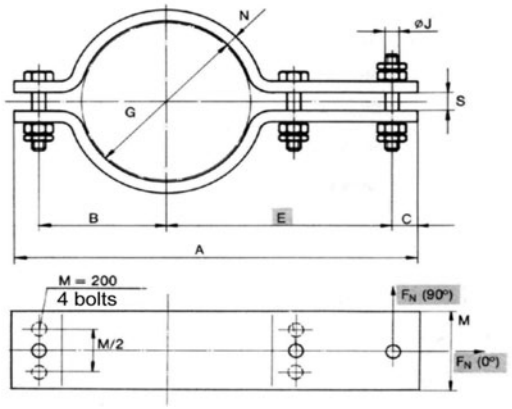
Fig. 295 L, 295 M, Pipe clamp, pipe size 15 - 1200



	Pipe size		ØG	A	B	C	E	ØJ	M	N	S	* Nominal load F_N [kN]					Weig.
	inch	mm	mm									S235JRG2		13 CrMo 45		X6CRNiTi 18-10	kg
												80°C	300°C	300°C	500°C	500-550°C	
Fig. 295 L	1/2	15	22	133	28	15	75	M 10	30	5	7	6,9	4,2	6,9	5,6	6,5	0,5
	3/4	20	27	142	33	15	79	M 10	30	5	7	6,9	4,2	6,9	5,6	6,4	0,5
	1	25	34	148	36	15	82	M 10	30	5	7	6,9	4,2	6,9	5,6	5,2	0,5
	1 1/4	32	43	158	41	15	87	M 10	30	5	7	6,9	4,2	6,9	5,6	4,2	0,6
	1 1/2	40	49	164	44	15	90	M 10	30	5	7	6,6	3,8	6,9	5,6	3,8	0,6
	2	50	61	198	54	18	108	M 12	40	6	9	6,9	4,2	6,9	5,6	6,0	1,1
	2 1/2	65	77	212	61	18	115	M 12	40	6	9	6,9	4,2	6,9	5,6	4,9	1,2
	3	80	89	226	68	18	122	M 12	40	6	9	6,9	4,2	6,9	5,6	4,4	1,3
	3 1/2	90	102	288	80	24	160	M 16	50	8	11	14,3	8,2	15,0	12,2	8,2	2,7
	4	100	115	296	89	24	159	M 16	50	8	11	13,0	7,5	13,7	11,1	7,5	2,8
	5	125	140	322	102	24	172	M 16	50	8	11	11,3	6,5	11,9	9,6	6,5	3,1
	6	150	169	350	116	24	186	M 16	50	8	11	9,9	5,7	10,3	8,4	5,7	3,3
	8	200	220	402	142	24	212	M 16	50	8	11	8,2	4,7	8,6	7,0	4,7	3,9
	10	250	273	494	174	30	260	M 20	60	8	14	8,0	4,6	8,4	6,8	4,6	5,9
	12	300	324	544	199	30	285	M 20	60	8	14	7,1	4,1	7,5	6,1	4,1	6,5
	14	350	356	578	216	30	302	M 20	60	8	14	6,7	3,8	7,0	5,7	3,8	6,9
	16	400	407	674	249	36	353	M 24	70	10	18	10,6	6,1	11,1	9,0	6,1	11,6
	18	450	457	726	274	36	380	M 24	70	10	18	9,8	5,6	10,3	8,4	5,6	12,5
	20	500	508	776	300	36	404	M 24	70	10	18	9,2	5,3	9,6	7,8	5,3	13,3
	22	550	565	885	345	45	450	M 30	90	15	25	22,2	12,7	23,2	18,9	12,7	28,6
	24	600	616	950	370	45	490	M 30	90	15	25	20,4	12,0	21,9	17,8	12,0	30,5
	28	700	719	1065	425	45	550	M 30	90	15	25	18,8	10,8	19,7	16,0	10,8	34,2
	30	750	770	1130	450	45	590	M 30	90	15	25	17,9	10,3	18,8	15,3	10,3	36,2
	32	800	821	1190	475	45	625	M 30	90	15	25	17,2	9,9	18,0	14,7	9,9	38,1
	34	850	873	1301	518	54	675	M 36	100	20	35	31,0	17,8	32,5	26,4	17,8	61,4
	36	900	924	1353	545	54	700	M 36	100	20	35	29,8	17,2	31,3	25,5	17,2	64,0
	40	1000	1027	1484	596	54	780	M 36	100	20	35	27,7	15,9	29,1	23,7	15,9	70,0
	48	1200	1233	1693	700	54	885	M 36	100	20	35	24,5	14,1	25,7	20,9	14,1	80,0
Fig. 295 M	2	50	61	256	63	24	145	M 16	40	8	12	17,9	10,3	18,7	15,2	10,3	2,0
	2 1/2	65	77	275	72	24	155	M 16	40	8	12	14,6	8,4	15,3	12,5	8,4	2,2
	3	80	89	286	78	24	160	M 16	40	8	12	13,0	7,4	13,6	11,1	7,4	2,3
	3 1/2	90	102	326	91	30	175	M 20	50	10	15	21,8	12,5	22,8	18,6	12,5	4,1
	4	100	115	338	98	30	180	M 20	50	10	15	19,7	11,3	20,7	16,8	11,3	4,2
	5	125	140	367	112	30	195	M 20	60	10	15	20,3	11,7	21,3	17,3	11,7	5,2
	6	150	169	412	127	30	225	M 20	70	10	15	20,5	11,8	21,5	17,5	11,8	6,5
	8	200	220	518	172	36	274	M 24	80	15	20	41,7	24,0	43,8	35,6	24,0	13,6
	10	250	273	567	195	36	300	M 24	80	15	20	35,4	20,4	37,1	30,2	20,4	15,0
	12	300	324	618	221	36	325	M 24	80	15	20	31,5	18,1	33,1	26,9	18,1	16,5
	14	350	356	655	238	36	345	M 24	80	15	20	29,5	16,9	30,9	25,1	16,9	17,5
	16	400	407	752	277	45	385	M 30	100	20	25	55,8	32,1	58,5	47,6	32,1	33,3
	18	450	457	803	303	45	410	M 30	100	20	25	51,6	29,7	54,1	44,0	29,7	35,8
	20	500	508	854	329	45	435	M 30	100	20	25	48,0	27,6	50,3	40,9	27,6	38,2
	22	550	565	940	362	54	470	M 36	150	20	30	62,2	35,8	65,3	53,1	35,8	63,8
	24	600	616	991	388	54	495	M 36	150	20	30	58,6	33,7	61,5	50,0	33,7	67,6
	28	700	719	1099	441	54	550	M 36	150	20	30	52,6	30,2	55,1	44,9	30,2	75,4
	30	750	770	1170	467	54	595	M 36	150	20	30	50,2	28,9	52,7	42,9	28,9	80,1
	32	800	821	1230	492	54	630	M 36	150	20	30	48,1	27,7	50,5	41,1	27,7	84,2
	34	850	873	1363	537	63	700	M 42	150	25	35	68,1	39,2	71,4	58,1	39,2	116,2
	36	900	924	1413	562	63	725	M 42	150	25	35	65,6	37,7	68,8	56,0	37,7	120,8
	40	1000	1027	1520	614	63	780	M 42	150	25	35	60,9	35,0	63,9	52,0	35,0	130,5
	48	1200	1233	1739	718	63	895	M 42	150	25	35	53,8	30,9	56,4	45,9	30,9	150,2

* Correction factors for imdiate temperature see catalogue page 65, pict. 46 - 48

Fig. 295 S, Pipe clamp, pipe size 15 - 1200

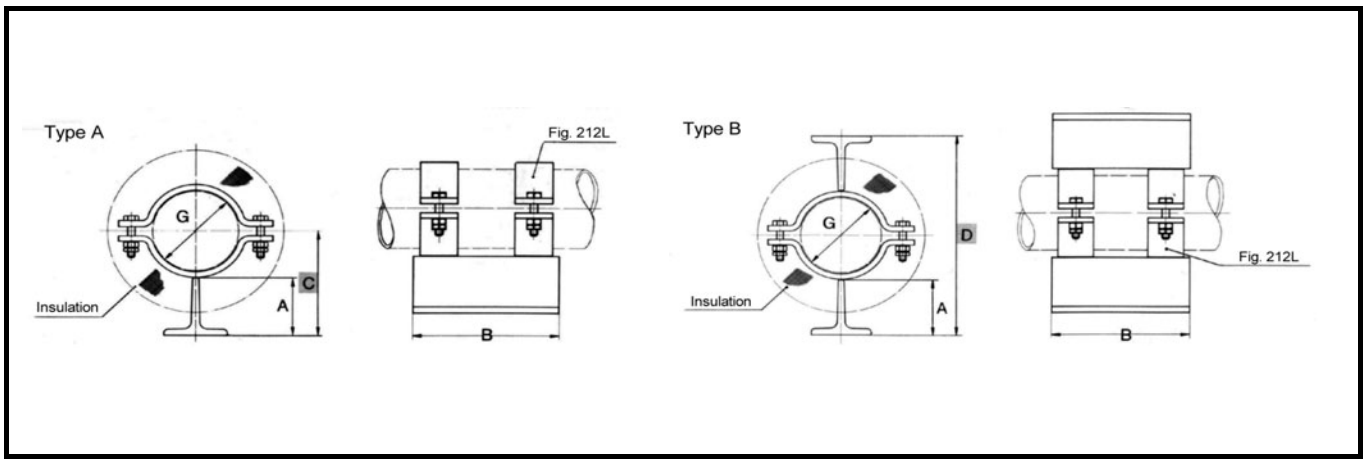


	Pipe size inch	Pipe size mm	ØG	A	B	C	E	ØJ	M	N	S	Weight kg
			←				mm			→		
Fig. 295 S	1/2	15	22	131	33	18	65	M 12	30	5	15	0,4
	3/4	20	27	133	34	18	66	M 12	30	5	15	0,5
	1	25	34	139	35	18	71	M 12	30	5	15	0,6
	1 1/4	32	43	170	45	18	92	M 12	30	8	18	0,7
	1 1/2	40	49	203	50	18	115	M 12	30	8	18	0,9
	2	50	61	228	55	18	135	M 12	30	8	18	1,2
	2 1/2	65	77	262	68	24	145	M 16	65	10	30	2,4
	3	80	90	275	75	24	151	M 16	65	10	30	3,6
	3 1/2	90	102	294	85	24	160	M 16	65	10	30	5,0
	4	100	116	325	95	36	169	M 24	65	15	30	6,5
	5	125	141	357	110	36	181	M 24	80	15	30	8,9
	6	150	170	439	150	36	223	M 24	80	15	30	10,7
	8	200	222	513	175	36	252	M 24	80	20	30	18,1
	10	250	276	561	200	36	275	M 24	90	20	30	22,1
	12	300	328	625	230	45	300	M 30	100	25	40	33,6
	14	350	360	692	255	45	332	M 30	125	25	40	46,7
	16	400	411	751	280	54	357	M 36	180	25	40	71,8
	18	450	462	801	305	54	382	M 36	180	25	40	77,3
	20	500	513	843	330	54	419	M 36	200	25	40	89,5
	22	550	565	898	365	54	439	M 36	200	30	40	113,7
	24	600	612	938	385	54	459	M 36	200	30	40	120,0
	28	700	714	1096	450	54	552	M 36	200	30	40	140,0
	30	750	770	1163	485	60	578	M 36	200	30	40	148,0
	32	800	815	1199	495	60	604	M 36	200	30	40	155,0
	34	850	873	1265	535	60	630	M 36	200	30	40	163,0
	36	900	918	1306	550	60	656	M 36	200	30	40	170,5
	40	1000	1019	1411	605	60	706	M 36	200	30	40	185,7
	48	1200	1223	1621	710	60	811	M 36	200	30	40	216,4

	Pipe size		* Nominal load F_N [kN]									
			S235JRG2				13 CrMo 45				X6CrNiTi 18-10	
	inch	mm	80° C		300° C		300° C		500° C		500°-550°C	
			0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
Nominal loads Fig. 295 S	1/2	15	13,3	0,55	7,6	0,3	11,9	0,6	9,7	0,45	7,6	0,3
	3/4	20	13,3	0,55	7,6	0,3	11,9	0,6	9,7	0,45	7,6	0,3
	1	25	13,3	0,55	7,6	0,3	11,8	0,6	9,6	0,45	6,5	0,3
	1 1/4	32	11,1	0,75	6,4	0,4	9,1	0,75	7,4	0,6	9,3	0,4
	1 1/2	40	11,1	0,75	6,4	0,4	9,1	0,75	7,4	0,6	9,3	0,4
	2	50	11,1	0,75	6,4	0,4	9,1	0,75	7,4	0,6	9,3	0,4
	2 1/2	65	17,1	2,65	9,8	1,5	14,1	2,8	11,5	2,2	14,4	1,5
	3	80	17,1	2,65	9,8	1,5	14,1	2,8	11,5	2,2	14,4	1,5
	3 1/2	90	17,1	2,6	9,8	1,4	14,1	2,7	11,5	2,2	14,4	1,4
	4	100	51,4	5,3	29,5	3,0	42,4	5,6	34,5	4,5	35,5	3,0
	5	125	51,4	6,8	29,5	3,9	42,4	7,1	34,5	5,8	36,7	3,9
	6	150	51,4	5,5	29,5	3,1	42,4	5,8	34,5	4,7	31,3	3,1
	8	200	42,6	9,1	24,5	5,2	38,2	9,5	31,1	7,7	38,9	5,2
	10	250	42,6	10,7	24,5	6,1	38,2	11,2	31,1	9,1	38,9	6,1
	12	300	64,0	18,2	36,8	10,5	57,4	19,1	46,7	15,5	58,4	10,5
	14	350	64,0	21,2	36,8	12,2	57,4	22,2	46,7	18,1	58,4	12,2
	16	400	110,7	31,7	63,7	18,2	99,2	33,2	80,8	27,0	87,4	18,2
	18	450	110,7	31,8	63,7	18,3	99,2	33,4	80,8	27,1	80,2	18,3
	20	500	110,7	33,3	63,7	19,1	99,2	34,9	80,8	28,4	82,7	19,1
	22	550	102,8	48,6	59,2	27,9	92,1	45,5	75,0	37,0	93,8	27,9
	24	600	102,8	49,4	59,2	28,4	92,1	45,5	75,0	37,0	93,8	28,4
	28	700	102,8	39,4	59,2	22,7	92,1	41,4	75,0	33,6	93,8	22,7
	30	750	102,8	39,4	59,2	22,7	92,1	41,4	75,0	33,6	88,1	22,7
	32	800	102,8	39,4	59,2	22,7	92,1	41,4	75,0	33,6	86,7	22,7
	34	850	102,8	39,1	59,2	22,5	92,1	41,0	75,0	33,3	80,6	22,5
	36	900	102,8	39,1	59,2	22,5	92,1	41,0	75,0	33,3	79,8	22,5
	40	1000	102,8	39,2	59,2	22,5	92,1	41,1	75,0	33,4	74,7	22,5
	48	1200	102,8	38,6	59,2	22,2	92,1	40,5	75,0	33,0	66,5	22,2

* Correction factors for imdiate temperature see catalogue page 65, pict. 46 - 48

EHS 1, Pipe guide, pipe size 32 - 125

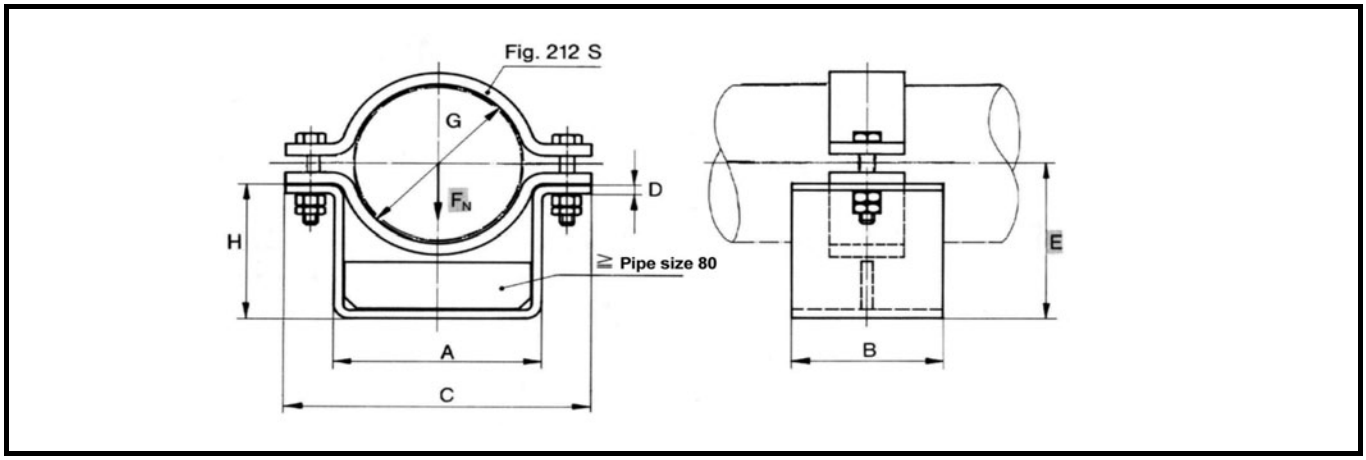


	Pipe size		ØG	50 mm Insulation A x B	C	D	Weight		80 mm Insulation A x B	C	D	Weight	
	inch	mm	mm	T - Steel	mm		Type A	Type B	T - Steel	mm		Type A	Type B
EHS 1	1 1/4	32	43	70 x 200	96,5	193	2,5	4,2	100 x 200	126,5	253	4,1	7,4
	1 1/2	40	49	70 x 200	99,5	199	2,5	4,2	100 x 200	129,5	259	4,1	7,4
	2	50	61	70 x 200	106,5	213	3,3	4,9	100 x 200	136,5	273	4,9	8,2
	2 1/2	65	77	70 x 200	114,5	229	3,5	5,0	100 x 200	144,5	289	5,0	8,3
	3	80	89	70 x 200	120,5	241	3,6	5,3	100 x 200	150,5	301	5,2	8,5
	3 1/2	90	102	70 x 250	129,0	258	5,9	8,0	100 x 250	159,0	318	7,9	12,0
	4	100	115	70 x 250	135,5	271	6,3	8,4	100 x 250	165,5	331	8,3	12,4
	5	125	140	70 x 250	148,0	296	6,7	8,8	100 x 250	178,0	356	8,7	12,8

max.nominal loads see catalogue page 76

For higher design temperatures see temperture correction table on catalogue page 65, pict. 46, 47

EHS 1S, Pipe guide, pipe size 15 - 200

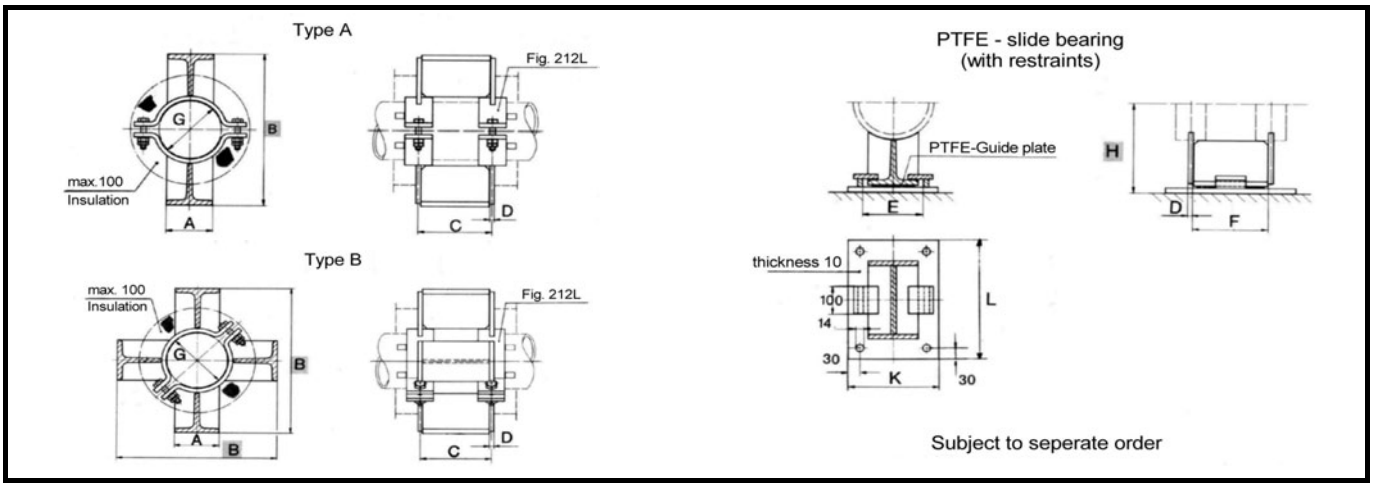


	Pipe size		ØG	A	B	C	D	E	H	Type A (low design) Nom. load F_N	Weig.	Type B (high design) E	H	Nom.load F_N	Weig.
	inch	mm	mm							N	kg	mm		N	kg
EHS 1S	1/2	15	26	35	60	96	4	60	48	1500	0,7	90	78	900	0,9
	1	25	38	55	60	112	4	60	48	1500	0,8	90	78	900	1,0
	2	50	65	90	80	176	6	90	73	3200	2,3	120	103	2600	2,6
	3	80	94	115	100	214	8	120	101	5200	5,7	150	131	3900	6,3
	4	100	120	150	100	282	8	150	120	5200	9,8	170	140	4500	10,2
	5	125	145	165	120	308	10	150	120	6700	13,4	200	170	5200	14,8
	6	150	174	200	120	358	12	170	140	7100	16,7	200	170	6500	17,8
	8	200	226	270	120	408	12	200	165	7100	23,0	-	-	-	-

max.nominal loads see catalogue page 76

For higher design temperatures see temperture correction table on catalogue page 65, pict. 46

