At Sea

GB

Production:
TiotusenEtt Reklambyrå, Kalmar.

Contents

Perfection can never be surpassed

For almost half a century MCT Brattberg's original system for cable and pipe transits has set the standard, at sea as well as on land.

However it is at sea that we feel most at home. Wherever demands are particularly high, on ships and oil rigs, transits from MCT Brattberg are the first choice.

Why? Because tests and certificates are not sufficient. The extra benefits MCT Brattberg offer are the attraction.

Ingenuity and hard work

From copper factory to finished nails, from finished nails to stainless steel parts for the car industry and from there to becoming internationally famous for cable and pipe transits.

The almost 250 year old works by River Lyckeby is part of Swedish industrial history. A "Brattberg" is a familiar term in the shipbuilding and offshore industries around the world.

The successes of the past 50 years are due to one man, Nils Brattberg. His basic idea, transits for several cables built from blocks, contained the most important ingredient of ingenuity - simplicity.

Nils Brattberg's invention satisfied a tremendous need, which everyone was aware of but nobody had formulated. As well as making it easier to draw cables through bulkheads, the "Brattberg" made it possible to retain the fire-resistant integrity and pressure-tightness.

Success was total and immediate from the day of introduction almost 50 years ago.

Strangely, Nils Brattberg never sat back and enjoyed his success, but continued his work as a ship's engineer at the Karlskrona shipyard, working on new ideas and further developing his invention until his retirement. We continue to work in that tradition.

Market leader in transits

Since as far back as 1952, when the first patent was approved, Brattberg has set the standard for how a multi-cable transit should be constructed.

Our measurements have been the guiding rule and MCT Brattberg is still the company that leads the development of characteristics, performance, materials and quality. The Brattberg is therefore the transit that dominates the market in extremely hazardous environments such as offshore operations, aboard ships and in nuclear power plants.

Old printing blocks now decorating the office.

Nils Brattberg

Continuous product development

The round RGP frame was introduced in the 1970s. At first it was designed for core-drilled holes in concrete. Nowadays it is even installed in bulkheads and ships' decks.

Lycron was introduced in 1986. Lycron is a halogen-free rubber mixture with the well known rusty red colour, from which all MCT Brattberg blocks are made. The need for halogen-free materials arose with the expanding use of electronics; as most rubber mixtures emit halogens when burned, which can quickly destroy printed circuits and processors. Lycron does not emit such halogens.

The same year saw the launch of the composite compression plate with integrated compression bolt.

The quality of welding in frame production was increased radically in 1992 by the introduction of new welding technology.

Pre-lubricated blocks, a long awaited feature that saves a great deal of time during installation, arrived in 1994.

In 1997 we introduced AddBlock, the universal block, which was soon a success. In certain markets today, AddBlock is the dominating type being used.

U-blocks and Plugs arrived in 1999. These together with AddBlocks provide electrical fitters with increased flexibility for solving problems in the best and easiest way.

Where valuable assets are at risk

Happily it is very seldom that our transits are put to the test. They are included as part of advanced systems, however when an accident does occur they are invaluable, considering the enormous value and human life they protect.

Onboard an oil tanker or in the offshore industry there are also the incalculable environmental consequences which would result from an uncontrolled fire.

The Brattberg System was originally designed to allow cables and pipes to be passed through a ship's bulkhead, without affecting the fire classification of the bulkhead.

Today's Brattbergs have several added characteristics. They have extremely low smoke indexes, withstand explosion, resist most chemicals, gamma radiation, temperature variations and rodent attacks. The system also retains the sound insulation integrity of walls and is not dislodged by vibration. There are even special versions that protect against EMC. Quality control is rigorous and is certified in accordance with ISO 9001.

Every delivery of raw material is accompanied by a certificate and every delivery is carefully inspected. Inside measurements of our completed frames are finely calibrated and their tolerances are closely controlled. Frames are destruction tested according to SIS 112680 to check durability of joints and materials.

The same applies to the blocks and components. Raw materials are carefully controlled and a sample of each batch is removed for testing.

Enormous capital value and human life are at risk in a difficult environment. Safety demands are extremely high. MCT Brattberg has been part of safety on the North Sea oil rigs since oil and gas started to be extracted in 1965.

Centre:
MCT Brattberg also manufactures special products as transit blocks for wave guides, used mainly in radars.