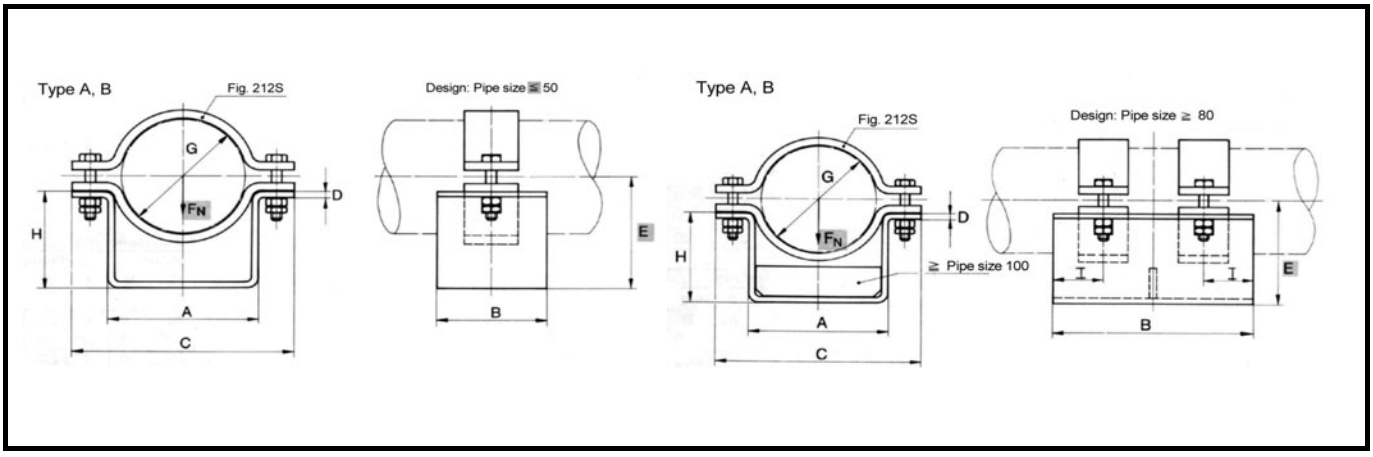
EHS 2, Pipe guide, pipe size 150 - 600



	Pipe size inch	Pipe size mm	ØG mm	1/2-I PBL 240 DIN1025/3	T - Steel DIN1024	A	B	C	D	E	F	H	K	L	Weight [kg] Type A	Weight [kg] Type B
						mm										
EHS 2	6	150	169	-	120	120	425	295	8	140	285	224,5	240	450	22	36
	8	200	220	-	120	120	476	295	10	140	285	250,0	240	450	24	37
	10	250	273	-	120	120	529	310	10	140	300	276,5	240	450	28	42
	12	300	324	-	120	120	580	310	10	140	300	302,0	240	450	29	43
	14	350	356	-	120	120	612	310	10	140	300	318,0	240	450	30	48
	16	400	407	115	-	240	657	365	15	260	350	340,5	340	450	53	74
	18	450	457	115	-	240	707	365	15	260	350	365,5	340	450	55	76
	20	500	508	115	-	240	758	415	15	260	400	391,0	340	500	60	84
	24	600	616	115	-	240	876	415	15	260	400	450,0	340	500	90	114

max.nominal loads see catalogue page 76
For higher design temperatures see temperture correction table on catalogue page 65, pict. 46, 47

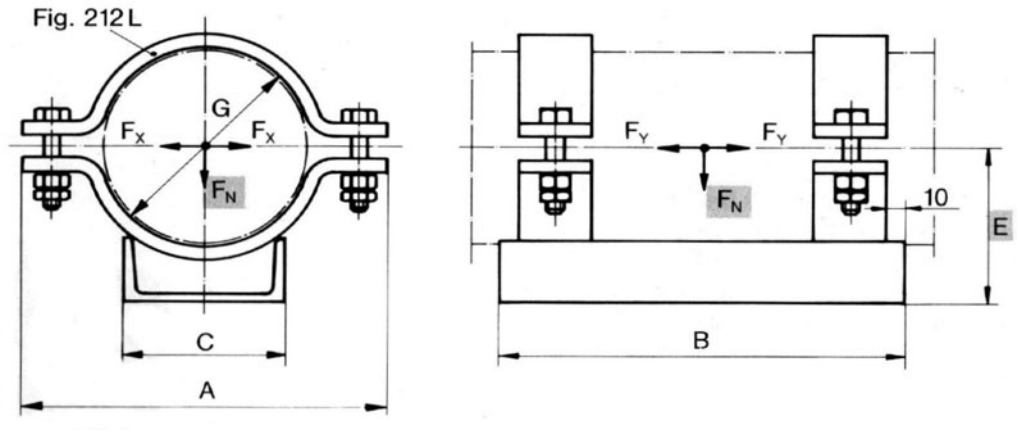
EHS 2S, Pipe guide, pipe size 15 - 150



	Pipe size inch	Pipe size mm	ØG	Type A (low design) A	B	C	D	E	H	I	Nom.load F_N N	Weight kg	Type B (high design) A	B	C	D	E	H	Nom.load F_N N	Weight kg
			mm										mm							
EHS 2S	1/2	15	22	35	60	96	4	60	48	-	2600	1,2	55	60	96	4	90	78	1900	1,4
	1	25	34	55	60	112	4	60	48	-	2600	1,3	55	60	112	4	90	78	1900	1,5
	2	50	61	90	80	176	6	90	73	-	3900	3,2	90	80	176	6	120	103	3200	3,5
	3	80	90	115	175	214	8	120	101	45	5200	9,8	115	175	214	8	150	131	4500	10,5
	4	100	115	150	175	282	8	150	120	45	7800	18,0	150	175	282	8	170	140	7100	18,4
	5	125	141	165	175	308	10	150	120	45	13000	23,2	165	175	308	10	200	170	9700	24,5
	6	150	169	200	250	358	10	170	140	65	15600	30,6	200	250	358	10	200	170	13000	31,8

max.nominal loads see catalogue page 76
For higher design temperatures see temperture correction table on catalogue page 65, pict. 46

EHS 19, Pipe guide, pipe size 100 - 1200



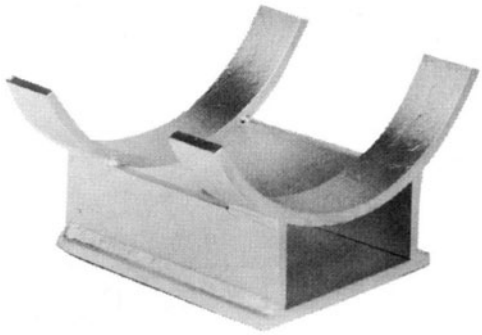
	Pipe size		ØG	A	B	C	E	* Nominal load F_N [kN]		Weight
	inch	mm	◄ mm ►					80° C	300° C	kg
EHS 19	4	100	115	226	200	100	97	8,0	4,6	6,3
	5	125	140	252	200	100	114	8,0	4,6	6,7
	6	150	169	280	200	100	131	8,0	4,6	7,3
	8	200	220	332	200	100	159	8,0	4,6	8,3
	9	225	246	384	300	160	172	20,0	11,5	14,4
	10	250	273	408	300	200	184	20,0	11,5	17,0
	12	300	324	458	300	200	216	20,0	11,5	18,2
	14	350	356	492	300	200	235	32,0	18,4	19,0
	16	400	407	570	400	300	257	32,0	18,4	37,7
	18	450	457	620	400	300	289	52,0	29,9	39,5
	20	500	508	672	400	300	321	52,0	29,9	41,3
	22	550	656	780	450	300	360	60,0	34,5	70,2
	24	600	616	830	450	300	389	85,0	48,9	73,6
	28	700	719	940	450	400	431	85,0	48,9	92,3
	30	750	770	990	450	400	460	100,0	57,5	95,5
	32	800	821	1040	450	400	489	120,0	69,0	98,9
	34	850	873	1144	500	400	524	140,0	80,5	143,3
	36	900	924	1198	500	400	552	140,0	80,5	148,5
	40	1000	1027	1300	500	400	607	140,0	80,5	158,5
	48	1200	1233	1508	500	400	717	180,0	103,6	179,0

* Corrective factors for intermediate temperatures see catalogue page 65, pict. 46

Accessories, EHS 1, EHS 2, EHS 3, EHS 4

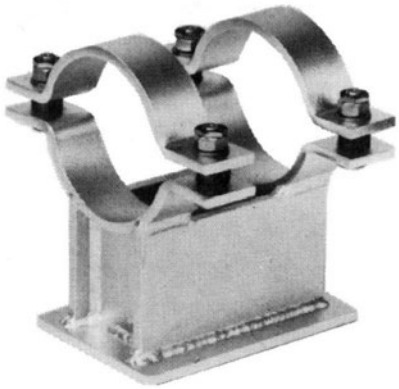
EHS 1 / Pipe guide

EHS 3 / Insulation saddle



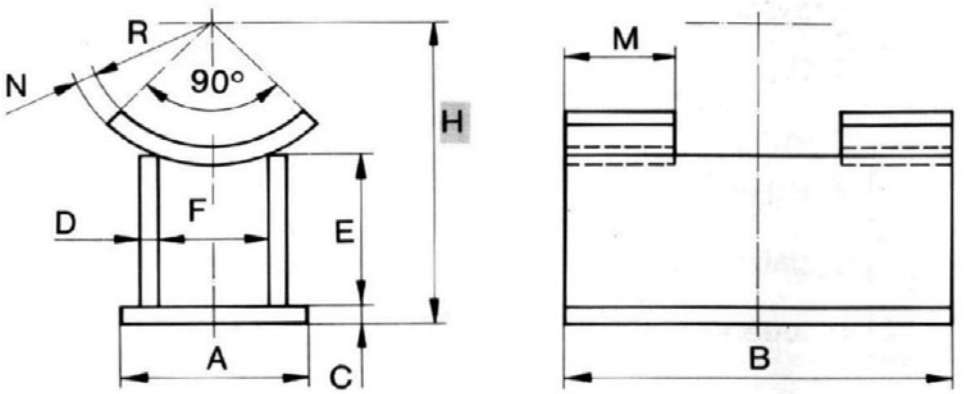
EHS 2 / Pipe guide

EHS 4 / Insulation saddle



Pipe size		Nominal load F_N at 80° C [kN]											
		EHS 1 Insulat. [mm]		EHS 2 Typ		EHS 3 Insulation thickness [mm]				EHS 4 Insulation thickness [mm]			
inch	mm	50	80	A	B	50	100	150	200	50	100	150	200
1 1/4	32	20	20	-	-	-	-	-	-	-	-	-	-
1 1/2	40	20	20	-	-	-	-	-	-	-	-	-	-
2	50	36	36	-	-	-	-	-	-	-	-	-	-
2 1/2	65	36	36	-	-	23	23	40	40	36	36	64	64
3	80	36	36	-	-	23	23	40	40	36	36	64	64
3 1/2	90	36	36	-	-	23	23	40	40	36	36	64	64
4	100	36	36	-	-	32	32	56	56	36	36	64	64
5	125	46	46	-	-	32	32	56	56	46	46	80	80
6	150	-	-	49	49	64	64	82	82	104	104	134	134
8	200	-	-	48	48	64	64	82	82	104	104	134	134
9	225	-	-	48	48	64	64	82	82	104	104	134	134
10	250	-	-	48	48	80	80	103	103	104	104	134	134
12	300	-	-	48	48	80	80	103	103	104	104	134	134
14	350	-	-	48	48	134	134	149	149	134	134	149	149
16	400	-	-	96	96	134	134	149	149	134	134	149	149
18	150	-	-	95	95	134	134	149	149	134	134	149	149
20	500	-	-	94	94	134	134	149	149	134	134	149	149
24	600	-	-	93	93	155	155	207	207	165	165	220	220

EHS 3, Insulation saddle, pipe size 65 - 600

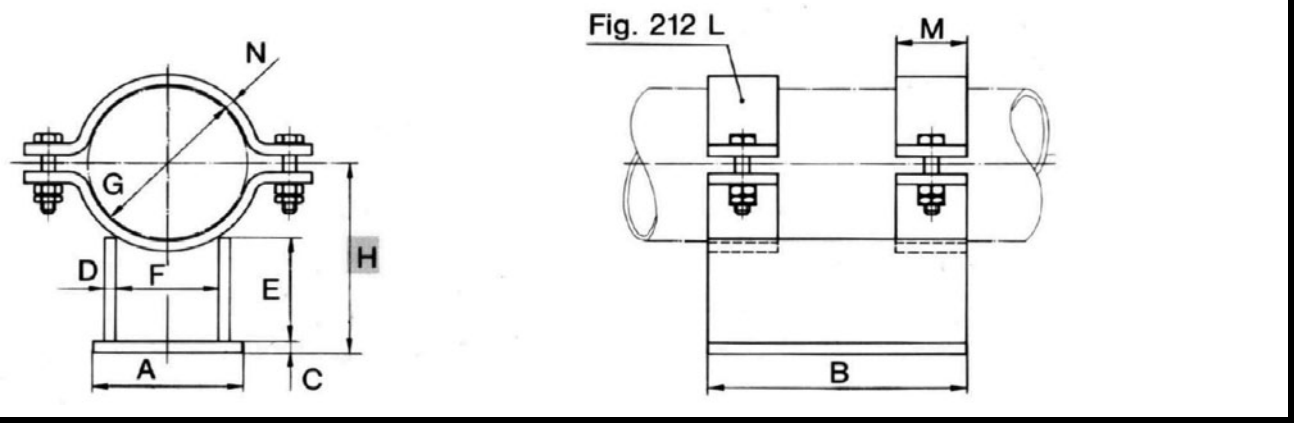


	Pipe size		R	F	50 mm Insulation H	Saddle			Web plate			Base plate			Weig.	100 mm Insulation H	Web plate			Weig.
	inch	mm	mm			M	N	Lg.	E	B	D	A	B	C	kg		E	B	D	kg
EHS 3	2 1/2	65	38,5	40	109	25	6	66	63	200	6	80	200	6	2,1	159	113	200	6	3,1
	3	80	45,0	45	115	25	6	76	63	200	6	85	200	6	2,2	165	113	200	6	3,1
	3 1/2	90	51,0	50	121	25	6	85	63	200	6	90	200	6	2,3	171	113	200	6	3,2
	4	100	57,5	60	130	35	6	95	68	250	6	100	250	6	3,1	180	118	250	6	4,3
	5	125	70,5	70	140	35	6	116	64	250	6	115	250	8	3,7	190	114	250	8	5,8
	6	150	84,5	85	155	40	6	138	65	300	8	130	300	10	6,1	205	115	300	10	9,0
	8	200	110,0	110	180	40	8	180	65	300	8	155	300	10	7,0	230	115	300	10	10,0
	10	250	137,0	140	209	50	12	225	65	300	10	190	300	12	10,6	259	115	300	12	14,0
	12	300	163,0	160	233	50	12	266	65	300	10	210	300	12	11,6	283	115	300	12	15,0
	14	350	178,0	180	249	65	12	290	65	300	12	240	300	16	16,3	299	115	300	16	21,3
	16	400	204,0	205	276	65	16	333	65	300	12	265	300	16	19,1	326	115	300	16	24,1
	18	450	229,0	215	302	65	16	373	65	300	12	275	300	16	20,2	352	115	300	16	25,2
	20	500	255,0	250	325	65	16	414	68	300	12	310	300	16	22,3	375	118	300	16	27,4
	24	600	306,0	300	375	75	16	494	74	300	16	370	300	16	28,9	425	124	300	20	35,0

	Pipe size		R	F	150 mm Insulation H	Saddle			Web plate			Base plate			Weig.	200 mm Insulation H	Web plate			Weig.
	inch	mm	mm			M	N	Lg.	E	B	D	A	B	C	kg		E	B	D	kg
EHS 3	2 1/2	65	38,5	40	209	25	6	66	163	200	8	80	200	6	5,0	259	213	200	8	6,3
	3	80	45,0	45	215	25	6	76	163	200	8	85	200	6	5,1	265	213	200	8	6,4
	3 1/2	90	51,0	50	221	25	6	85	163	200	8	90	200	6	5,2	271	213	200	8	6,5
	4	100	57,5	60	230	35	6	95	168	250	8	100	250	6	6,8	280	218	250	8	8,4
	5	125	70,5	70	240	35	6	116	164	250	10	115	250	8	8,7	290	214	250	10	10,6
	6	150	84,5	85	255	40	6	138	165	300	12	135	300	10	13,1	305	215	300	12	15,9
	8	200	110,0	110	280	40	8	180	165	300	12	160	300	10	14,0	330	215	300	12	16,9
	10	250	137,0	140	309	50	12	225	165	300	16	200	300	12	20,3	359	215	300	16	24,0
	12	300	163,0	160	333	50	12	266	165	300	16	220	300	12	21,2	383	215	300	16	25,0
	14	350	178,0	180	349	65	12	290	165	300	20	250	300	16	28,6	399	215	300	20	33,3
	16	400	204,0	205	376	65	16	333	165	300	20	275	300	16	31,4	426	215	300	20	36,1
	18	450	229,0	215	402	65	16	373	165	300	20	285	300	16	32,4	452	215	300	20	37,1
	20	500	255,0	250	425	65	16	414	168	300	20	320	300	16	34,7	475	218	300	20	39,4
	24	600	306,0	300	475	75	16	494	174	300	25	390	300	16	44,5	525	224	300	25	50,4

For higher temperatures see temperature correction table on catalogue page 65, pict. 46, 47

EHS 4, Insulation saddle, pipe size 65 - 600

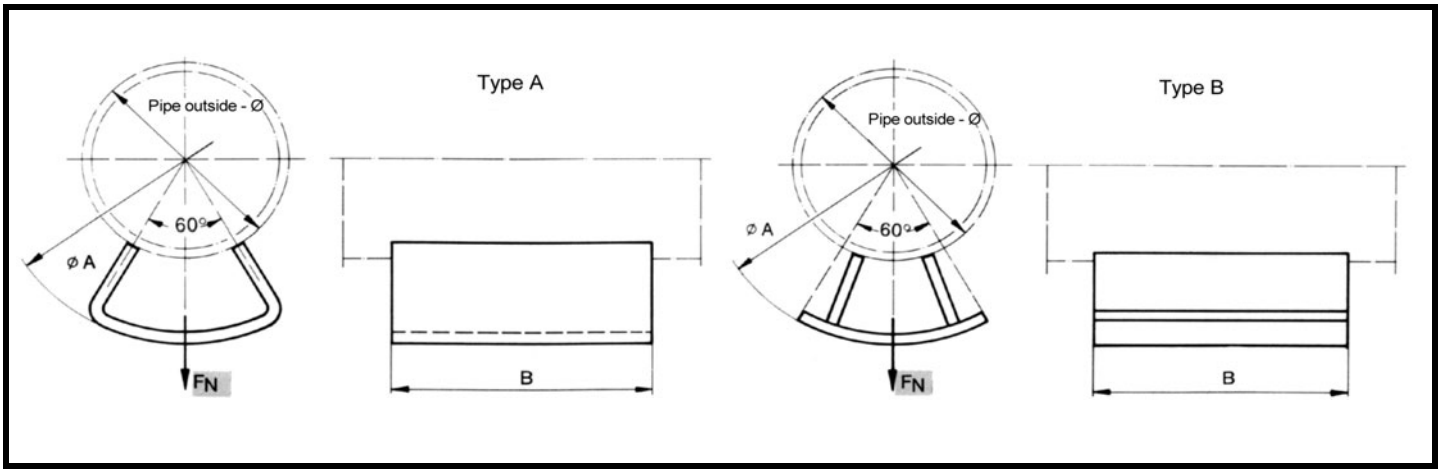


	Pipe size		ØG	F	50 mm Insulation H	Fig. 212L			Web plate			Base plate			Weig.	100 mm Insulation H	Web plate			Weig.
	inch	mm	mm			M	N	Weig. kg	E	B	D	A	B	C	kg		E	B	D	kg
EHS 4	2 1/2	65	77	40	110	40	6	0,9	64	200	6	80	200	6	3,8	160	114	200	6	4,7
	3	80	89	45	116	40	6	1,0	64	200	6	85	200	6	4,0	166	114	200	6	5,0
	3 1/2	90	102	50	124	50	8	1,9	64	200	6	90	200	6	5,9	174	114	200	6	6,8
	4	100	115	56	130	50	8	2,1	64	250	6	100	250	6	6,9	180	114	250	6	8,1
	5	125	140	70	142	50	8	2,3	64	250	6	115	250	8	8,0	192	114	250	8	10,0
	6	150	169	85	158	50	8	2,6	65	300	8	130	300	10	10,8	208	115	300	10	13,7
	8	200	220	110	180	50	8	3,1	65	300	8	155	300	10	12,3	230	115	300	10	15,3
	9	225	246	125	195	60	8	4,4	68	300	10	175	300	10	16,0	245	118	300	10	18,4
	10	250	273	130	210	60	8	4,7	68	300	10	180	300	12	17,7	260	118	300	12	21,2
	12	300	324	160	230	60	8	5,3	68	300	10	210	300	12	19,8	280	118	300	12	23,3
	14	350	356	170	250	60	8	5,7	68	300	12	230	300	16	24,0	300	118	300	16	29,0
	16	400	407	195	274	70	10	9,6	68	300	12	255	300	16	32,7	324	118	300	16	37,7
	18	450	457	200	301	70	10	10,5	68	300	12	260	300	16	34,7	351	118	300	16	39,7
	20	500	508	220	324	70	10	11,4	68	300	12	280	300	16	37,2	374	118	300	16	42,3
	24	600	616	300	385	90	15	26,4	82	300	16	370	300	16	73,0	435	132	300	20	79,2

	Pipe size		ØG	F	150 mm Isolierung H	Fig. 212L			Web plate			Base plate			Weig.	200 mm Isolierung H	Web plate			Weig.
	inch	mm	mm			M	N	Weig. kg	E	B	D	A	B	C	kg		E	B	D	kg
EHS 4	2 1/2	65	77	40	210	40	6	0,9	164	200	8	80	200	6	6,7	260	214	200	8	8,0
	3	80	89	45	216	40	6	1,0	164	200	8	85	200	6	7,0	266	214	200	8	8,2
	3 1/2	90	102	50	224	50	8	1,9	164	200	8	90	200	6	8,8	274	214	200	8	10,1
	4	100	115	56	230	50	8	2,1	164	250	8	100	250	6	10,6	280	214	250	8	12,1
	5	125	140	70	242	50	8	2,3	164	250	10	115	250	8	12,9	292	214	250	10	14,9
	6	150	169	85	258	50	8	2,6	165	300	12	130	300	10	17,6	308	215	300	12	20,5
	8	200	220	105	280	50	8	3,1	165	300	12	155	300	10	19,2	330	215	300	12	22,0
	9	225	246																	
	10	250	273	120	310	60	8	4,7	166	300	16	180	300	12	27,0	360	216	300	16	30,8
	12	300	324	150	330	60	8	5,3	166	300	16	210	300	12	29,0	380	216	300	16	32,8
	14	350	356	160	350	60	8	5,7	166	300	20	230	300	16	35,7	400	216	300	20	40,4
	16	400	407	185	374	70	10	9,6	166	300	20	255	300	16	44,5	424	216	300	20	49,2
	18	450	457	190	401	70	10	10,5	166	300	20	260	300	16	46,5	451	216	300	20	51,2
	20	500	508	210	424	70	10	11,4	166	300	20	280	300	16	49,0	474	216	300	20	53,7
	24	600	616	290	485	90	15	26,4	180	300	25	370	300	16	88,0	535	230	300	25	93,8

For higher temperatures see temperature correction table on catalogue page 65, pict. 46, 47

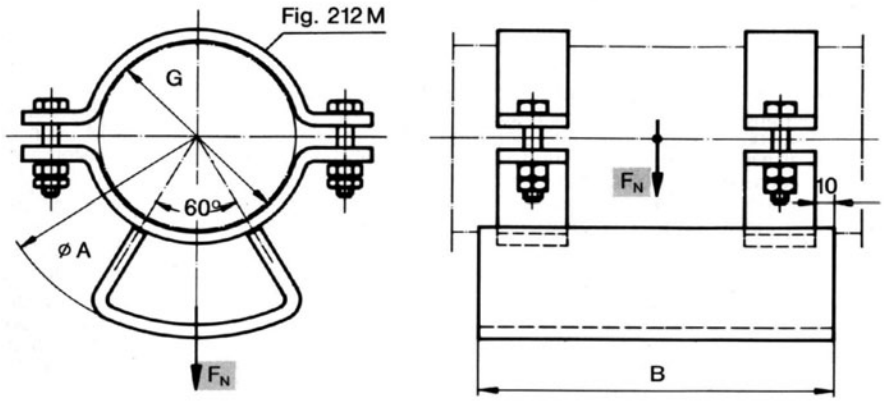
EHS 27, Insulation saddle, welded to the pipe



	Type	Pipe size		Pipe-outside Ø	Insulation thickness [mm]			B	Nom.load F_N at 80° C
					50	100	150		
		inch	mm	mm	Ø A [mm]			mm	N
EHS 27	A	2	50	60,3	160	260	360	300	1500
	A	2 1/2	65	76,1	180	280	380	300	1500
	A	3	80	88,9	190	290	390	300	1500
	A	3 1/2	90	101,6	202	302	402	300	1750
	A	4	100	114,3	215	315	415	300	2000
	A	5	125	139,7	240	340	440	300	4000
	A	6	150	168,3	270	370	470	300	4000
	A	8	200	219,1	320	420	520	300	10000
	A	10	250	273,0	375	475	575	300	10000
	A	12	300	232,9	425	525	625	300	20000
	A	14	350	355,6	455	555	655	300	20000
	A	16	400	406,4	510	610	710	300	40000
	A	18	450	457,2	560	660	760	300	40000
	B	20	500	508,0	630	730	830	300	50000
	B	22	550	558,8	680	780	880	300	60000
	B	24	600	609,6	730	830	930	300	75000
	B	28	700	711,2	840	940	1040	300	100000
	B	30	750	762,0	890	990	1090	300	110000
	B	32	800	812,8	940	1040	1140	300	125000
	B	34	850	863,6	990	1090	1190	300	135000
	B	36	900	914,4	1040	1140	1240	300	150000
	B	40	1000	1016,0	1150	1250	1350	300	200000
	B	48	1200	1220,0	1350	1450	1550	300	250000

Insulation saddles to be welded > Pipe size 1200 on demand

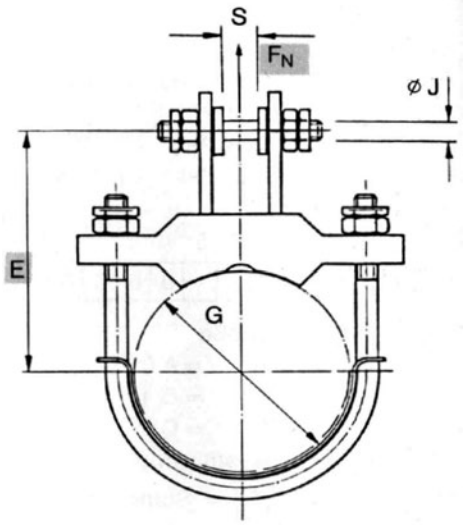
EHS 28, Insulation saddle with pipe clamp



	Pipe size		ØG	Insulation thickness [mm]			B	Nom.load F_N at 80° C
				50	100	150		
	inch	mm	mm	Ø A [mm]			mm	N
EHS 28	2	50	61	178	278	378	300	1500
	2 1/2	65	77	198	298	398	300	1500
	3	80	89	208	308	408	300	1500
	3 1/2	90	102	224	324	424	300	1750
	4	100	115	238	338	438	300	2000
	5	125	140	262	362	462	300	4000
	6	150	169	293	393	493	300	4000
	8	200	220	353	453	553	300	10000
	10	250	273	407	507	607	300	10000
	12	300	324	457	557	657	300	20000
	14	350	356	487	587	687	300	20000
	16	400	407	553	653	753	400	40000
	18	450	457	602	702	802	400	40000
	20	500	508	672	772	872	400	50000
	22	550	565	728	828	928	500	60000
	24	600	616	778	878	978	500	75000
	28	700	719	890	990	1090	500	100000
	30	750	770	940	1040	1140	500	110000
	32	800	821	990	1090	1190	500	125000
	34	850	873	1052	1152	1252	500	135000
	36	900	924	1102	1202	1302	500	150000
	40	1000	1027	1214	1314	1414	500	200000
	48	1200	1233	1416	1516	1616	500	250000

Insulation saddles to be welded > Pipe size 1200 on demand

EHS 18S, U-Bolt Clamp, pipe size 125 - 1000



U-Bolt Clamp	Figure 200A 201A	Figure 211L	* Nominal load F_N [kN] S235JRG2 ≤ 80° C	S235JRG2 300° C	13 CrMo 45 300°C	13 CrMo 45 500° C	ØJ mm	S mm
Size 1	3 1/4"	E	78	44,8	81,8	66,5	30	22,5
Size 2	4"	F	130	74,8	136,3	110,9	45	32,5
Size 3	5"	G	234	134,6	245,4	199,7	60	44,5
Size 4	6"	-	303	174,4	317,7	258,6	70	49,5
Size 5	-	H	380	218,7	398,5	324,3	70	49,5
Size 6	8"	-	489	281,4	512,8	417,4	80	55,5
Size 7	-	I	600	345,3	629,2	512,1	80	55,5

EHS 18S

Pipe size inch	Pipe size mm	ØG mm	U-Bolt Clamp Size 1 E [mm]	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7
5	125	141	180	-	-	-	-	-	-
6	150	170	205	235	-	-	-	-	-
8	200	222	225	255	-	-	-	-	-
10	250	276	265	300	325	-	-	-	-
12	300	328	295	330	355	360	-	-	-
14	350	360	325	365	390	395	400	-	-
16	400	411	365	400	425	430	435	-	-
18	450	462	405	450	475	480	485	493	-
20	500	513	445	500	525	530	535	543	-
22	550	565	485	550	575	580	585	593	600
24	600	616	525	600	625	630	635	643	650
28	700	714	600	685	710	715	720	728	735
32	800	815	655	740	765	770	775	783	790
36	900	918	700	785	810	815	820	828	835
40	1000	1019	740	835	860	865	870	878	885

*Corrective factors for intermediate temperatures see catalogue page 65, pict. 46, 47

Pipe rollers

Application

Pipe rollers are used to carry the dead weight of the piping and to enable a thermal expansion of the piping with low friction forces.

Construction features

- Axis made of stainless steel
- Bearing of the axis by maintenance free multilayer bearings

Design

The Saddle construction is selected by means of the pipe diameter and the insulation thickness.

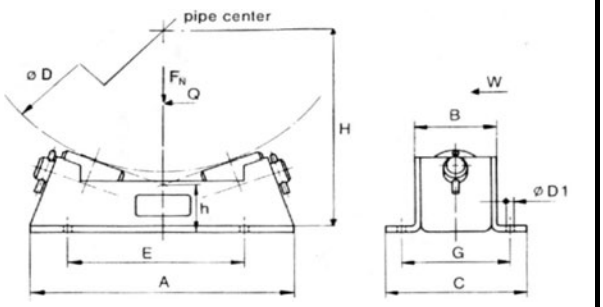
With the nominal load and the necessary pipe or saddle diameter the pipe roller size is determined.

Depending on the application the pipe roller type is selected.

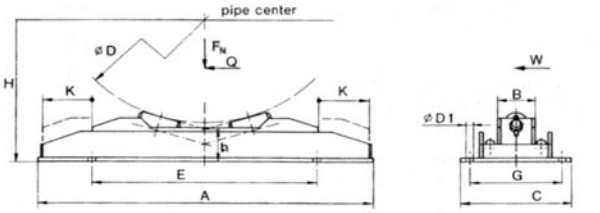
The nominal load corrective factors for the individual cases are indicated on catalogue page X.

EHS 20, EHS 21, Double cylinder roller

EHS 20



EHS 21, axial free

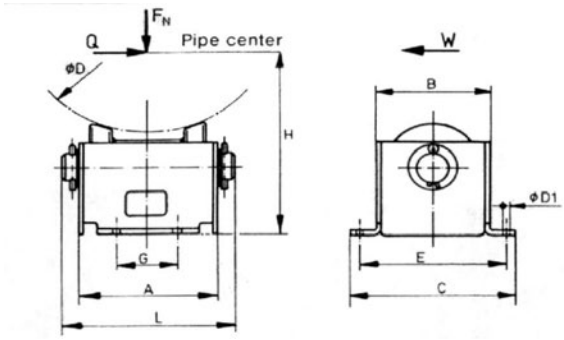


	ØD min.	ØD max.	F_N max. at 80° C	A	B	C	$ØD_1$	E	G	h	Weight
	mm		kN	mm							kg
EHS 20	115	273	7	170	57	100	10	70	80	42	2
	220	407	15	225	68	120	12	90	100	46	2
	324	661	25	335	92	160	14	150	130	53	8
			50								
	508	965	25	485	115	200	18	240	160	68	18
			50								18
			100								21
	813	1350	50	660	150	260	23	320	210	82	40
			100								46
			200								52
	1120	1920	100	880	185	320	27	520	270	130	70
			200								90
			350								110
	1620	2620	200	1280	270	450	33	830	380	165	175
			300								205
			500								265
	2220	3520	200	1550	270	450	33	1170	380	170	190
			300								240
			500								300

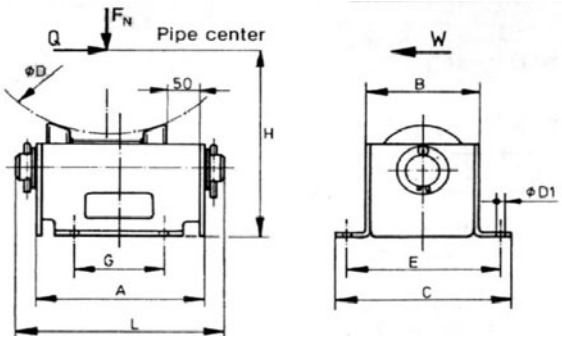
	ØD min.	ØD max.	F_N max. at 80° C	A	B	C	$ØD_1$	E	G	K	h	Weight
	mm		kN	mm								kg
EHS 21, axial free	115	273	7	370	57	172	10	250	150	100	42	3
	220	407	15	420	68	192	12	300	160	100	46	7
	324	661	25	570	92	240	14	410	210	100	53	17
			50									18
	508	965	25	740	115	325	18	580	290	100	68	41
			50									43
			100									45
	813	1350	50	930	150	380	23	750	330	100	82	81
			100									87
			200									93
	1120	1920	100	1100	185	480	27	860	420	100	130	130
			200									150
			350									170
	1620	2620	200	1500	270	640	33	1260	550	100	165	265
			300									295
			500									355
	2220	3520	200	1770	270	640	33	1470	550	100	170	295
			300									345
			500									405

EHS 22, EHS 23, Roller, axial free

EHS 22



EHS 23

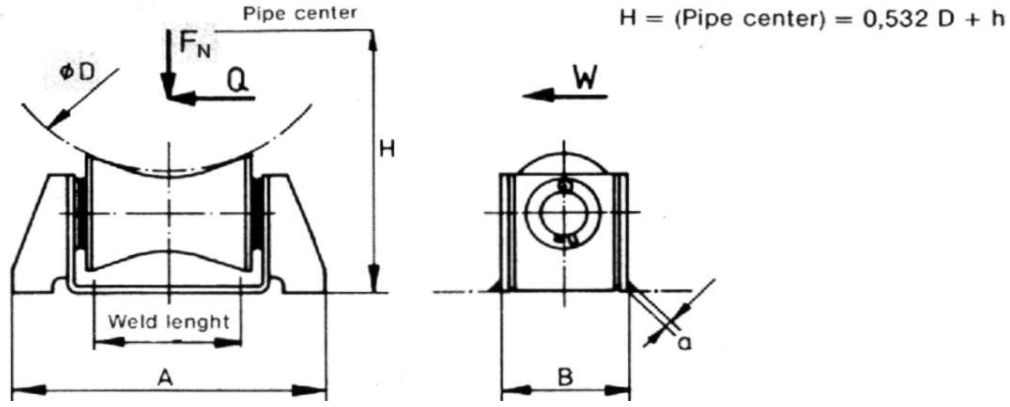


	ØD min.	ØD max.	F_N max. at 80° C kN	A	B	C	$ØD_1$	E	G	L	h	Weight
	mm			mm								kg
EHS 22	140	220	10	90	95	145	7	35	35	120	90	3,0
			15									
	200	280	10	125	120	180	9	50	50	155	110	5,5
			15									
			25									
	280	410	15	170	145	215	11	80	80	210	130	10,0
			25									
			40									
	400	560	25	230	190	280	14	110	110	270	165	23,0
			40									
			60									
			80									
	550	820	40	320	240	350	18	160	160	370	210	55,0
			60									
			80									
			100									
			140									
	800	1120	80	445	300	440	22	240	240	495	255	150,0
			100									
			140									
			180									

EHS 23	140	220	10	90	95	145	7	35	35	120	90	3,0
			15									
	200	280	10	125	120	180	9	50	50	155	110	5,5
			15									
			25									
	280	410	15	170	145	215	11	80	80	210	130	10,0
			25									
			40									
	400	560	25	230	190	280	14	110	110	270	165	23,0
			40									
			60									
			80									
	550	820	40	320	240	350	18	160	160	370	210	55,0
			60									
			80									
			100									
			140									
	800	1120	80	445	300	440	22	240	240	495	255	150,0
			100									
			140									
			180									

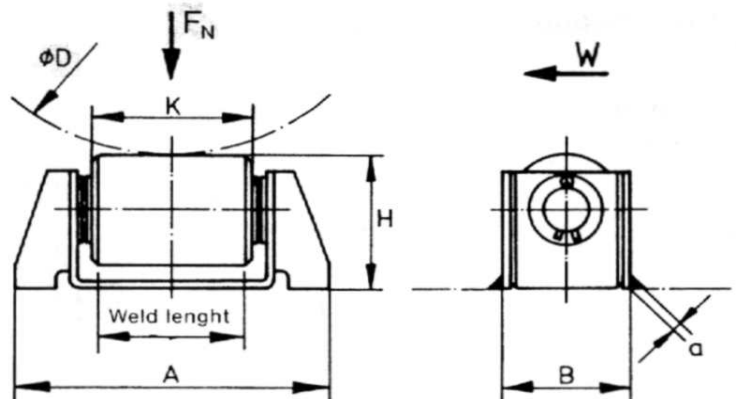
EHS 24, Roller, welded to the structure
EHS 25, Cylinder roller welded to the structure

EHS 24



ØD min.	ØD max.	F_N max. at 80°C	A	B	L	a	h	Weight
mm	mm	kN	mm	mm	mm	mm	mm	kg
50	220	10	153	60	80	3	54	1,4

EHS 25



ØD min.	ØD max.	F_N max. at 80°C	A	B	H	K	L	a	Weight
mm	mm	kN	mm	mm	mm	mm	mm	mm	kg
100	220	10	153	60	70	80	80	3	0,8
200	410	25	240	84	88	150	150	4	1,8

Fig. 46 H, U-traverse

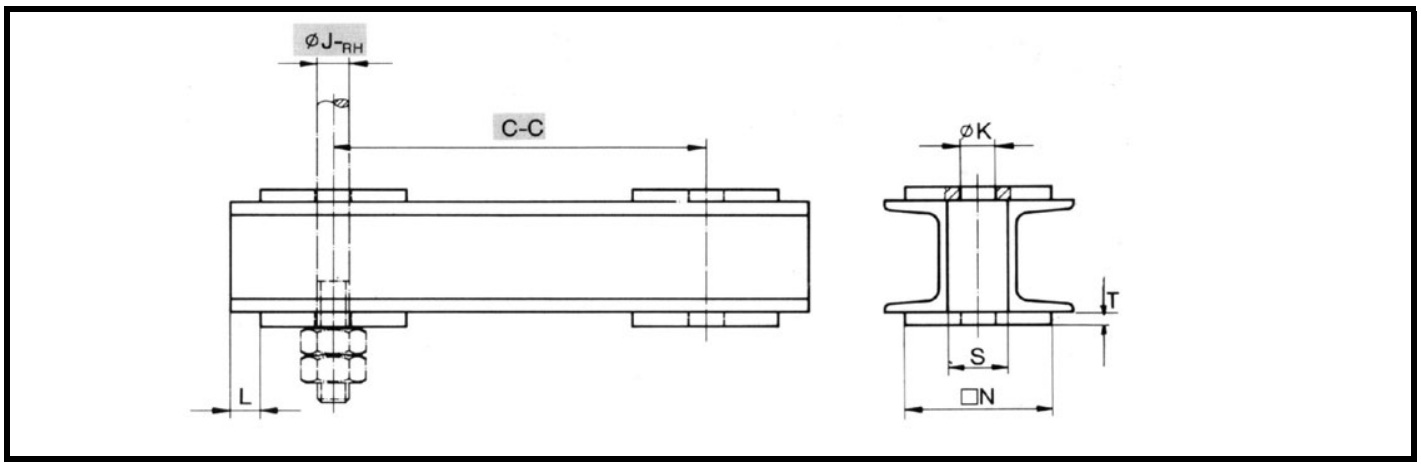


Fig. 46H

Size	U-profile DIN1026	Span width C-C [mm] Nominal load [kN] at 80° C 300	350	400	450	500	550	600	650	700	750	900	1050	1200	1350	1500	2xU-p. Weig. kg / m
1	80	39	33	29	26	23	21	20	17	16	16	13	11	10	8	8	17,3
2	100	68	58	51	45	40	37	33	31	29	27	23	19	17	15	13	21,2
3	120	103	92	80	71	64	58	53	49	46	43	36	30	27	24	21	26,8
4	160	147	147	133	118	107	97	89	82	76	71	59	51	44	39	36	37,6
5	200	208	208	208	192	173	157	144	133	123	115	96	82	72	64	57	50,6
6	240	279	279	279	279	279	260	238	220	204	190	159	136	119	106	95	66,4
7	300	368	368	368	368	368	368	368	351	326	304	254	218	190	169	152	92,4
8	380	629	629	629	629	629	629	629	629	629	592	494	424	371	330	297	126,2

Rod size ØJ-RH	inch / mm	1/2 M 12	5/8 M 16	3/4 M 20	1 M 24	1 1/8 M 30	1 1/2 M 36	1 3/4 M 42	2 M 48	2 1/4 M 56	2 1/2 M 64	2 3/4 M 72x6	3 M 80x6	3 1/3 M 90x6
ØK	↑ mm ↓	14	18	22	26	33	39	45	52	62	70	78	86	96
S		18	21	24	35	38	48	57	64	70	76	83	90	100
□N		80	80	100	100	100	110	120	125	130	135	145	150	160
T		6	10	10	12	12	20	20	20	20	20	20	20	20
L		6	8	8	10	10	10	10	10	10	10	10	10	10

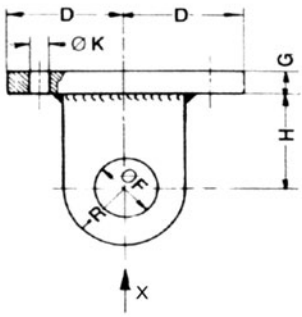
For higher design temperatures see temperature correction table on catalogue page 65, pict. 46

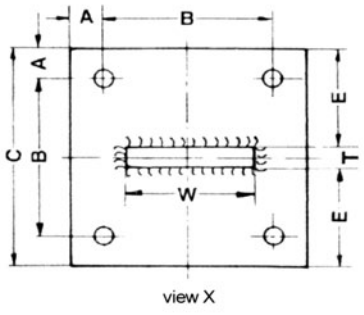
Fig. 47, Concrete single lug plate

When ordering, please tell us:

Ø J, and Fig.