Several thousand people in a limited space. If a fire spreads here a catastrophe is soon evident. Cruise liner operator trusts in cable transits from MCT Brattberg AB.

Safety is taken to the limit in nuclear power stations. Thousands of Brattbergs are installed here.

Fire onboard a submarine is a nightmare - a leak in the hull a disaster. At Kockums shipyard, the world's most modern, conventionally powered submarines are built using transits from MCT Brattberg AB.

Tested, approved and certified

Since the early 1950s, when we first started specializing in fireproof and pressure-sealed transits, quality testing and classification has been essential.

In 1986 our sealing method and quality system was adapted to meet the rigid requirements of the offshore industry (NS 5801). Today MCT Brattberg is assessed and certified by the BSI QA (British Standard Institution of Quality Assurance), in accordance with the standard EN ISO 9001: 1994, for the design, manufacture and supply of fire barrier and sealed transit systems associated with cable and pipe routes in building and marine environments.

As a direct result of this achievement, quality inspections are carried out by BSI QA twice annually.

MCT Brattberg also holds quality certificates and approvals from a wide variety of classification institutions and customers, among them:

ABS (American Bureau of Shipping)

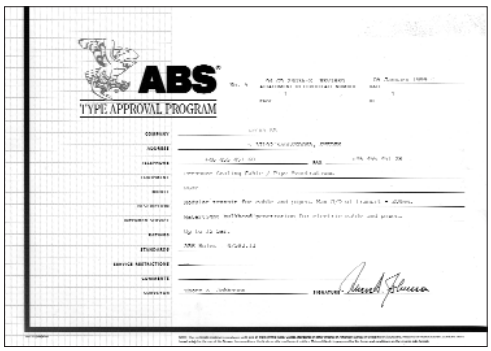
ASC (Australian Submarine Corp.)

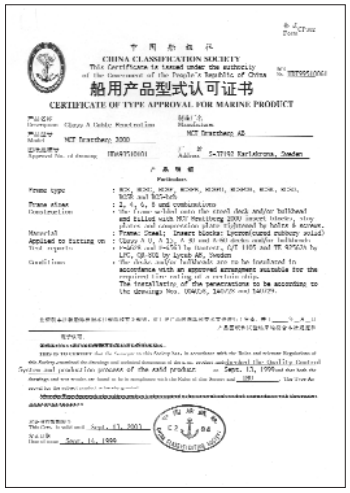
BSI QA (British Standard Institution of Quality Assurance)

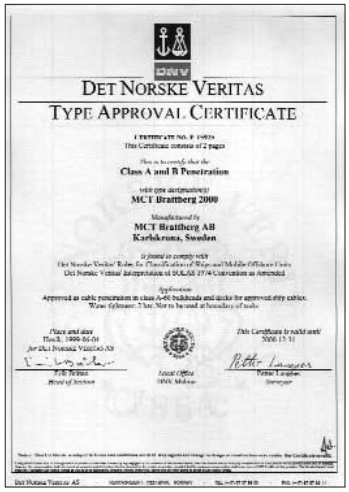
Lloyds' Register Quality Assurance

US Navy

Siemens AG KWU







Our products are tested and certified by a long list of customers, laboratories and certification organisations.

ABS, American Bureau of Shipping - Canadian Coast Guard - Bureau Veritas
China Classification Society - Australian Maritime Safety Authority - DNV, Det Norske Veritas
Danish Maritime Authority - Korean Register of Shipping - Lloyds' Register of Shipping
Nippon Kaiji Kyokai - NL Shipping Inspection - Polski Rejestr Statkow - Germanischer Lloyd
Swedish Adm. of Shipping and Navigation - Croatian Register of Shipping
RINA, Registro Italiano Navale - Russian Maritime Register - US Coast Guard
US Navy - Underwriters Laboratories Inc. - Underwriters Laboratories of Canada

MCT Brattberg is also certified according to MED, Marine Equipment Directive (via Lloyds' Register of Shipping)

Please consult MCT Brattberg for latest updated certificates and approvals.

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The MCT Brattberg concept

The basic idea behind the MCT Brattberg concept is ingeniously simple. It is built around two components: the frame and the insert blocks. The seal is created when the blocks are pressed together in the frame by use of the compression system.

Yet this simple concept is much more than a fire barrier and pressure seal - it is a complete marine sealing system for cables and pipes. In addition to fire, pressure and heat it withstands smoke, temperature variation, ageing, radiation, explosion and vibration, and has proven unpalletable to rats, bugs and other vermin.