Material: **S235JRG2**





	ØJ		Ø Screw		A	B	C	D	E	G	H	R	T	ØF	W	ØK	N.load [N]	Weight
	inch	mm	inch	mm													at 450 K	kg
Fig. 47	1/2	M12	5/8	M16	25	204	254	127	124	10	38	32	6	18	64	14	5030	5,29
	5/8	M16	3/4	M20	25	204	254	127	123	12	38	32	68	22	64	14	8050	6,36
	3/4	M20	1	M24	25	204	254	127	122	12	38	32	10	28	64	18	12100	6,37
	1	M24	1 1/8	M30	50	204	304	152	147	20	51	38	10	33	76	22	22100	14,96
	1 1/8	M30	1 1/2	M36	50	204	304	152	144	20	76	38	16	38	76	26	27700	15,33
	1 1/2	M36	1 3/4	M42	50	204	304	152	142	25	76	64	20	48	128	26	51700	20,36
	1 3/4	M42	2	M48	50	204	304	152	140	30	76	64	25	54	128	33	69800	24,47
	2	M48	2 1/4	M56	50	204	304	152	140	30	102	77	25	58	154	33	91800	25,98

Fig. 49 Concrete clevis plate, Fig. 52 Concrete rod attachement plate

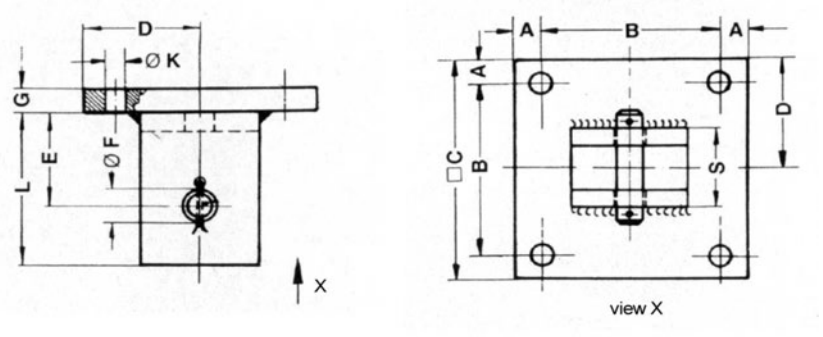
Fig. 49

When ordering, please tell us:

Ø J, Fig., with or without bolt

Material:

Attachement: S235JRG2
Bolt: ST 50K



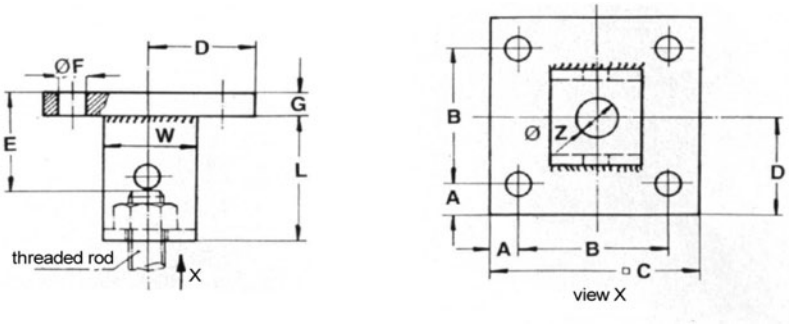
ØJ inch	ØJ mm	Ø Bolt inch	Ø Bolt mm	A	B	C	D	ØF	ØK	G	E	L	S	N.load [N] at 450 K	Weight kg
				mm											
3/8	M10	1/2	12	25	204	254	127	14	14	10	50	75	48	2710	5,52
1/2	M12	5/8	16	25	204	254	127	18	14	10	50	75	48	5030	5,63
5/8	M16	3/4	20	25	204	254	127	22	14	12	50	75	52	8050	6,82
3/4	M20	1	25	25	204	254	127	28	18	12	50	80	70	12100	7,37
1	M24	1 1/8	30	50	204	304	152	33	22	20	75	115	97	22100	17,71
1 1/8	M30	1 1/2	35	50	204	304	152	38	26	20	75	120	107	27700	18,13
1 1/2	M36	1 3/4	45	50	204	304	152	48	26	25	100	165	135	51700	27,09
1 3/4	M42	2	50	50	256	356	178	54	33	30	125	195	145	69800	40,37
2	M48	2 1/4	55	50	256	356	178	58	33	30	125	210	155	91800	44,28

Fig. 52

When ordering, please tell us:

Ø J, Fig.

Material: **S235JRG2**



ØJ inch	ØJ mm	N.load [N] at 450 K	G x C		Ø Z	Ø F	D	A	B	C	W	E	L	Weight kg
					mm									
3/8	M10	2710	10	254	11	14	127	25	204	254	50	60	75	5,52
1/2	M12	5030	10	254	14	14	127	25	204	254	50	60	75	5,63
5/8	M16	8050	12	254	18	14	127	25	204	254	50	62	75	6,82
3/4	M20	12100	12	254	22	18	127	25	204	254	65	62	80	7,37
1	M24	22100	20	304	26	22	152	50	204	304	80	90	115	17,71
1 1/8	M30	27700	20	304	33	26	152	50	204	304	80	90	120	18,13
1 1/2	M36	51700	25	304	39	26	152	50	204	304	125	125	165	27,09
1 3/4	M42	69800	30	356	45	33	178	50	256	356	125	140	195	40,37
2	M48	91800	30	356	52	33	178	50	256	356	150	170	210	44,28

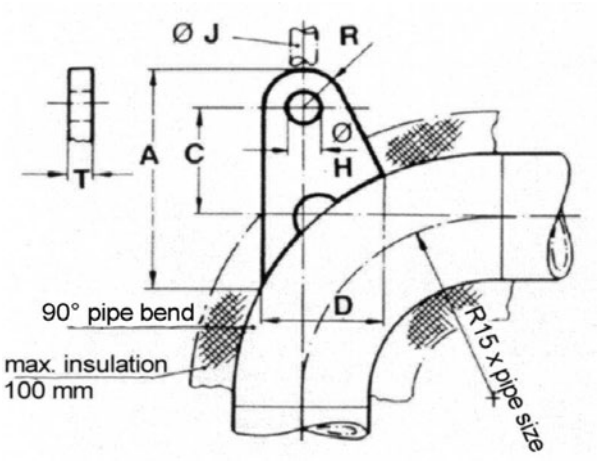
HS 53 Lug

By ordering please indicate:

Ø J, Fig. and pipe size

Material:

up to M56: S235JRG2
from M64: S355J2G3



Threaded rod ØJ		inch	1/2	5/8	3/4	1	1 1/8	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
		mm	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72x6	M80x6
Nominal load at 623K		[N]	5.030	8.050	12.100	22.100	27.700	51.700	69.800	91.800	121.000	149.000	185.100	225.000
T		mm	12	12	12	16	16	20	25	25	25	25	25	30
D		mm	90	90	90	127	127	178	178	216	216	248	248	248
R		mm	38	38	38	50	50	76	76	89	89	95	95	98
Ø H DIN 69		mm	18	22	28	37	43	52	58	63	68	74	78	93

	Pipe size inch	Pipe size mm	C = C_1	A / Weig.	mm / kg										
HS 53 Lug	2 1/2	65	186	A	320	320	320								
				Weig.	1,4	2,1	2,1								
	3	80	190	A	297	297	297								
				Weig.	1,3	2,0	2,0								
	3 1/2	90	190	A	295	295	295								
				Weig.	1,3	2,0	2,0								
	4	100	190	A	294	294	294	343	343						
				Weig.	1,3	2,0	2,0	4,4	5,4						
	5	125	190	A	292	292	292	332	332						
				Weig.	1,3	2,0	2,0	4,2	5,2						
	6	150	220	A	325	325	325	360	360	455	455				
				Weig.	1,3	2,0	2,0	4,2	5,2	11,4	15,1				
	8	200	220	A	330	330	330	360	360	440	440	485	485	510	
				Weig.	1,3	2,0	2,0	4,2	5,2	10,9	14,4	19,5	19,5	23,8	
	10	250	215	A	330	330	330	360	360	430	430	470	470	490	
				Weig.	1,3	2,0	2,0	4,2	5,2	10,7	14,2	18,9	18,9	22,8	
	12	300	210	A		335	335	365	365	430	430	465	465	465	
				Weig.		2,0	2,0	4,2	5,3	10,7	14,2	18,7	18,7	22,4	
	14	350	190	A			340	370	370	435	435	470	470	490	
				Weig.			2,1	4,3	5,4	10,8	14,3	18,9	18,9	22,7	
	16	400	185	A				375	375	435	435	470	470	485	
				Weig.				4,4	5,4	10,8	14,3	18,8	18,8	22,5	
	18	450	180	A				375	375	435	435	465	465	485	
				Weig.				4,4	5,4	10,8	14,3	18,8	18,8	22,5	
	20	500	200	A					405	465	465	500	500	515	
				Weig.					6,0	11,5	15,4	20,0	20,0	24,0	
	22	550	215	A						490	490	520	520	538	538	538
				Weig.						12,1	16,2	21,0	21,0	25,0	25,0	31,3
	24	600	215	A						497	497	525	525	542	542	542
				Weig.						12,4	16,6	21,4	21,4	25,4	25,4	32,0
	26	650	210	A						495	495	525	525	540	540	540
				Weig.						12,3	16,5	21,2	21,0	25,1	25,0	31,1
	28	700	210	A							500	530	530	545	545	545
				Weig.							16,6	21,3	21,3	25,2	25,2	31,5
	30	750	210	A								540	540	555	555	555
				Weig.								22,0	22,0	26,0	26,0	32,5

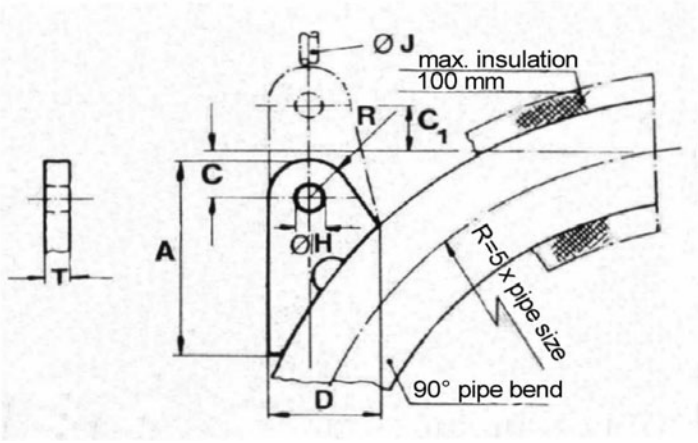
HS 54 Lug

By ordering please indicate:

Ø J, HS and pipe size

Material:

up to M56: S235JRG2
from M64: S355J2G3



Threaded rod ØJ		inch	1/2	5/8	3/4	1	1 1/8	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
		mm	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72x6	M80x6
Nominal load at 623K		[N]	5.030	8.050	12.100	22.100	27.700	51.700	69.800	91.800	121.000	149.000	185.100	225.000
T		mm	6	10	10	12	16	20	25	25	25	25	25	30
D		mm	90	90	90	127	127	178	178	216	216	248	248	248
R		mm	38	38	38	50	50	76	76	89	89	95	95	98
Ø H DIN 69		mm	18	22	28	37	43	52	58	63	68	74	78	93
Pipe size		C =	A	mm →										
inch	mm	C_1	Weig.	kg →										
HS 54 Lug														
2 1/2	65	95	A	360	360	360								
			Weig.	1,6	2,4	2,4								
3	80	70	A	360	360	360	425	425						
			Weig.	1,6	2,4	2,4	5,4	6,8						
3 1/2	90	45	A	370	370	370	430	430						
			Weig.	1,6	2,5	2,5	5,5	6,8						
4	100	20	A	375	375	375	430	430						
			Weig.	1,7	2,5	2,5	5,4	6,8						
5	125	40	A	385	385	385	430	430	575	575				
			Weig.	1,7	2,5	2,5	5,5	6,8	15,4	20,5				
6	150	95	A	395	395	395	445	445	555	555	630	630		
			Weig.	1,7	2,6	2,6	5,6	7,0	14,8	19,7	27,2	27,2		
8	200	220	A	410	410	410	455	455	555	555	620	620	655	
			Weig.	1,9	2,7	2,7	5,8	7,2	14,9	19,8	26,7	26,7	32,4	
10	250	345	A	415	415	415	460	460	550	550	610	610	625	
			Weig.	1,9	2,8	2,8	5,9	7,3	14,7	19,5	26,2	26,2	31,0	
12	300	475	A		410	410	465	465	555	555	595	595	620	
			Weig.		2,7	2,7	5,9	7,4	14,9	19,8	25,6	25,6	30,6	
14	350	620	A			420	480	480	560	560	625	625	655	
			Weig.			2,8	6,1	7,6	15,0	20,0	26,9	26,9	32,5	
16	400	755	A				470	470	555	555	620	620	635	
			Weig.				6,0	7,5	14,8	19,7	26,7	26,7	31,5	
18	450	887	A				490	490	575	575	630	630	650	
			Weig.				6,2	7,8	15,4	20,5	27,2	27,2	32,3	
20	500	940	A					580	660	660	705	705	725	
			Weig.					9,2	17,6	23,5	30,4	30,4	35,8	
22	550	1118	A						692	692	736	736	762	762
			Weig.						18,4	24,6	31,8	31,8	37,7	37,7	47,1
24	600	1187	A						680	680	730	730	755	755	755
			Weig.						18,1	24,1	31,5	31,4	37,4	37,4	46,7
26	650	1308	A						805	705	743	743	762	762	762
			Weig.						18,9	25,0	32,0	32,0	37,7	37,7	47,1
28	700	1460	A							686	730	730	749	749	749
			Weig.							24,3	31,5	31,5	37,1	37,1	46,3
30	750	1550	A								775	775	795	795	795
			Weig.								33,4	33,4	39,2	39,2	49,0

Fig. 55, Structural welding lug and Fig. 60, Steel washer plate

Fig. 55

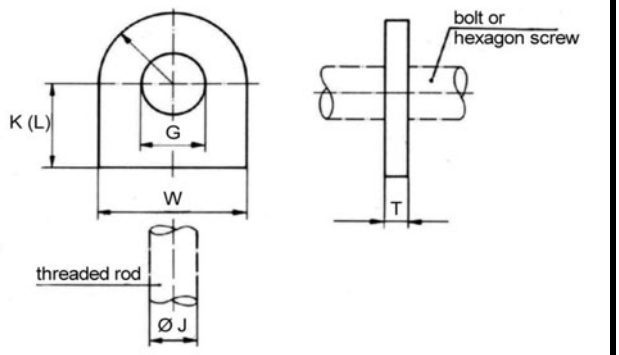
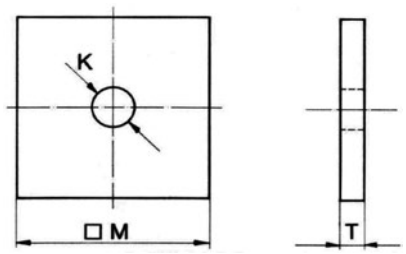


Fig. 60

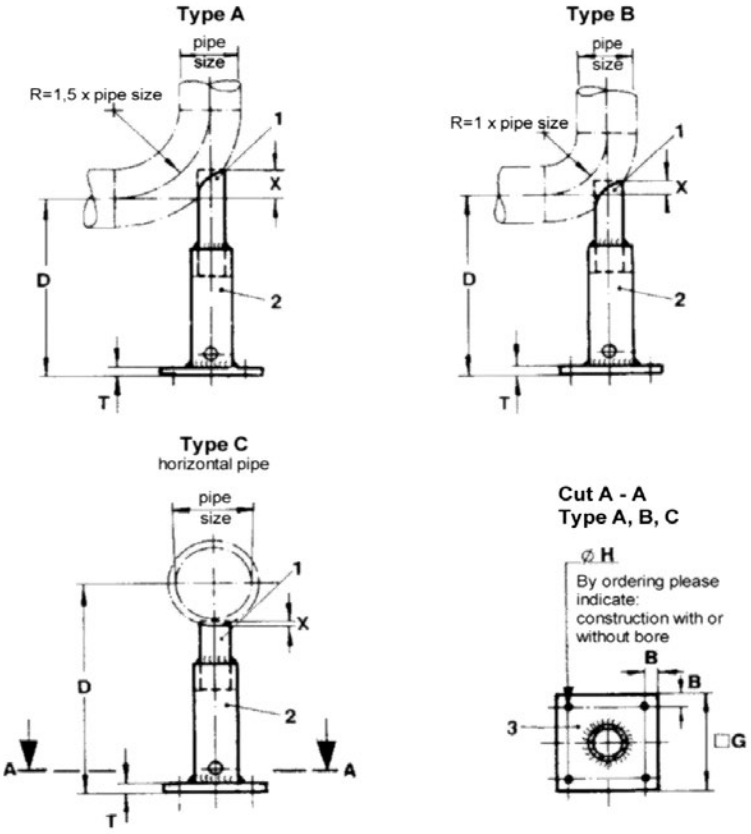


	ØJ		Bolt		ØG	K	L	R	T	W	Nom.load F_N	Weight	
						short	long				at 80° C	short	long
	inch	mm	inch	mm	← mm →						N	kg	kg
Fig. 55	1/2	M 12	5/8	M 16	18	38	76	32	6	64	6900	0,2	0,3
	5/8	M 16	3/4	M 20	22	38	76	32	8	64	13000	0,2	0,4
	3/4	M 20	1	M 24	28	38	76	32	10	64	18000	0,3	0,5
	1	M 24	1 1/8	M 30	33	51	76	38	10	76	26000	0,4	0,6
	1 1/8	M 30	1 1/2	M 36	38	76	102	38	16	76	40000	0,9	1,2
	1 1/2	M 36	1 3/4	M 42	48	76	115	51	20	102	60000	1,6	2,2
	1 3/4	M 42	2	M 48	54	76	115	64	25	128	90000	2,8	3,8
	2	M 48	2 1/4	M 56	58	102	115	77	25	154	120000	4,5	4,9
	2 1/4	M 56	2 1/2	M 64	70	115	-	77	25	154	160000	4,6	-
	2 1/2	M 64	2 3/4	M 72x6	78	115	-	102	25	204	200000	7,0	-
	2 3/4	M 72x6	3	M 80x6	86	115	-	102	25	204	200000	6,8	-
	3	M 80x6	3 1/2	M 90x6	96	127	-	102	30	204	225000	8,4	-
	3 1/2	M 90x6	3 3/4	M 95x6	101	152	-	114	30	228	317100	11,3	-
	3 3/4	M 95x6	4	M 100x6	106	152	-	114	40	228	368700	14,8	-

	ØJ		ØK	□ M	T	Nom. load F_N at 80° C	Weight
	inch	mm	← mm →			N	kg
Fig. 60	1/2	M 12	14	80	6	6900	0,3
	5/8	M 16	18	80	10	13000	0,4
	3/4	M 20	22	100	10	18000	0,7
	1	M 24	26	100	12	26000	0,9
	1 1/8	M 30	33	100	20	40000	0,9
	1 1/2	M 36	39	130	20	60000	1,8
	1 3/4	M 42	45	130	20	90000	1,7
	2	M 48	52	150	20	120000	1,7
	2 1/4	M 56	62	150	20	160000	3,0
	2 1/2	M 64	70	150	20	200000	2,9
	2 3/4	M 72x6	78	150	20	200000	2,8
	3	M 80x6	86	150	20	225000	2,7
	3 1/2	M 90x6	96	180	20	317100	3,7
	3 3/4	M 95x6	101	180	20	368700	3,5

For higher design temperatures see temperature correction table on catalogue page 65, pict. 46

HS 62, Adjustable pipe stanchion



HS 62 Adjustable pipe stanchion

Combination number	1	2	3	4
Upper column , Pos. 1	48,3 x 4	76,1 x 5	114,3 x 6,3	139,7 x 7,1
Lower column, Pos. 2	60,3 x 4	88,9 x 5	139,7 x 10	168,3 x 11
Plate, Pos. 3 □G x T	150 x 10	250 x 10	250 x 10	250 x 10
Plate dimension B	25	30	30	30
Boring Ø H	14	14	18	18

Dimensions in mm

Pipe size/ pipe bend		Type A Combination number				Type B Combination number				Type C Combination number			
inch	mm	1	2	3	4	1	2	3	4	1	2	3	4
2	50	X = 45	-	-	-	X = 20	-	-	-	X = 10	-	-	-
2 1/2	65	X = 40	-	-	-	X = 15	-	-	-	X = 8	-	-	-
3	80	X = 35	X = 65	-	-	X = 10	X = 35	-	-	X = 6	X = 20	-	-
4	100	X = 40	X = 60	-	-	X = 5	X = 25	-	-	X = 6	X = 15	-	-
5	125	-	X = 60	X = 110	-	-	X = 15	X = 55	-	-	X = 10	X = 30	-
6	150	-	X = 65	X = 100	X = 140	-	X = 10	X = 45	X = 75	-	X = 8	X = 20	X = 40
8	200	-	-	X = 105	X = 130	-	-	X = 30	X = 55	-	-	X = 20	X = 25
10	250	-	-	X = 105	X = 130	-	-	X = 20	X = 35	-	-	X = 15	X = 20
12	300	-	-	-	X = 135	-	-	-	X = 25	-	-	X = 15	X = 15
14	350	-	-	-	X = 160	-	-	-	X = 35	-	-	-	X = 15
16	400	-	-	-	X = 165	-	-	-	X = 25	-	-	-	X = 15
18	450	-	-	-	X = 170	-	-	-	X = 25	-	-	-	X = 10

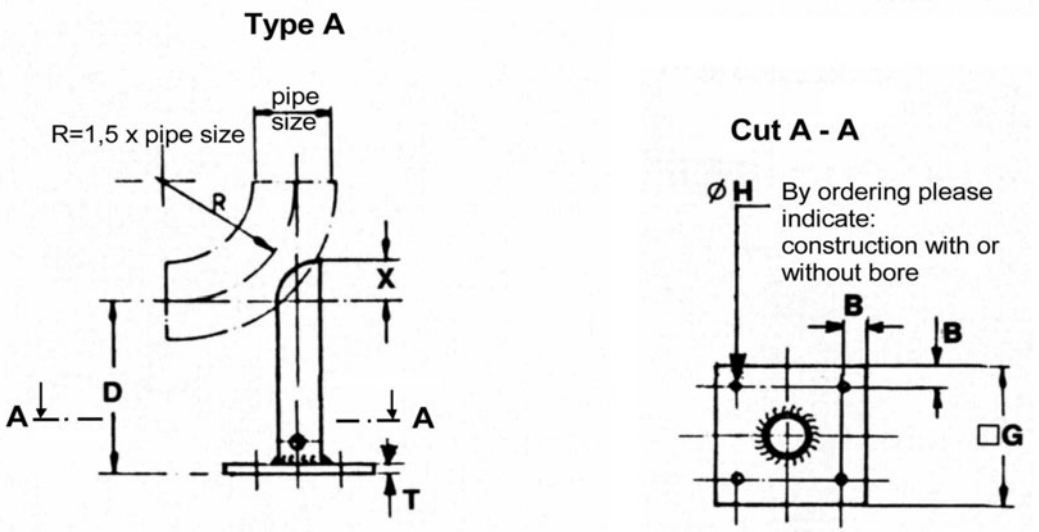
Material

Pos. 1, 2: ST 35.8

Pos. 3: S235JRG2

Higher design temperature: 573K

HS 63, Pipe stanchion, Type A



Column	**inch**	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	20
	mm	48,3 x 4	60,3 x 5	76,1 x 5	88,9 x 5,6	114,3 x 6,3	139,7 x 7,1	168,3 x 7,1	219,1 x 8	273,0 x 10	323,9 x 10	355,6 x 10	406,4 x 10	508,0 x 11
Base plate	**□G**	150	150	200	200	200	250	250	355	455	455	510	560	610
	T	10	10	10	10	10	10	10	10	12	12	12	12	12
	B	25	25	30	30	30	30	30	30	40	40	40	40	40
	Ø H	14	14	14	14	18	18	22	26	33	33	33	33	33

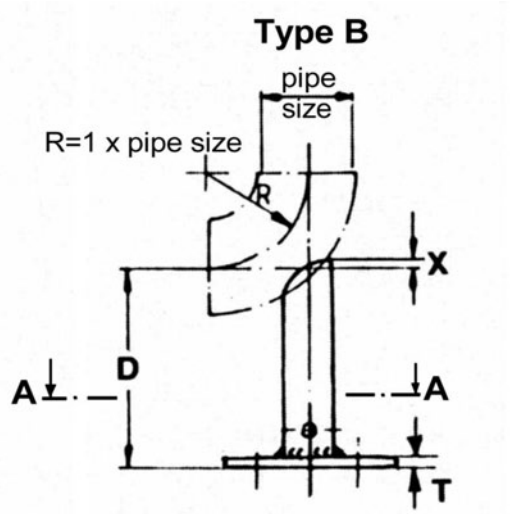
HS 63, Pipe stanchion Type A

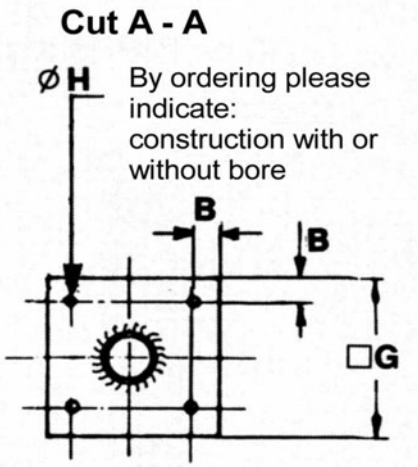
Nominal load		**X [mm]**												
inch	**mm**													
2 1/2	65	37	56	-	-	-	-	-	-	-	-	-	-	-
3	80	37	49	65	-	-	-	-	-	-	-	-	-	-
4	100	40	49	62	81	-	-	-	-	-	-	-	-	-
5	125	40	51	62	76	108	-	-	-	-	-	-	-	-
6	150	-	-	64	76	102	138	-	-	-	-	-	-	-
8	200	-	-	-	83	103	129	162	-	-	-	-	-	-
10	250	-	-	-	-	106	129	154	214	-	-	-	-	-
12	300	-	-	-	-	-	133	157	208	281	-	-	-	-
14	350	-	-	-	-	-	159	181	229	295	383	-	-	-
16	400	-	-	-	-	-	165	186	230	287	354	408	-	-
18	450	-		-	-	-	-	194	235	286	343	386	471	-
20	500	-	-	-	-	-	-	-	240	287	340	376	445	-
22	550	-	-	-	-	-	-	-	246	291	340	373	432	600
24	600	-	-	-	-	-	-	-	252	295	341	360	427	535

Material:
Pipe: St 35.8
Base plate: S235JRG
Higher design temperature: 573K

Type A Type B Type C

HS 63, Pipe stanchion Type B





Column	**inch**	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	20
	mm	48,3 x 4	60,3 x 5	76,1 x 5	88,9 x 5,6	114,3 x 6,3	139,7 x 7,1	168,3 x 7,1	219,1 x 8	273,0 x 10	323,9 x 10	355,6 x 10	406,4 x 10	508,0 x 11
Base plate	**□G**	150	150	200	200	200	250	250	355	455	455	510	560	610
	T	10	10	10	10	10	10	10	10	12	12	12	12	12
	B	25	25	30	30	30	30	30	30	40	40	40	40	40
	Ø H	14	14	14	14	18	18	22	26	33	33	33	33	33

HS 63, Pipe stanchion Type B

Pipe size inch	Pipe size mm	X [mm]												
2 1/2	65	14	29	-	-	-	-	-	-	-	-	-	-	-
3	80	10	19	33	-	-	-	-	-	-	-	-	-	-
4	100	5	13	24	40	-	-	-	-	-	-	-	-	-
5	125	2	8	16	29	56	-	-	-	-	-	-	-	-
6	150	-	-	11	22	43	73	-	-	-	-	-	-	-
8	200	-	-	6	13	30	52	79	-	-	-	-	-	-
10	250	-	-	-	-	19	37	59	111	-	-	-	-	-
12	300	-	-	-	-	-	37	48	98	152	-	-	-	-
14	350	-	-	-	-	-	35	54	95	151	227	-	-	-
16	400	-	-	-	-	-	27	45	83	129	183	232	-	-
18	450	-		-	-	-	-	37	70	114	164	198	273	-
20	500	-	-	-	-	-	-	-	62	102	144	176	235	-
22	550	-	-	-	-	-	-	-	52	90	132	159	210	354
24	600	-	-	-	-	-	-	-	45	81	119	144	191	310

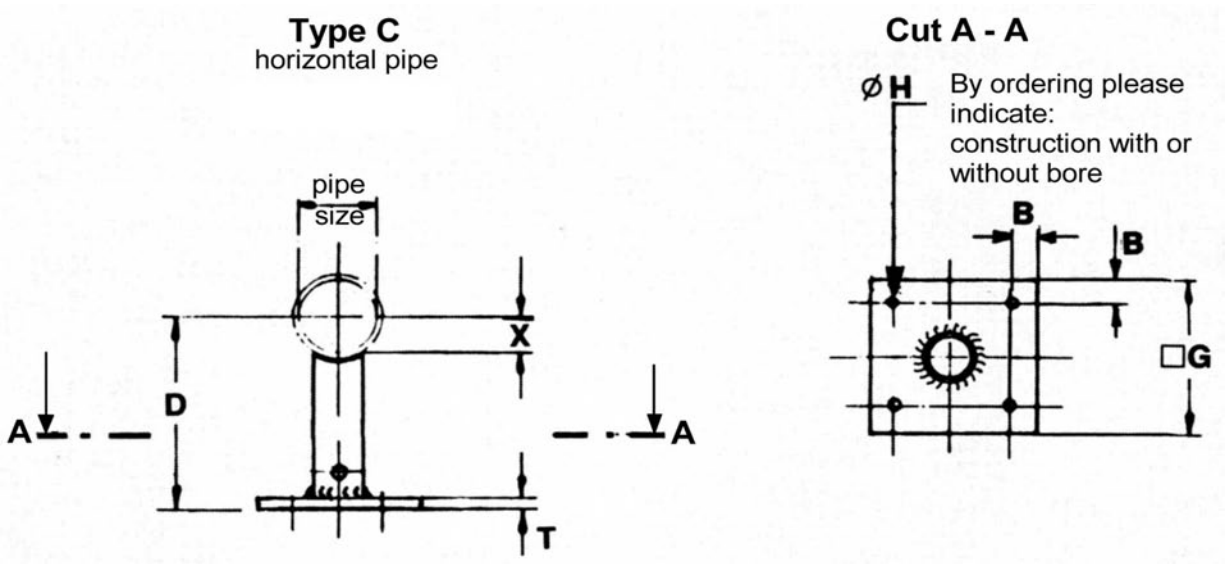
Material:

Pipe: St 35.8

Base plate: S235JRG

Higher design temperature: 573K

HS 63, Pipe stanchion Type C



Column	**inch**	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	20
	mm	48,3 x 4	60,3 x 5	76,1 x 5	88,9 x 5,6	114,3 x 6,3	139,7 x 7,1	168,3 x 7,1	219,1 x 8	273,0 x 10	323,9 x 10	355,6 x 10	406,4 x 10	508,0 x 11
Base plate	**□G**	150	150	200	200	200	250	250	355	455	455	510	560	610
	T	10	10	10	10	10	10	10	10	12	12	12	12	12
	B	25	25	30	30	30	30	30	30	40	40	40	40	40
	Ø H	14	14	14	14	18	18	22	26	33	33	33	33	33

HS 63, Pipe stanchion Type C

Pipe size		**X [mm]**												
inch	**mm**													
2 1/2	65	27	21	-	-	-	-	-	-	-	-	-	-	-
3	80	37	33	32	-	-	-	-	-	-	-	-	-	-
4	100	54	48	45	35	-	-	-	-	-	-	-	-	-
5	125	67	64	60	56	41	-	-	-	-	-	-	-	-
6	150	-	-	76	71	62	46	-	-	-	-	-	-	-
8	200	-	-	-	100	92	84	70	-	-	-	-	-	-
10	250	-	-	-	-	124	117	108	83	-	-	-	-	-
12	300	-	-	-	-	149	146	138	119	87	-	-	-	-
14	350	-	-	-	-	-	164	157	140	113	73	-	-	-
16	400	-	-	-	-	-	191	184	172	151	122	98	-	-
18	450	-		-	-	-	-	211	200	184	162	143	105	-
20	500	-	-	-	-	-	-	-	229	214	195	181	152	-
22	550	-	-	-	-	-	-	-	259	243	227	216	192	116
24	600	-	-	-	-	-	-	-	284	273	257	248	227	168

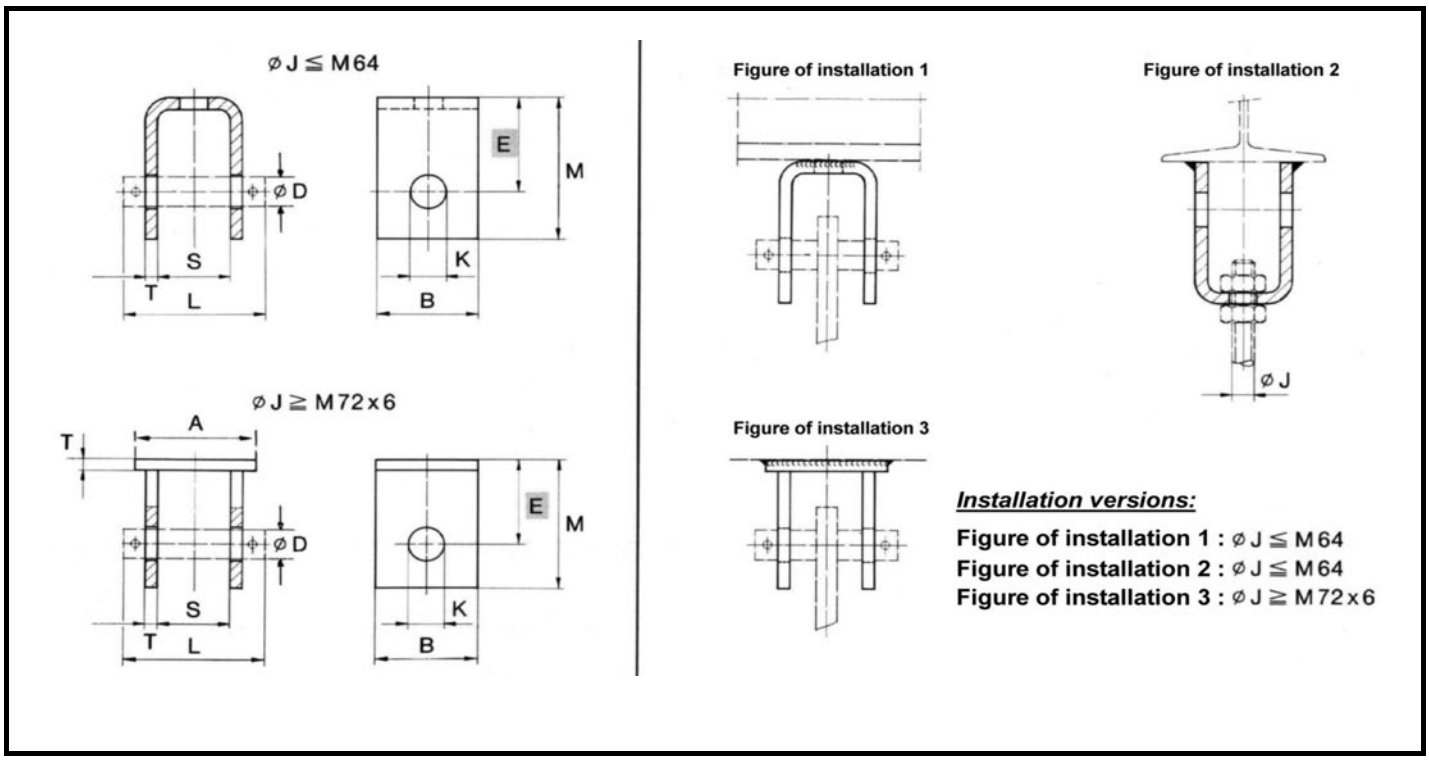
Material:

Pipe: St 35.8

Base plate: S235JRG

Higher design temperature: 573K

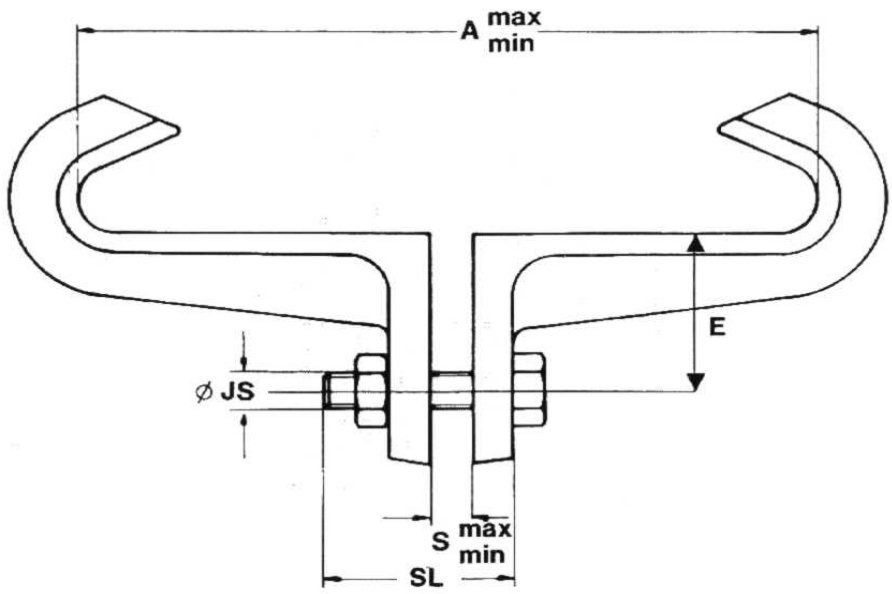
Fig. 66, Welded beam attachment



	ØJ		A	B	ØD	E	ØK	L	M	S	T	Nom.load F_N at 80°C	Weight with bolt	Weight without bolt
	inch	mm	mm									N	kg	kg
Fig. 66	1/2	M 12	-	50	16	50	18	70	75	36	6	6900	0,6	0,4
	5/8	M 16	-	50	20	50	22	85	75	42	8	13000	0,7	0,5
	3/4	M 20	-	65	25	50	28	100	80	50	10	18000	1,3	0,9
	1	M 24	-	80	30	75	33	130	115	65	16	26000	3,2	2,5
	1 1/8	M 30	-	80	35	75	38	145	120	75	16	40000	3,7	2,6
	1 1/2	M 36	-	125	45	100	48	170	165	95	20	60000	9,0	7,4
	1 3/4	M 42	-	125	50	125	54	180	195	105	20	90000	0,8	8,6
	2	M 48	-	150	55	125	58	200	210	115	20	120000	14,7	11,1
	2 1/4	M 56	-	150	65	150	70	210	240	125	20	160000	17,6	12,2
	2 1/2	M 64	-	150	75	155	78	220	250	135	20	200000	19,2	12,7
	2 3/4	M 72x6	155	155	75	150	78	180	250	95	20	200000	19,7	13,6
	3	M 80x6	165	180	90	160	96	200	265	95	25	225000	29,7	20,0
	3 1/2	M 90x6	180	200	95	190	101	210	305	110	25	317000	37,8	26,4

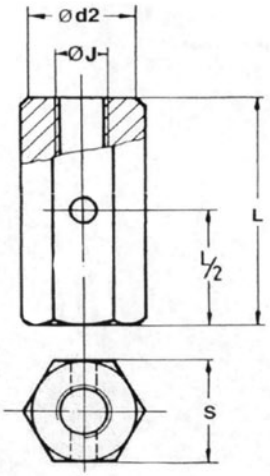
For higher design temperatures see temperature correction table on catalogue page 65, pict. 46

Fig. 131 Beam clamp



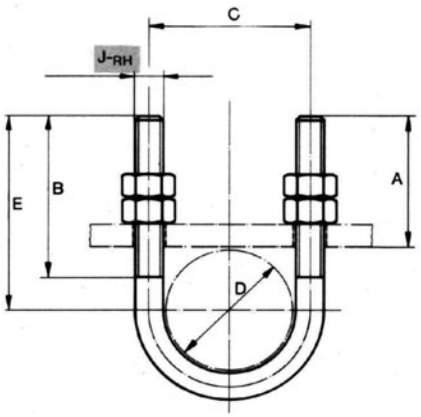
	Size	A min	A max	E	Ø JS		SL	S min	S max	Nom.load [N]	Weight
		mm			inch	mm		mm		at 450K	[kg]
Fig. 131 Beam clamp	2	50	60	30	3/8	M10	38	3	13	1650	0,21
	2 1/"2	65	75								0,22
	3	80	90								0,24
	3 1/2	90	100	30	3/8	M10	38	3	13	1650	0,26
	4	105	115								0,28
	4 1/2	115	125								0,39
	5	130	140	30	3/8	M10	38	3	13	1650	0,41
	5 1/2	140	150								0,44
	6	150	160								0,50

Fig. 135 Steel rod coupling



	ØJ		L	S	Ød2	Nom.load [N]	Weight
	inch	mm		mm		at 450K	kg
Fig. 135	1/2	M 12	35	19	17,0	5030	0,06
	5/8	M 16	40	24	22,0	8050	0,09
	3/4	M 20	45	30	27,0	12100	0,16
	1	M 24	60	36	32,5	22100	0,32
	1 1/8	M 30	70	46	41,5	27700	0,62
	1 1/2	M 36	85	55	49,5	51700	1,07
	1 3/4	M 42	100	65	62,0	69800	1,78
	2	M 48	115	75	71,0	92100	2,76
	2 1/4	M 56	130	85	81,0	121000	3,87
	2 1/2	M 64	140	95	90,0	149000	5,06
	2 3/4	M 72x6	155	105	100,0	185000	8,71
	3	M 80x6	165	115	110,0	225000	11,13
	3 1/2	M 90x6	190	130	125,0	317100	16,37
	3 3/4	M 95x6	205	145	140,0	368700	21,98