The original standard system and the flexible AddBlocks form the basis of a completely compatible concept, that provides electrical installers the field with several new ways of solving their installation problems. The plugs to be used with the AddBlocks and the U-blocks further add to this flexibility.

Reliability, simplicity and flexibility - the things that make MCT Brattberg the first choice where demands are particularly high on ships, oil rigs and shipyards the world over.

Compatibility provides flexibility

All blocks in the MCT Brattberg range are part of the same concept. Standard blocks can be combined in the same frame with AddBlocks and U-blocks, since they all follow the same original series of measurements.

The integrity of the finished transit is not affected, security is the same, but flexibility is increased many times over.

The standard system is based on the original patent and has become synonymous with a ”Brattberg” for generations of marine electricians. It is the first choice in new constructions, where cable dimensions are known or when one is certain that cable diameters are not going to be changed or complemented within the foreseeable future. It is still the MCT Brattberg product in greatest demand.

Standard pieces are available for cable diameters from 4-100 mm. Other dimensions can be supplied to order. Unused space in the frame is filled with compact blocks called spares.

Special designs are also supplied, which include an EMC protected version, see page 21.

The AddBlock system is the solution where you are not sure in advance of the exact dimensions of the cables or pipes. This might be a repair or where the documentation is incomplete. They are also convenient if you want to build up a small stand-by store for future repairs.

Using just nine AddBlocks you can build a transit for as many as 45 cable and pipe dimensions. The secret is the four insert sheets that sit on each block. By peeling these off and fitting the correct insert, each AddBlock can be adapted to five different cable dimensions.

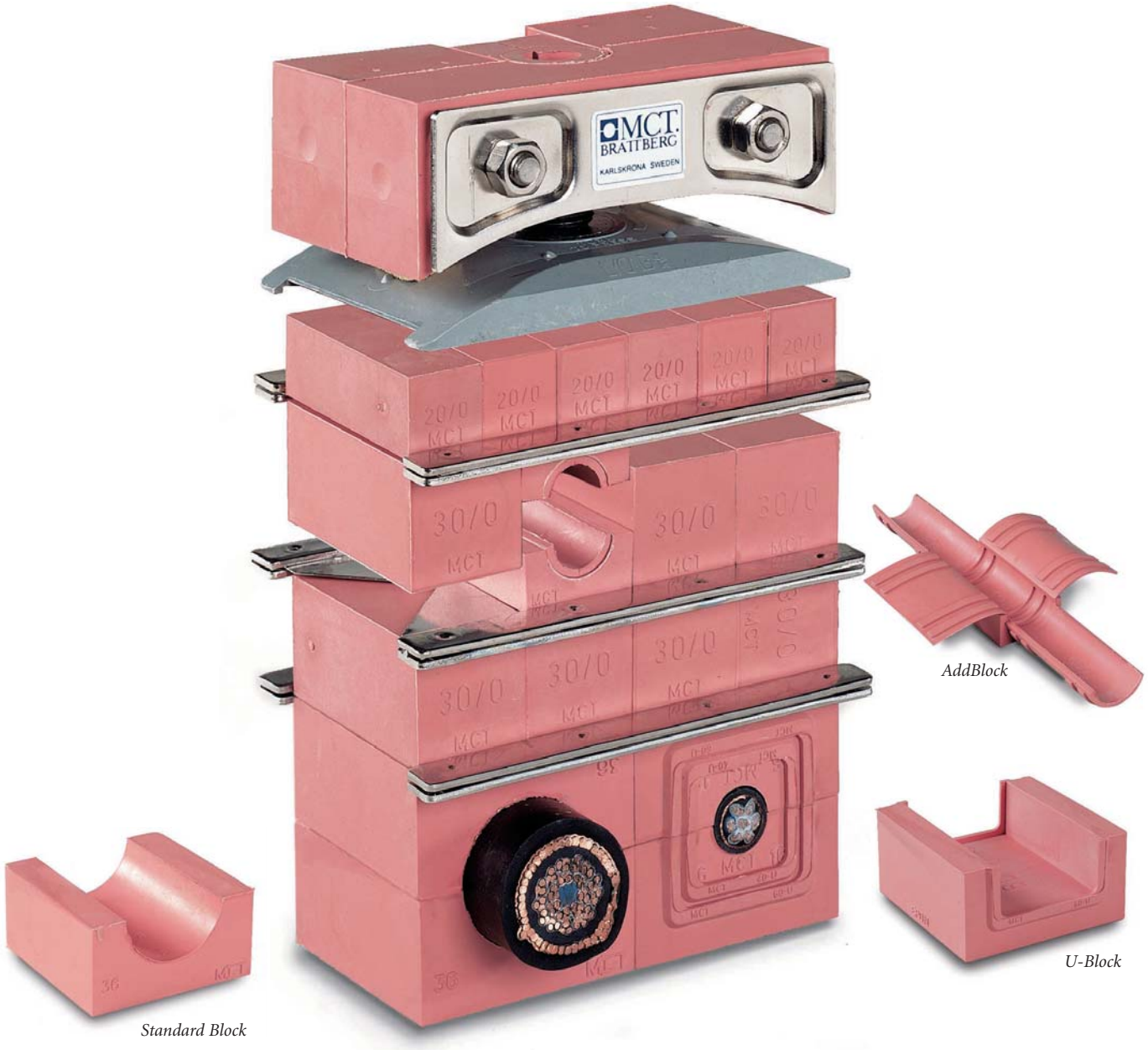
Thanks to the locking devices the inserts remain in position and there is no risk of ”tele-scoping”. The base block and each insert is marked with its outside size in mm.