Fig. 137, Standard U-Bolt



	Pipe size		ØD	ØJ-RH		A	B	C	E	Nom.load F_N at 80° C	Weight
	inch	mm	mm	inch	mm	← mm →				N	kg
Fig. 137	1/2	15	21,3	1/4	M 6	59	60	30	70	2980	0,04
	3/4	20	26,9	1/4	M 6	59	60	34	70	2980	0,04
	1	25	33,7	1/4	M 6	53	60	41	70	2980	0,05
	1 1/4	32	42,4	3/8	M 10	51	60	54	73	7490	0,14
	1 1/2	40	48,3	3/8	M 10	52	63	60	76	7490	0,15
	2	50	60,3	3/8	M 10	52	63	72	83	7490	0,17
	2 1/2	65	76,1	1/2	M 12	59	76	90	95	13900	0,29
	3	80	88,9	1/2	M 12	57	76	102	100	13900	0,32
	3 1/2	90	101,6	1/2	M 12	57	76	115	108	13900	0,35
	4	100	114,3	1/2	M 12	57	76	128	114	13900	0,38
	5	125	139,7	1/2	M 12	56	76	155	127	13900	0,44
	6	150	168,3	5/8	M 16	71	95	187	156	22200	1,00
	8	200	219,1	5/8	M 16	71	95	238	181	22200	1,20
	10	250	273,0	3/4	M 20	75	100	297	213	33200	2,20
	12	300	323,9	1	M 24	83	108	351	245	46200	3,70
	14	350	355,6	1	M 24	83	108	384	260	46200	4,00
	16	400	406,4	1	M 24	83	108	434	286	46200	4,50
	18	450	457,2	1 1/8	M 30	92	120	491	320	60800	7,80
	20	500	508,0	1 1/8	M 30	92	120	542	346	60800	8,60
	24	600	609,6	1 1/8	M 30	92	120	644	397	60800	10,00
	30	750	762,0	1 1/8	M 30	92	120	796	473	60800	12,20

For higher design temperatures see temperature correction table on catalogue page 65, pict. 46

Fig. 140 / 141 / 146 / 253 / 254, Machined threaded Rod

Fig. 140 / 253

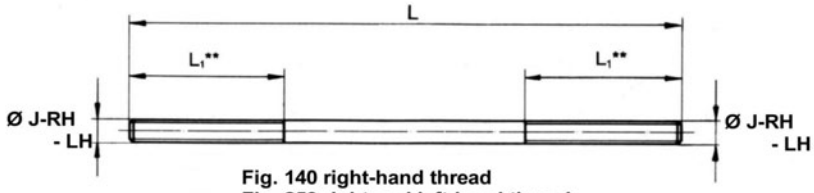


Fig. 140 right-hand thread
Fig. 253 right-and left-hand thread

Fig. 141 / 254

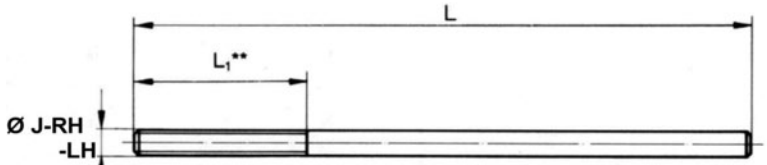


Fig. 141 right-hand thread
Fig. left-hand thread

Fig. 146

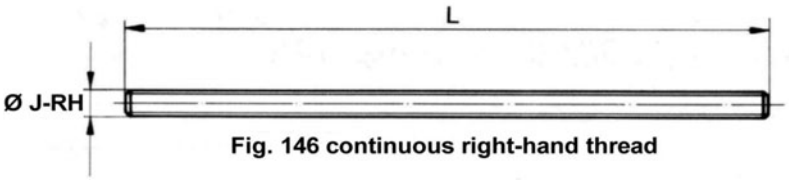
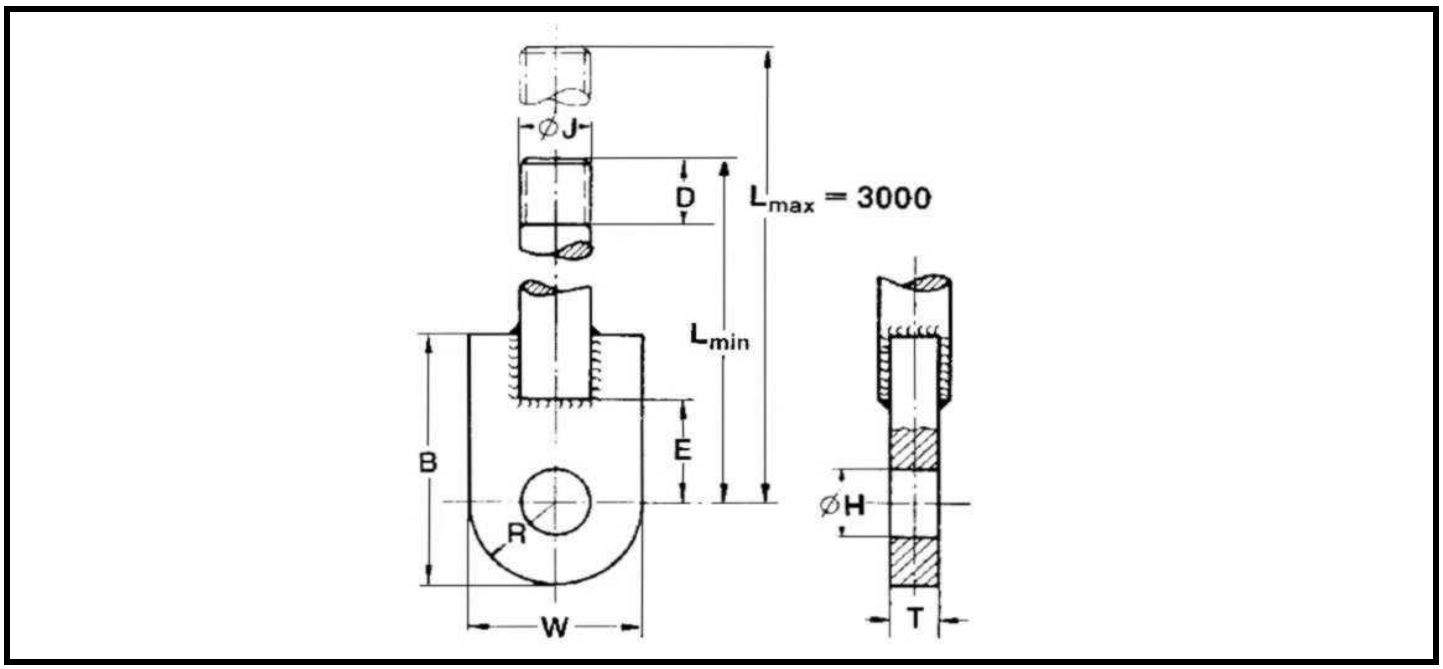


Fig. 146 continuous right-hand thread

Fig. 140 / 141 / 146 / 253 / 254

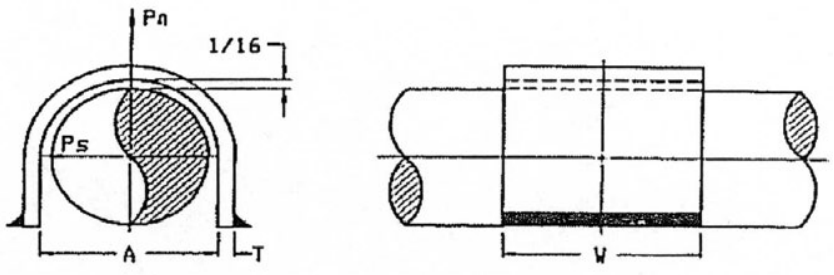
ØJ-RH ØJ-LH		Fig. 140/253		Fig. 141/254		Fig. 140/253 Fig. 141/254	Fig. 146		Nom.load F_N at 80° C	Weight
inch	mm	L_{min}	L_{max}	L_{min}	L_{max}	L_1**	L_{min}	L_{max}	N	kg
1/2	M 12	250	3000	250	3000	65	250	3000	6900	0,9
5/8	M 16	250	3000	250	3000	65	250	3000	13000	1,6
3/4	M 20	250	3000	250	3000	75	250	3000	18000	2,5
1	M 24	250	3000	250	3000	100	250	3000	26000	3,6
1 1/8	M 30	500	3000	250	3000	115	500	2000	40000	5,6
1 1/2	M 36	500	3000	250	3000	150	500	2000	60000	8,0
1 3/4	M 42	500	3000	250	3000	175	500	2000	90000	12,0
2	M 48	500	3000	250	3000	200	500	2000	120000	14,2
2 1/4	M 56*	1000	3000	500	3000	225	500	2000	160000	19,3
2 1/2	M 64*	1000	3000	500	3000	250	500	2000	200000	25,3
2 3/4	M 72x6	1000	3000	500	3000	280	-	-	200000	32,0
3	M 80x6	1000	3000	500	3000	305	-	-	225000	39,5
3 1/2	M 90x6	1000	3000	500	3000	305	-	-	317100	49,9
3 3/4	M 95x6	1000	3000	500	3000	305	-	-	368700	55,6

Fig.148, Rod with eye end



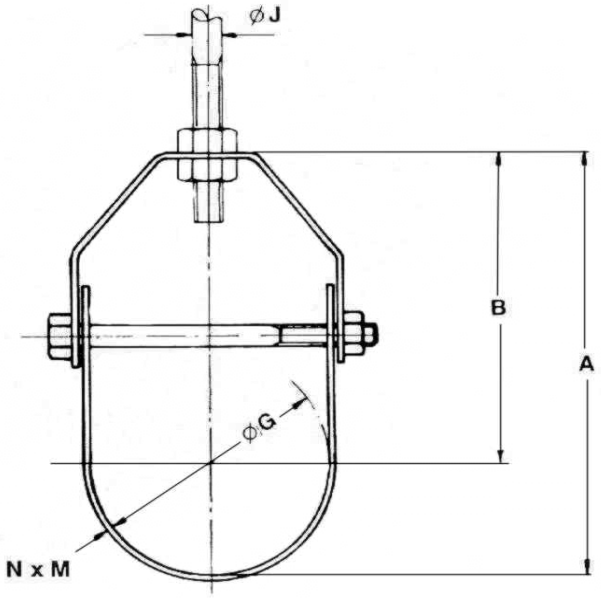
	ØJ		N.load at 450K	B	D	E	ØH	$L_{min.}$	R	T	W	Weight at				
	inch	mm	[N]	mm								$L_{min.}$ [kg]	L=500 [kg]	L=1000 [kg]	L=2000 [kg]	L=3000 [kg]
Fig. 148	1 1/2	M36	51700	165	80	65	48	250	50,0	25	100	3,94	5,93	9,93	17,92	25,91
	1 3/4	M42	69800	165	90	65	52	400	50,0	25	100	5,87	6,96	12,41	23,31	34,21
	2	M48	92100	200	100	75	58	400	62,5	35	125	9,66	11,08	18,18	32,38	46,58
	2 1/4	M56	121000	200	120	75	66	400	62,5	35	125	10,82	12,69	22,04	40,74	59,44
	2 1/2	M64	149000	200	140	75	66	400	62,5	35	125	12,61	15,21	28,12	54,21	80,21
	2 3/4	M72x6	185000	230	305	95	86	480	75,0	40	150	19,23	19,87	35,87	67,87	99,87
	3	M80x6	225000	250	305	100	93	510	75,0	40	150	23,52	23,12	42,87	82,37	121,87
	3 1/2	M90x6	317100	290	380	120	96	610	90,0	50	180	38,07	32,58	57,53	107,43	157,33
	3 3/4	M95x6	368700	325	380	130	101	635	95,0	50	190	44,10	36,59	64,39	119,99	175,59

Fig. 244A Pipe strap



	Pipe size inch	Side load N	Nom. load N	A mm	Sheet thickn. mm	Width mm	True length mm	Radius mm	Weight kg
Fig. 244A	1/2	1150	6800	25	7	50	77	12,5	0,212
	3/4	1150	6800	30	7	50	90	15,0	0,248
	1	1150	6800	37	7	50	108	18,5	0,297
	1 1/4	2270	9100	45	10	75	133	22,5	0,783
	1 1/2	2270	9100	51	10	75	149	25,5	0,877
	2	2270	9100	64	10	75	182	32,0	1,072
	2 1/2	2950	10430	78	15	75	226	39,0	2,000
	3	2950	10430	91	15	100	259	45,5	3,050
	4	2950	10430	117	15	100	326	58,5	3,839
	6	3180	10430	172	15	150	468	86,0	8,266
	8	3400	11800	224	15	150	609	112,0	10,756

Fig. 260, Adjustable clevis hanger



	Pipe size inch	Pipe size mm	Ø G mm	A mm	Ø J Zoll	Ø J mm	N x M mm	B mm	Nom.load [N] at 573 K	Weight [kg]
Fig. 260	1/2	15	22	73	3/8	M 10	3 x 25	62	2700	0,16
	3/4	20	27	89	3/8	M 10	3 x 25	75	2700	0,18
	1	25	34	96	3/8	M 10	3 x 25	79	2700	0,20
	1 1/4	32	43	107	3/8	M 10	3 x 25	85	2700	0,24
	1 1/2	40	49	116	3/8	M 10	3 x 25	91	2700	0,25
	2	50	61	126	3/8	M 10	3 x 25	95	2700	0,28
	2 1/2	65	77	159	1/2	M 12	5 x 35	120	5000	0,64
	3	80	90	166	1/2	M 12	5 x 35	120	5000	0,69
	3 1/2	90	102	176	1/2	M 12	5 x 35	127	5000	0,78
	4	100	115	198	5/8	M 16	5 x 35	140	6300	0,97
	5	125	141	227	5/8	M 16	5 x 35	160	6300	1,10
	6	150	169	260	3/4	M 20	5 x 40	175	8600	1,63
	8	200	220	320	1	M24	5 x 45	211	8900	2,25
	10	250	274	390	1	M24	6 x 45	253	16000	3,98
	12	300	325	450	1	M24	6 x 50	287	16900	5,17
	14	350	360	493	1	M24	6 x 50	313	18700	6,72
	16	400	411	589	1	M24	6 x 65	383	20400	9,52
	18	450	463	635	1 1/8	M 30	6 x 65	403	21300	11,05
	20	500	514	702	1 1/2	M 36	10 x 75	445	21300	19,30
	24	600	617	814	1 1/2	M 36	10 x 75	505	21300	21,96
	30	750	769	985	1 1/2	M 36	10 x 75	600	26700	31,51

Fig.278/278L/278X, Eye rod and Fig.290/290L Weldness eye nut

Fig. 278/278L/278X

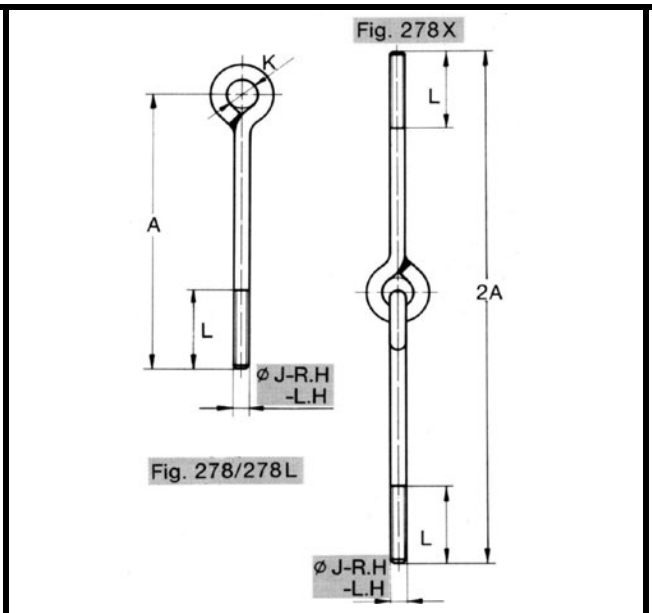
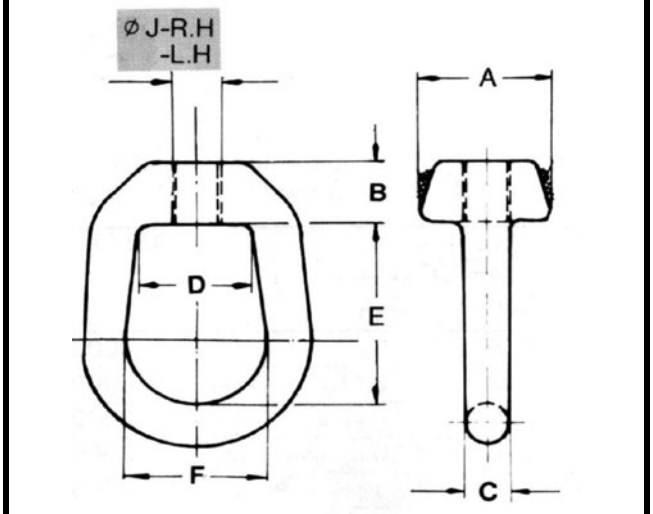


Fig. 290/290L



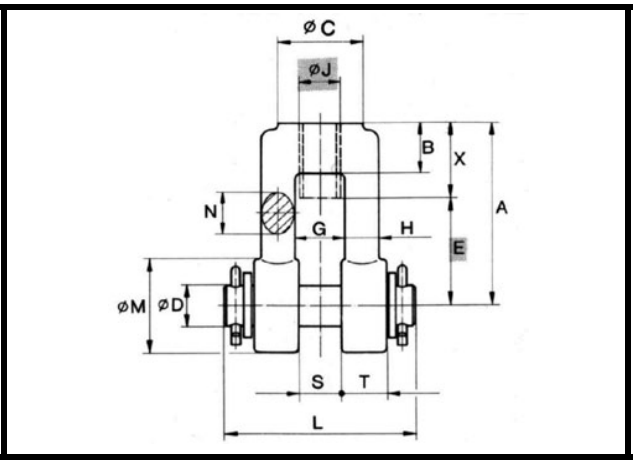
	ØJ- RH / -LH inch	ØJ- RH / -LH mm	L mm	ØK mm	Nominal load F_N at 80° C [N]	Weight [kg] Fig. 278/278L A=250 mm	A=500 mm	A=1000 mm	A=1500 mm	A=2000 mm
Fig. 278/278L/278X	1/2	M 12	65	22	6900	0,30	0,52	0,96	1,41	1,85
	5/8	M 16	65	26	13000	0,56	0,95	1,74	2,53	3,32
	3/4	M 20	75	36	18000	0,96	1,58	2,81	4,05	5,28
	1	M 24	100	40	26000	1,45	2,33	4,11	5,88	7,66
	1 1/8	M 30	115	46	40000	2,42	3,81	6,58	9,36	12,13

	Siz. -	ØJ inch	ØJ mm	E	B mm	C mm	D mm	A mm	F mm	Nominal load F_N at 80° C [N]	Weight kg
Fig. 290/290L	1	3/8	M 10	50	18	13	30	35	38	2710	0,29
		1/2	M 12	50	18	13	30	35	38	6900	0,29
		5/8	M 16	50	18	13	30	35	38	13000	0,29
		3/4	M 20	50	18	13	30	35	38	18000	0,27
	2	1	M 24	50	25	19	43	50	50	26000	0,77

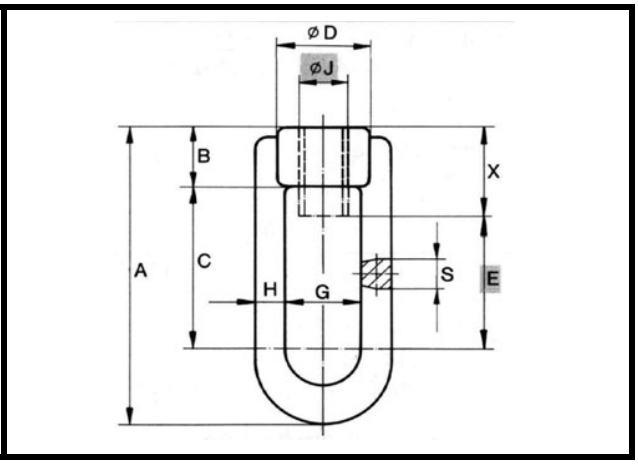
For higher temperatures see temperature correction table on catalogue page 65, pict. 46

EHS 5S, DIN-Clevis and EHS 6S, DIN-Eye-nut

EHS 5S



EHS 6S



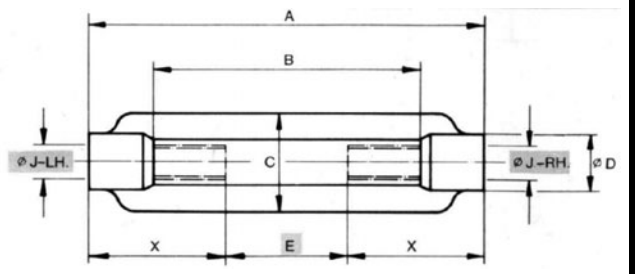
	ØJ inch	ØJ mm	X	E	A	B	ØC	ØD	G	H	L	ØM	N	S	T	Nom.load F_N at 80° C N	Weig. kg
			◄ mm ►														
EHS 5S	1/2	M12	20	50	70	15	25	12	16,5	8	60	24	12	12	11,0	6900	0,2
	5/8	M 16	30	50	80	20	33	16	20,0	11	70	32	15	17	13,5	13000	0,4
	3/4	M 20	35	55	90	25	40	20	23,0	16	90	46	21	20	18,5	18000	1,0
	1	M 24	45	65	110	30	46	24	27,0	19	110	53	25	22	23,0	26000	1,6
	1 1/8	M 30	50	80	130	35	51	36	34,0	19	130	64	29	27	26,5	40000	2,7
	1 1/2	M 36	60	90	150	40	61	40	40,0	22	150	80	36	32	30,5	60000	4,4
	1 3/4	M 42	70	100	170	50	72	45	47,0	27	170	90	40	37	37,0	90000	7,2
	2	M 48	85	95	180	60	83	50	53,0	33	200	100	44	42	44,0	120000	10,4
	2 1/4	M 56	95	120	215	65	90	60	68,0	30	220	120	45	50	50,0	160000	14,8
	2 1/2	M 64	100	130	230	70	110	70	85,0	35	260	150	55	60	57,0	200000	24,4

	ØJ inch	ØJ mm	X	E	A	B	C	ØD	G	H	S	Nom.load F_N at 80° C N	Weig. kg
			◄ mm ►										
EHS 6S	1/2	M12	20	40	79	15	45	24	17	8,0	6	6900	0,1
	5/8	M 16	30	45	101	20	55	30	25	9,5	10	13000	0,2
	3/4	M 20	35	55	125	25	65	35	29	15,0	10	18000	0,4
	1	M 24	45	65	154	30	80	44	35	18,5	15	26000	0,8
	1 1/8	M 30	50	75	181	35	90	50	42	23,0	17	40000	1,2
	1 1/2	M 36	60	75	202	40	95	60	47	26,5	20	60000	2,0
	1 3/4	M 42	70	85	229	50	105	70	52	29,0	25	90000	2,9
	2	M 48	85	85	258	60	120	80	62	29,0	30	120000	4,7
	2 1/4	M 56	95	105	280	65	135	95	62	36,5	40	160000	7,7
	2 1/2	M 64	100	130	315	70	160	105	72	39,0	40	200000	8,8

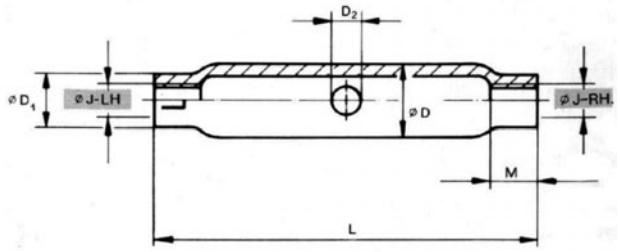
For higher temperatures see temperature correction table on catalogue page 65, pict. 49

EHS 7S, Turnbuckle and EHS 8S, Pipe turnbuckle

EHS 7S



EHS 8S



	ØJ-RH ØJ-LH		X	E	A	B	C	ØD	Nominal load F_N at 80° C	Weight
	inch	mm	◄ mm ►						N	kg
EHS 7S	1/2	M 12	45	40	130	88	34	19	6900	0,2
	5/8	M 16	57	56	170	116	42	24	13000	0,4
	3/4	M 20	67	66	200	134	52	30	18000	0,7
	1	M 24	85	80	250	172	62	36	26000	1,2
	1 1/8	M 30	92	86	270	180	74	46	40000	1,8
	1 1/2	M 36	102	86	290	180	86	55	60000	3,0
	1 3/4	M 42	117	96	330	204	104	65	90000	4,8
	2	M 48	125	80	330	180	130	75	120000	7,6
	2 1/4	M 56*	120	80	320	180	Ø 90	80	160000	9,1
	2 1/2	M 64*	130	80	340	180	Ø 105	90	200000	12,7

For higher temperatures see temperature correction table on page 178, pict. 49

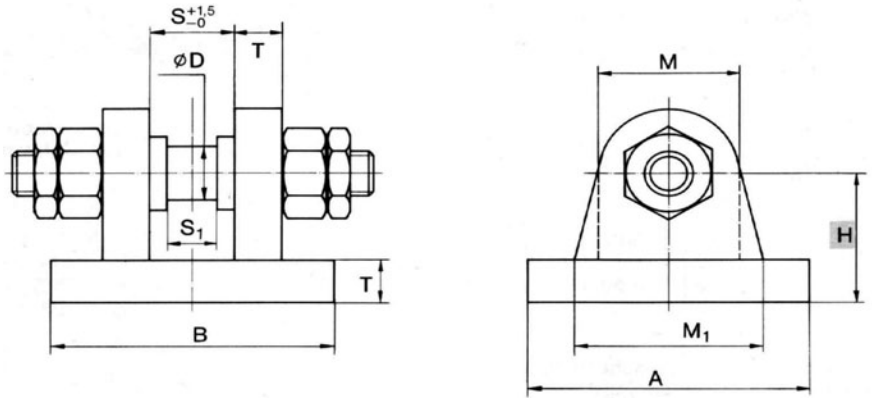
* If fine thread is requested please indicate M56x4, M64x4 !

	ØJ-RH ØJ-LH	ØD	$ØD_1$	$ØD_2$	M	L	Adjust-tability	Nom.load F_N at 80° C	Weight
	mm	◄ mm ►						N	kg
EHS 8S	M 12	25,0	18	10	15	125	90	6900	0,2
	M 16	30,0	24	10	20	170	120	13000	0,4
	M 20	33,7	30	12	24	200	140	18000	0,7
	M 24	42,4	33	12	29	255	180	26000	1,2
	M 30	51,0	41	16	36	255	160	40000	1,4
	M 36	63,5	50	16	43	295	180	60000	2,2
	M 42	70,0	60	20	51	330	200	90000	3,5
	M 48	82,5	72	20	58	355	210	120000	4,7
	M 56*	90,0	90	25	68	355	190	160000	6,3
	M 64*	100,0	100	25	77	425	240	200000	9,4

For higher temperatures see temperature correction table on page 65, pict. 46

* If fine thread is requested please indicate M56x4, M64x4 !

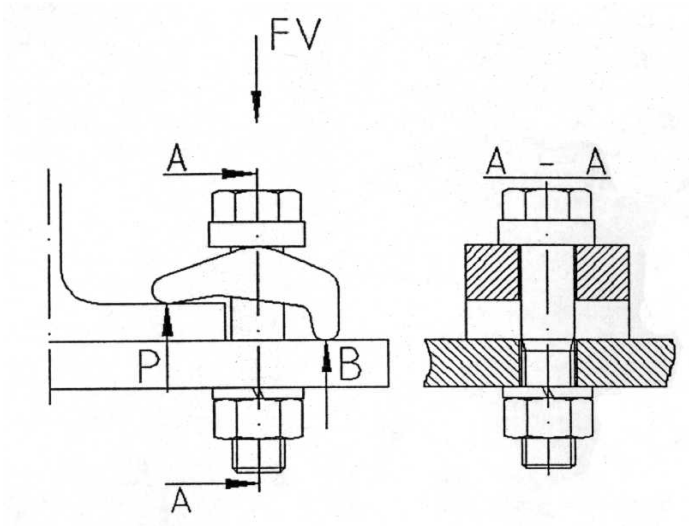
EHS 14S, Rear bracket, size A-I



	Rear bracket EHS 14S Size		Fig. 200A Fig. 201A Size	Fig. 211L Type E1, E2 Size	A	B	ØD	H	M	M_1	S	S_1	T	Nom. load at 80° C N	Weig. kg
					mm										
EHS 14S	A		-	A	55	65	12	35	30	-	15,5	10,5	12	5000	0,7
	B		1 1/2"	B	65	80	15	40	35	-	18,5	12,5	15	13000	1,0
	C	1	-	C	100	110	20	50	45	60	30,5	16,5	20	32000	3,0
		2			200	200									7,6
	D	1	2 1/2"	D	120	120	25	60	60	80	35,5	20,5	20	45000	3,8
		2			200	200									8,8
	E	1	3 1/4"	E	140	140	30	70	60	100	40,5	22,5	25	78000	5,9
		2			200	200									11,5
	F	1	4"	F	180	180	45	85	90	150	55,5	22,5	30	130000	18,1
		2													31,5
		3			300	300		90					35		35,0
	G	1	5"	G	260	240	60	120	130	220	70,5	44,5	40	234000	42,5
		2			300	300									51,2
	H		6"	H	340	280	70	140	150	250	80,5	49,5	50	380000	73,2
	I		8"	I	420	300	80	155	180	270	90,5	55,5	50	600000	93,2

Connection possibility at: Sway Strut, Fig. 211L, Type E1 and E2
Hydrauloc Shock and Sway Suppressor, Fig. 200/201A

Clamp plate



	Load group for screw	Loading P [kN]	Reaction B [kN]	Pre-load force FV [kN]	Torque MV [Nm]	Horizontal force H [kN]
Clamp plate	M10	5,15	6,48	11,63	16,47	0,52
	M12	9,37	11,72	21,09	35,50	0,94
	M16	16,31	20,97	37,28	84,10	1,63
	M20	26,56	34,73	61,29	171,50	2,66
	M24	33,75	44,64	78,39	263,20	3,38

Constant Hanger, Fig. 58H-DU, Fig. 58V-DU

Weights

Group	Size	Total travel		Constant Hanger, Gig. 58H-DU, net weight (kg)										Constant Hanger, Gig. 58V-DU, net weight (kg)									
				Type A		Type B		Type C		Type D		Type E		Type A		Type B		Type C		Type E		Type G	
	-	S_N		a)	b)	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)	a)	b)
		mm																					
I	1- 3	≤ 102	≥ 114	20,5	23	21	23,5	21,5	24	22	24,5	24	26,5	-	-	-	-	-	-	-	-	-	-
	4- 6			21	23,5	21,5	24	22	24,5	22,5	25	24,5	27	-	-	-	-	-	-	-	-	-	-
	7- 9			22	24,5	22,5	25	23	25,5	23,5	26	25,5	28	-	-	-	-	-	-	-	-	-	-
II	10- 12	≤ 127	≥ 140	37	40,5	37,5	41	38	41,5	38,5	42	41,5	46,5	44,5	44,5	43,5	43,5	44,5	44,5	38	38	93,5	93,5
	13- 15			41	44,5	41,5	45	42	45,5	42,5	46	45,5	50,5	48,5	48,5	47,5	47,5	48,5	48,5	42	42	101	102
	16- 18			43,5	47	44	47,5	44,5	48	45	48,5	48	53	51	51	50	50	51	51	44,5	44,5	107	107
III	19+ 20	≤ 127	≥ 140		82		83		85		87,5		95		96		92		94,5		80		185
	21- 23			75	81,5	76	82,5	78	84,5	80,5	87	84,5	94,5	93	95,5	89	91,5	91,5	94	77	79,5	179	184
	24- 26			77	83,5	78	84,5	80	86,5	82,5	89	86,5	96,5	95	97,5	91	93,5	93,5	96	79	81,5	182	188
	27- 29			80	86,5	81	87,5	83	89,5	85,5	92	89,5	99,5	98	100,5	94	96,5	96,5	99	82	84,5	188	194
	30- 32			84	90,5	85	91,5	87	93,5	89,5	96	93,5	103,5	102	104,5	98	100,5	100,5	103	86	88,5	196,5	202
	33+ 34			87	93,5	88	94,5	90	96,5	92,5	99	96,5	106,5	105	107,5	101	103,5	103,5	106	89	91,5	202,5	208
IV	35- 37	≤ 152	≥ 165	157	175,5	157	175,5	161	179,5	163	181,5	180,5	206	208	215,5	196	204,5	201	209,5	194	201,5	394	409
	38- 40			164	182,5	164	182,5	168	186,5	170	188,5	187,5	213	215	222,5	203	211,5	208	216,5	201	208,5	408	423
	41- 43			171	189,5	171	189,5	175	193,5	177	195,5	194,5	220	222	229,5	210	218,5	215	223,5	208	215,5	422	437
	44- 46			180	198,5	180	198,5	184	202,5	186	204,5	203,5	229	231	238,5	219	227,5	224	232,5	217	224,5	440	455
	47- 49			187	205,5	187	205,5	191	209,5	193	211,5	210,5	236	238	245,5	226	234,5	231	239,5	224	231,5	454	469
V	50+ 51	≤ 203	≥ 216	359	385	362	388	365	391	365	391	409	450,5	467	477	417	427	428	438	360	370	804,5	824,5
	52- 54			379	405	382	408	385	411	385	411	429	470,5	487	497	437	447	448	458	380	390	844,5	864,5
	55- 57			401	427	404	430	407	433	407	433	451,5	492,5	509	519	459	469	470	480	402	412	888,5	908,5
	58- 60			427	453	430	456	433	459	433	459	477	518,5	535	545	485	495	496	506	428	438	940,5	960,5
	61- 63			449	475	452	478	455	481	455	481	499	540,5	557	567	507	517	518	528	450	460	984,5	1004,5
VI	64+ 65	≤ 267	≥ 279																				
	66- 68			699	718	691	710	696	715	700	719	774	793	1007	1020	910	923	932	945	818	831	1613	1638
	69- 71			750	769	742	761	747	766	751	770	825	844	1057	1070	960	973	982	995	868	881	1714	1739
	72- 74			794	813	786	805	791	810	795	814	869	888	1102	1115	1005	1018	1027	1040	913	926	1803	1828
VII	75- 77	≤ 267	≥ 279	894	894	874	874	884	884	892	892	982	982	1070	1070	975	975	1000	1000	880	880	1750	1750
	78- 80			916	916	896	896	906	906	914	914	1004	1004	1102	1102	1007	1007	1032	1032	912	912	1814	1814
	81- 83			989	989	969	969	979	979	987	987	1077	1077	1166	1166	1071	1071	1096	1096	976	976	1942	1942
VIII	84+ 85	≤ 241	≥ 254	1101	1101	1081	1081	1097	1097	-	-	1177	1177	1298	1298	1331	1331	1364	1364	-	-	-	-
	86- 88			1170	1170	1150	1150	1166	1166	-	-	1246	1246	1368	1368	1401	1401	1434	1434	-	-	-	-
IX	89+ 90	≤ 241	≥ 254	1265	1265	1245	1245	1261	1261	-	-	1341	1341	1463	1463	1496	1496	1529	1529	-	-	-	-
	91+ 92			1306	1306	1286	1286	1302	1302	-	-	1382	1382	1503	1503	1536	1536	1569	1569	-	-	-	-
	93+ 94			1353	1353	1333	1333	1349	1349	-	-	1429	1429	1550	1550	1583	1583	1616	1616	-	-	-	-
X	95- 98	≤ 356	≥ 368	1780	1780	1813	1813	1846	1846	-	-	1946	1946	1973	1973	2006	2006	2039	2039	-	-	-	-
XI	99+ 102			1928	1928	1961	1961	1994	1994	-	-	2094	2094	2121	2121	2154	2154	2187	2187	-	-	-	-
XII	103+ 106			2211	2211	2244	2244	2277	2277	-	-	2377	2377	2404	2404	2437	2437	2470	2470	-	-	-	-
XIII	107+ 110			2472	2472	2460	2460	2493	2493	-	-	2593	2593	2631	2631	2664	2664	2697	2697	-	-	-	-

Remarks:

a) Weight column a) per type A-G refers to $S_N \leq$ …. [mm]

b) Weight column b) per type A-G refers to $S_N \geq$ …. [mm]

c) Weight of type G has been ascertained with a C-C dimension of 1000 mm!

Constant Hanger load travel table

Group: I-V, Size 1-63 / Nominal load F_N in KN, total travel S_N in inch and mm! S_N = horizontal / F_N = vertical

	C.H	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"	6 1/2"	7"	7 1/2"	8"	8 1/2"
	Size	38	51	63	76	89	102	114	127	140	152	165	178	190	202	216
Group I	1	0,805	0,600	0,485	0,402	0,344	0,300	0,268	0,241	0,291	0,201	0,185	0,172	0,161	0,150	
	2	0,949	0,707	0,572	0,475	0,405	0,354	0,316	0,284	0,258	0,237	0,218	0,202	0,190	0,178	
	3	1,084	0,807	0,654	0,542	0,463	0,404	0,361	0,324	0,294	0,271	0,250	0,231	0,217	0,203	
	4	1,333	0,993	0,804	0,667	0,570	0,497	0,444	0,399	0,362	0,333	0,307	0,285	0,267	0,250	
	5	1,557	1,160	0,939	0,779	0,665	0,580	0,519	0,466	0,423	0,389	0,359	0,332	0,311	0,291	
	6	1,776	1,323	1,071	0,888	0,758	0,662	0,592	0,531	0,482	0,444	0,409	0,379	0,365	0,332	
	7	2,148	1,600	1,296	1,074	0,917	0,800	0,716	0,643	0,583	0,537	0,495	0,459	0,430	0,402	
	8	2,510	1,870	1,514	1,255	1,072	0,935	0,837	0,751	0,681	0,628	0,578	0,536	0,502	0,470	
	9	2,857	2,129	1,723	1,429	1,220	1,064	0,952	0,855	0,775	0,714	0,658	0,610	0,571	0,535	
	B middle	44	57	70	84	99	113	126	140	155	168	182	196	210	224	
Group II	10		3,390	2,744	2,275	1,943	1,659	1,517	1,361	1,235	1,137	1,084	0,971	1,910	0,852	0,800
	11		3,968	3,212	2,663	2,274	1,984	1,775	1,593	1,445	1,331	1,226	1,137	1,065	0,997	0,937
	12		4,556	3,688	3,057	2,610	2,278	2,038	1,829	1,660	1,529	1,408	1,305	1,223	1,145	1,076
	13		5,488	4,443	3,683	3,145	2,744	2,455	2,204	2,000	1,841	1,696	1,572	1,473	1,379	1,296
	14		6,402	5,183	4,296	3,669	3,201	2,864	2,571	2,332	2,148	1,979	1,834	1,718	1,608	1,512
	15		7,335	5,938	4,922	4,203	3,668	3,281	2,946	2,672	2,461	2,267	2,102	1,969	1,843	1,732
	16		8,827	7,146	5,923	5,058	4,414	3,949	3,545	3,216	2,962	2,728	2,529	2,369	2,217	2,084
	17		10,338	8,369	6,937	5,924	5,169	4,625	4,151	3,766	3,469	3,195	2,962	2,775	2,597	2,441
	18		11,844	9,588	7,948	6,787	5,922	5,299	4,756	4,315	3,974	3,660	3,394	3,179	2,976	2,797
	B middle		58	70	84	99	113	126	140	155	168	182	196	210	224	238
Group III	19															
	20															
	21															
	22		12,578	10,182	8,440	7,208	6,289	5,627	5,051	4,582	4,220	3,888	3,604	3,376	3,160	2,970
	23		13,500	10,929	9,059	7,736	6,750	6,039	5,421	4,918	4,530	4,173	3,868	3,624	3,392	3,188
	24		14,259	11,543	9,568	8,171	7,129	6,379	5,726	5,194	4,784	4,407	4,085	3,872	3,582	3,367
	25		15,239	12,336	10,226	8,732	7,620	6,817	6,120	5,551	5,113	4,710	4,366	4,090	3,828	3,598
	26		16,219	13,130	10,884	9,294	8,110	7,256	6,513	5,908	5,442	5,013	4,647	4,354	4,075	3,829
	27		18,083	14,639	12,135	10,362	9,042	8,090	7,262	6,587	6,077	5,589	5,181	4,854	4,543	4,270
	28		19,677	15,929	13,204	11,275	9,839	8,803	7,902	7,168	6,602	6,082	5,638	5,282	4,943	4,646
	29		21,271	17,219	14,274	12,189	10,635	9,516	8,542	7,749	7,137	6,575	6,095	5,710	5,344	5,022
	30		22,056	17,855	14,800	12,639	11,028	9,867	8,857	8,035	7,400	6,817	6,319	5,920	5,541	5,208
	31		23,320	18,878	15,649	13,363	11,660	10,433	9,365	8,495	7,824	7,208	6,682	6,260	5,859	5,506
	32		24,609	19,922	16,514	14,102	12,305	11,009	9,882	8,965	8,257	7,606	7,051	6,605	6,182	5,810
	33		26,592	21,527	17,845	15,238	13,296	11,896	10,679	9,687	8,922	8,219	7,619	7,138	6,681	6,279
	34		27,747	22,462	18,620	15,900	13,874	12,413	11,142	10,108	9,310	8,576	7,950	7,448	6,971	6,551
	B middle		62	70	84	99	113	126	140	155	168	182	196	210	224	238
Group IV	35				21,529	17,417	15,197	13,597	12,205	11,072	10,198	9,394	8,708	8,158	7,636	7,176
	36				22,781	18,430	16,081	14,388	12,915	11,716	10,791	9,941	9,215	8,633	8,080	7,594
	37				24,027	19,437	16,960	15,175	13,622	12,357	11,381	10,485	9,719	9,105	8,522	8,009
	38				25,747	20,829	18,174	16,261	14,597	13,241	12,196	11,235	10,415	9,757	9,132	8,582
	39				27,454	22,210	19,379	17,339	15,564	14,119	13,005	11,980	11,105	10,404	9,737	9,151
	40				29,162	23,592	20,585	18,418	16,533	14,996	13,814	12,725	11,796	11,051	10,343	9,721
	41				32,588	26,363	23,003	20,582	18,475	16,760	15,436	14,220	13,182	12,349	11,558	10,863
	42				35,445	28,675	25,020	22,386	20,095	18,229	16,790	15,467	14,337	13,432	12,572	11,815
	43				38,302	30,986	27,037	24,191	21,175	19,698	18,143	16,714	15,493	14,514	13,585	12,767
	44				39,746	32,154	28,056	25,103	22,533	20,441	18,827	17,344	16,077	15,062	14,097	13,249
	45				42,297	34,218	29,857	26,714	23,979	21,753	20,035	18,457	17,109	16,028	15,002	17,099
	46				44,466	35,973	31,388	28,084	25,209	22,868	21,063	19,403	17,986	16,850	15,771	14,822
	47				47,572	38,485	33,580	30,045	26,970	24,466	22,534	20,759	19,243	18,027	16,873	15,857
	48				50,377	40,754	35,560	31,817	28,560	25,908	23,863	21,983	20,377	19,090	17,868	16,792
	49				53,189	43,029	37,545	33,593	30,154	27,354	25,195	23,210	21,515	20,156	18,865	17,730
	B middle				80	96	113	126	140	155	168	182	196	210	224	238
Group V	50					48,312	42,155	37,717	33,856	30,713	28,288	26,059	24,156	22,630	21,181	19,906
	51					51,574	45,001	40,264	36,142	32,786	30,198	27,819	25,787	24,158	22,611	21,250
	52					58,705	51,223	45,831	41,140	37,320	34,373	31,665	29,353	27,499	25,738	24,189
	53					62,551	54,579	48,834	34,835	39,765	36,625	33,740	31,276	29,300	27,424	25,773
	54					66,401	57,938	51,839	46,433	42,212	38,880	35,816	33,201	31,104	29,112	27,360
	55					73,929	64,507	57,717	54,809	46,994	43,287	39,877	36,965	34,630	32,412	30,461
	56					80,511	70,205	62,855	56,421	51,182	47,141	43,427	70,259	37,713	35,298	33,174
	57					87,094	75,994	67,994	61,034	55,367	50,996	46,978	43,547	40,797	38,184	35,886
	58					90,460	78,931	70,622	63,392	57,507	52,967	48,794	45,230	42,373	39,960	37,273
	59					95,797	83,588	74,789	67,133	60,900	56,092	51,672	47,899	44,873	42,000	39,472
	60					101,149	88,257	78,967	70,880	64,302	59,225	54,559	50,575	47,380	44,346	41,677
	61					108,015	94,248	84,328	75,695	68,667	63,246	58,263	54,008	50,597	47,356	44,506
	62					114,361	99,785	89,282	80,143	73,701	66,961	61,686	57,181	53,569	50,139	47,121
	63					120,712	105,327	94,240	84,593	76,738	70,680	65,111	60,356	56,544	52,923	49,738
	B middle					107	113	126	140	155	168/	182	196	210	224	238

Constant Hanger load travel table

Group: I-V, Size 1-63 / Nominal load F_N in KN, total travel S_N in inch and mm! S_N = horizontal / F_N = vertical

[

	C.H	9“	9 1/2“	10“	10 1/2“	11“	11 1/2“	12“	12 1/2“	13“	13 1/2“	14“	14 1/2“	15“	15 1/2“	16“	16 1/2“
	Size	229	241	254	267	279	292	305	318	330	343	356	368	381	394	406	419
Group I	1																
	2																
	3																
	4					Group I, Size 1-9 not applicable to C.H. Fig. 58 V-DU!											
	5																
	6																
	7																
	8																
	9																
	B middle																
Group II	10																
	11																
	12																
	13					Design on demand!											
	14																
	15																
	16																
	17																
	18																
	B middle																
Group III	19	2,376	2,249	2,134													
	20	2,507	2,382	2,260													
	21	2,590	2,461	2,335													
	22	2,801	2,662	2,525													
	23	3,007	2,857	2,711													
	24	3,175	3,017	2,863													
	25	3,394	3,225	3,060													
	26	3,612	3,432	3,527		Design on demand!											
	27	4,072	3,827	3,631													
	28	4,382	4,164	3,951													
	29	4,737	4,501	4,271													
	30	4,912	4,667	4,429													
	31	5,194	4,935	4,682													
	32	5,481	5,208	4,941													
	33	5,922	5,627	5,339													
	34	6,179	5,872	5,571													
	B middle	253	266	280													
Group IV	35	6,769	6,432	6,103	5,805	5,556	5,308	5,082	4,874	4,697	4,519	4,354	4,212				
	36	7,163	6,806	6,458	6,143	5,879	5,617	5,378	5,158	4,970	4,782	4,607	4,457				
	37	7,554	7,178	6,811	6,479	6,201	5,924	5,672	5,440	5,242	5,044	4,859	4,701				
	38	8,095	7,692	7,298	6,943	6,644	6,349	6,078	5,830	5,618	5,405	5,207	5,037				
	39	8,632	8,202	7,782	7,403	7,085	6,769	6,481	6,216	5,990	5,763	5,552	5,371				
	40	9,169	8,712	8,266	7,864	7,526	7,191	6,884	6,603	6,363	6,121	5,898	5,706				
	41	10,246	9,736	9,238	8,788	8,410	8,035	7,693	7,378	7,110	6,841	6,591	6,376				
	42	11,144	10,589	10,047	9,588	9,147	8,740	8,367	8,025	7,733	7,440	7,169	6,935	Design on demand!			
	43	12,042	11,443	10,857	10,329	9,884	9,444	9,042	8,672	8,357	8,040	7,746	7,494				
	44	12,497	11,874	11,267	10,781	10,257	9,800	9,383	8,999	8,672	8,343	8,039	7,776				
	45	13,299	12,636	11,990	11,406	10,915	10,429	9,985	9,577	9,228	8,879	8,554	8,276				
	46	13,980	13,284	12,605	11,991	11,475	10,964	10,497	10,068	9,702	9,334	8,993	8,700				
	47	14,957	14,212	13,485	12,828	12,277	11,730	11,230	10,771	10,379	9,986	9,621	3,308				
	48	15,839	15,050	14,280	13,585	13,000	12,422	11,892	11,406	10,991	10,575	10,189	9,856				
	49	16,723	15,890	15,077	14,343	13,726	13,115	12,556	12,043	11,605	11,165	10,757	10,406				
	B middle	253	266	280	295	308	322	336	351	364	378	393	406				
Group V	50	18,776	17,841	16,928	16,104	15,411	14,725	14,098	13,521	13,030	12,536	12,078	11,684	11,285	10,193	10,590	10,262
	51	20,044	19,046	18,071	17,191	16,452	15,719	15,049	14,434	13,909	13,382	12,894	12,473	12,047	11,650	11,306	10,955
	52	22,815	21,679	20,570	19,568	18,727	17,893	17,130	16,430	15,833	15,232	14,676	14,198	13,713	13,261	12,869	12,470
	53	24,310	23,100	21,917	20,850	19,954	19,065	18,253	17,506	16,870	16,230	15,638	15,128	14,612	14,130	13,712	13,286
	54	25,807	24,522	23,266	22,134	21,182	20,239	19,376	18,584	17,908	17,229	16,600	16,059	15,511	14,999	14,556	14,104
	55	28,732	27,302	25,904	24,643	23,583	22,533	21,573	20,691	19,938	19,183	18,482	17,880	17,270	16,700	16,206	15,703
	56	31,290	29,732	28,211	26,837	25,683	24,539	23,493	22,533	21,714	20,891	20,128	19,471	18,807	18,186	17,649	17,101
	57	33,849	32,163	30,517	29,031	27,783	26,546	25,414	24,375	23,489	22,599	21,774	21,063	20,345	19,674	19,092	18,500
	58	35,157	33,406	31,697	30,153	28,856	27,572	26,397	25,317	24,397	23,472	22,615	21,878	21,131	20,434	19,830	19,215
	59	37,231	35,377	33,567	31,932	30,559	29,198	27,954	26,811	25,836	24,857	23,949	23,168	22,378	21,639	21,000	20,348
	60	39,311	37,354	35,442	33,716	32,266	30,830	29,516	28,309	27,208	26,246	25,287	24,463	23,628	22,848	22,173	21,485
	61	41,980	39,889	37,848	36,005	34,456	32,922	31,519	30,231	29,131	28,027	27,004	26,123	25,232	24,399	23,678	22,944
	62	44,446	42,233	40,071	38,120	36,481	34,857	33,371	32,007	30,843	29,674	28,590	27,658	26,714	25,833	25,069	24,291
	63	46,914	44,578	42,297	40,237	38,507	36,792	35,224	33,784	32,556	31,322	30,178	29,194	28,198	27,267	26,461	25,640
	B middle	253	266	280	295	308	322	336	351	364	378	393	406	420	434	448	462

Constant Hanger load travel load

Group: VI-XIII, Size 64-110
Nominal load F_N in KN, total travel S_N in inch and mm!^

S_N = horizontal / F_N = vertical

	C.H	4"	4 1/2"	5"	5 1/2"	6"	6 1/2"	7"	7 1/2"	8"	8 1/2"	9"	9 1/2"	10"	10 1/2"	11"	11 1/2"	12"
	Size	102	114	127	140	152	165	178	190	203	216	229	241	254	267	279	292	305
Group VI	64																	
	65																	
	66																	
	67	109,014	97,539	87,554	79,424	73,154	67,390	62,468	58,523	54,775	51,479	48,556	46,139	43,777	41,646	39,854	38,080	36,457
	68	117,936	105,522	94,720	85,925	79,141	72,906	67,581	63,313	59,258	55,692	52,530	49,915	47,360	45,054	43,116	41,197	39,441
	69	125,352	112,157	100,676	91,328	84,118	77,490	71,831	67,294	62,985	59,194	55,834	53,053	50,338	47,887	45,828	43,787	41,921
	70	132,760	118,785	106,626	96,725	89,089	82,070	76,076	71,271	66,707	62,692	59,133	56,189	53,313	50,717	48,536	46,375	44,398
	71	140,162	125,408	112,571	102,118	94,056	86,646	80,317	75,245	70,426	66,188	62,430	59,322	56,285	53,545	51,242	48,961	46,874
	72	148,940	133,262	119,621	108,513	99,946	95,072	85,348	79,957	74,837	70,333	66,340	63,037	59,810	56,898	54,451	52,027	49,809
	73	157,707	141,106	126,662	114,901	105,830	97,492	90,371	84,664	79,242	74,473	70,245	66,747	63,331	60,248	57,656	55,089	52,741
	74	166,471	148,947	133,701	121,286	111,711	102,909	95,393	89,368	83,645	78,611	74,149	70,457	66,850	63,596	60,860	58,151	55,672
	B middle	102	114	157	140	152	165	178	190	203	216	229	241	254	267	279	292	305
Group VII	75	175,997	157,471	141,352	128,226	118,103	108,798	100,852	94,493	88,432	83,110	78,392	74,488	70,676	67,235	64,343	61,478	58,858
	76	185,522	165,993	149,002	135,166	124,495	114,686	106,310	99,596	93,218	87,607	82,634	78,520	74,501	70,873	67,825	64,806	62,043
	77	195,048	174,516	156,653	142,106	130,887	120,575	111,769	104,710	98,004	92,106	86,877	82,551	78,326	74,513	71,308	68,133	65,229
	78	205,640	183,994	165,160	149,823	137,995	127,123	117,838	110,396	103,326	97,108	91,595	87,034	82,580	78,559	57,180	71,833	68,771
	79	216,222	193,462	173,658	157,533	145,096	133,664	123,902	116,077	108,643	102,105	96,308	91,513	86,829	82,602	79,049	75,530	72,310
	80	226,800	202,926	183,154	165,240	152,195	140,204	129,964	121,756	113,958	107,100	101,020	95,990	91,077	86,643	82,916	79,225	75,848
	81	238,140	213,073	191,262	173,502	159,804	147,214	136,462	127,843	119,656	112,455	106,071	100,789	95,631	90,975	87,062	83,186	79,640
	82	249,480	223,219	200,370	181,764	167,414	154,224	142,960	133,931	125,354	117,810	111,122	105,589	100,185	95,307	91,208	87,147	83,433
	83	260,820	233,365	209,477	190,026	175,024	161,234	149,458	140,019	131,052	123,165	116,173	110,388	104,739	99,639	95,353	91,108	87,225
	B middle	102	113	126	139	151	164	177	189	202	215	228	239	252	265	277	290	303
Group VIII	84			223,171	202,448	186,465	171,774	159,229	149,172	139,619	131,216	123,767	117,605	111,585	106,152	101,587	97,064	92,927
	85			237,686	215,615	198,513	182,946	169,585	158,874	148,700	139,750	131,817	125,254	118,853	113,056	108,194	103,377	98,971
	86			251,294	227,959	209,963	193,420	179,294	167,970	157,213	147,751	139,364	132,424	125,647	119,529	114,388	109,295	104,637
	87			264,902	240,304	221,332	203,894	189,003	177,066	165,727	155,752	146,911	139,596	132,451	126,002	120,583	115,214	110,303
	88			278,510	252,648	232,702	214,368	198,712	186,162	174,240	163,753	154,457	146,766	139,255	132,475	126,777	121,133	115,970
	B middle			129	143	155	168	181	193	207	220	233	245	258	272	284	297	310
Group IX	89			299,376	271,576	250,136	230,429	213,600	200,109	187,294	176,022	166,029	157,762	149,688	142,400	136,275	130,208	124,658
	90					278,197	256,278	237,561	222,557	208,305	195,768	184,655	175,460	166,480	158,374	151,562	144,815	138,642
	91					304,656	280,653	260,155	243,725	228,117	214,387	202,217	192,148	182,314	173,437	165,977	158,588	151,828
	92					333,396	307,128	284,698	266,717	249,636	234,612	221,293	210,275	199,512	189,798	181,635	173,548	166,151
	93					366,645	337,758	313,090	293,316	274,532	258,009	243,363	231,245	219,410	208,727	199,749	190,856	182,721
	94					396,900	365,629	338,926	317,520	297,186	279,300	263,444	250,327	237,515	225,950	216,232	206,605	197,799
	B middle			129	143	155	168	181	193	207	220	233	245	258	272	284	297	310
Group X	95							358,026	335,414	313,934	295,040	278,291	264,434	250,900	238,684	228,418	218,248	208,946
	96							372,610	349,077	326,722	307,058	289,627	275,206	261,120	248,406	237,722	227,139	217,457
	97							387,193	362,739	339,509	319,075	300,962	285,976	271,340	258,128	247,026	236,028	225,968
	98							396,900	371,833	348,021	327,075	308,507	293,146	278,142	264,600	253,219	241,946	231,633
	B middle							172	183	196	208	221	232	245	257	269	281	294
Group XI	99								390,737	365,715	343,704	324,193	308,050	292,284	278,053	266,094	254,247	243,410
	100								405,882	379,890	357,026	336,758	319,990	303,613	288,830	276,407	264,102	252,845
	101									394,647	370,895	349,840	332,420	315,406	300,050	287,144	274,360	262,666
	102									408,842	384,236	362,423	344,377	326,752	310,843	297,473	284,229	272,115
	B middle								183	196	208	221	232	245	257	269	281	294
Group XII	103										402,080	379,255	360,371	341,927	325,279	311,288	297,429	284,752
	104											394,445	374,805	355,622	338,307	323,756	309,342	296,157
	105											410,776	390,323	370,346	352,314	337,161	322,150	308,419
	106												406,538	385,560	366,787	351,012	335,384	321,089
	B middle										208	221	232	245	257	269	281	294
Group XIII	107													402,762	383,152	366,672	350,348	335,415
	108														398,111	380,988	364,026	385,510
	109															397,097	379,418	363,246
	110															412,782	394,405	377,594
	B middle													245	257	269	281	294

Constant Hanger load travel table

Group: VI-XIII, Size 64-110
Nominal load F_N in KN, total travel S_N in inch and mm!

S_N = horizontal / F_N = vertical

	C.H	12 1/2"	13"	13 1/2"	14"	14 1/2"	15"	15 1/2"	16"	16 1/2"	17"	17 1/2"	18"	18 1/2"	19"	19 1/2"	20"
	Size	318	330	343	356	368	381	394	406	419	432	445	457	470	482	495	508
Group VI	64																
	65																
	66																
	67	34,967	33,695	32,418	31,234	30,216	29,185	28,222	27,388								
	68	37,828	36,453	35,071	33,791	32,689	31,573	30,532	29,629			Design on demand!					
	69	40,207	38,745	37,276	35,915	34,744	33,559	32,451	31,492								
	70	42,583	41,035	39,480	38,038	36,798	35,542	34,369	33,353								
	71	44,958	43,323	41,681	40,159	38,849	37,524	36,285	35,213								
	72	47,773	46,036	44,291	42,674	41,282	39,874	38,558	37,418								
	73	50,585	48,746	46,898	45,186	43,712	42,221	40,828	39,621								
	74	53,396	51,455	49,504	47,697	46,141	44,567	43,096	41,823								
	B middle	318	330	343	356	368	381	394	406								
Group VII	75	56,452	54,399	52,337	50,426	48,782	47,117	45,563	44,216								
	76	59,507	57,343	55,170	53,155	51,422	49,667	48,028	46,609								
	77	62,562	60,287	58,003	55,884	54,062	52,217	50,495	49,002								
	78	65,960	63,561	61,152	58,919	56,998	55,053	53,237	51,663			Design on demand!					
	79	69,354	66,832	64,299	61,951	59,931	57,886	55,976	54,332								
	80	72,747	70,102	67,445	64,982	62,863	60,718	58,715	56,978								
	81	76,384	73,607	70,817	68,231	66,006	63,754	61,650	59,828								
	82	80,022	77,112	74,189	71,480	69,149	66,790	64,586	62,677								
	83	83,659	80,617	77,562	74,729	72,292	69,826	67,522	65,526								
	B middle	316	328	341	354	365	378	391	403								
Group VIII	84	89,128	85,887	82,632	79,614	77,018	74,390	71,936	69,810								
	85	94,925	91,473	88,006	84,792	82,027	79,228	76,614	74,350								
	86	100,359	96,710	93,045	89,647	86,724	83,765	81,001	78,607			Design on demand!					
	87	105,794	101,947	98,083	94,501	91,420	88,301	85,387	82,863								
	88	111,229	107,184	103,122	99,356	93,116	92,837	89,773	87,120								
	B middle	323	335	349	362	374	387	400	413								
Group IX	89	119,562	115,214	110,848	106,800	103,317	99,792	96,499	93,647								
	90	132,975	128,139	123,283	118,781	114,907	110,987	107,325	104,152								
	91	145,622	140,326	135,008	130,078	125,836	121,542	117,532	114,058			Design on demand!					
	92	159,359	153,564	147,744	142,349	137,707	133,008	128,620	124,818								
	93	175,252	168,879	162,478	156,545	151,440	146,237	141,447	137,266								
	94	189,713	182,814	175,886	169,463	163,937	158,343	153,119	148,593								
	B middle	323	335	349	362	374	387	400	413								
Group X	95	200,404	193,117	185,798	179,013	173,176	167,267	161,748	156,967	152,097	147,520	143,210	139,450	135,593	132,217	128,745	125,450
	96	208,568	200,983	193,366	186,305	180,230	174,080	168,336	163,361	158,292	153,529	149,044	145,130	141,116	137,603	133,989	130,560
	97	216,731	208,849	200,934	193,596	187,283	180,893	174,925	169,754	164,488	159,358	154,877	150,810	146,639	142,988	139,233	135,670
	98	222,164	214,085	205,971	198,450	191,979	185,428	179,310	174,010	168,611	163,537	158,670	154,591	150,315	146,573	142,724	139,071
	B middle	306	318	330	343	354	367	379	391	403	416	428	440	452	464	476	789
Group XI	99	233,459	224,970	216,443	208,540	201,739	194,856	188,427	182,857	177,184	171,852	166,832	162,451	157,958	154,025	149,980	146,142
	100	242,508	233,690	224,832	216,623	209,559	202,408	195,730	189,945	184,052	178,513	173,298	168,747	164,080	159,995	155,793	151,806
	101	251,928	242,767	233,566	225,037	217,699	210,271	203,333	197,323	191,201	185,447	180,030	175,303	170,454	166,210	161,845	157,703
	102	260,990	251,500	241,968	233,132	225,530	217,834	210,647	204,421	198,079	192,118	186,505	181,608	176,585	172,189	167,666	163,376
	B middle	306	318	330	343	354	367	379	391	403	416	428	440	452	464	476	489
Group XII	103	273,111	263,180	253,205	243,959	236,004	227,951	220,430	213,915	207,728	201,040	195,167	190,042	184,786	180,185	175,453	170,963
	104	284,050	273,721	263,347	253,730	245,456	237,081	229,259	222,483	215,580	209,093	202,984	197,654	192,187	187,402	182,481	177,811
	105	295,811	285,054	274,250	264,236	255,619	246,897	238,751	231,694	224,505	217,749	211,388	205,838	200,144	195,161	190,036	185,173
	106	307,963	296,764	285,517	275,090	266,120	257,040	248,559	241,212	233,728	226,695	220,072	214,294	208,366	203,179	197,843	192,780
	B middle	306	318	330	343	354	367	379	391	403	416	428	440	452	464	476	489
Group XIII	107	321,703	310,005	298,255	287,364	277,993	268,508	259,648	251,974	244,156	236,809	229,891	223,855	217,663	212,244	206,670	201,381
	108	334,263	322,108	309,900	298,583	288,847	278,991	269,786	261,812	253,689	246,055	238,866	232,594	226,161	220,530	214,739	209,243
	109	248,396	335,727	323,003	311,208	301,060	290,787	281,193	272,882	264,415	256,458	248,996	242,429	235,723	229,855	223,818	218,090
	110	362,158	348,988	335,762	323,501	312,952	302,273	292,300	283,661	274,860	266,588	258,800	252,005	245,034	238,934	232,659	226,705
	B middle	306	318	330	343	354	367	379	391	403	416	428	440	452	464	476	489