The AddBlock system includes plugs and wrap-around casings that make it possible to build a temporary spare block. Perfect when you want to prepare for a future installation.

U-blocks are a complement to both the Standard and AddBlocks. With these it is possible to change the outer dimensions of a block, whether a Standard block or an AddBlock. For example, it is possible to center a narrow cable beside a larger cable and retain the height of the row; something that was not always possible previously.

Centering a cable in a round RGP-frame is also considerably easier with U-blocks. Being able to increase outer dimensions is also valuable when one wants to build a temporary spare which can be repacked with cables without waste of other systems.

U-blocks work on the principle of a "Russian Doll". The unique edges secure the blocks into each other, which considerably eases installation. They are available in five sizes from 30-120 mm.



All blocks are made from Lycron, a halogen-free polymer, specially developed by MCT Brattberg. All Lycron parts are supplied pre-lubricated to make installation easy.

Exclusive material and narrow tolerances

Very high demands are made on blocks used in cable transits at sea. If the fire resisting classification is to be retained, the material must not only be inflammable. It should in principle be as resistant to heat as the bulkhead itself. It must not melt or harden and become brittle. Nor must it emit poisonous or corrosive gasses or smoke when heated. The material must also be resistent to chemicals and gasses and must not age noticeably for several decades.

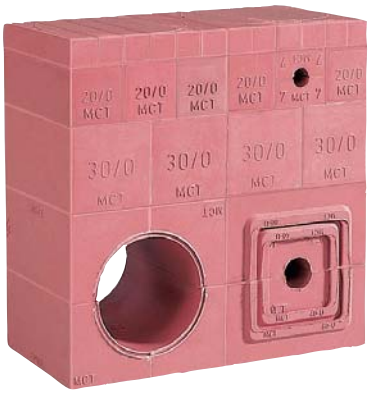
The halogen-free Lycron material was introduced in 1986. It is not a standard material but one specially developed by MCT Brattberg to meet our strict specifications. It is made from a mixture of 21 ingredients.

Lycron is a synthetic polymer of the EPDM rubber type. We are not willing to disclose the exact make-up of Lycron, but will gladly share our test results and experience in the field.

Lycron is free from halogen, which means no corrosive gasses are emitted during fire. This specification requirement has come about in order to protect sensitive electronics. Lycron also has an extremely low smoke index, is inflammable and resistant to explosion, smoke, temperature variations, ageing and radiation. Not even rats, mice or other gnawing rodents can affect it.

MCT Brattberg's blocks are manufactured using the injection moulding process.

This method is more complex than the ordinary extrusion process but is the only one suitable when specifications requirements are high and tolerances tight.



Exact measurements and perfect fit facilitate installation work and are a guarantee for the integrity of the transit.


No
admission

Extreme forces demand high quality

frames

A ship's bulkhead is in constant motion and is also subject to expansion and contraction due to temperature variation. These actions cause frames to be subjected to extremely powerful forces. We have full control of all stages of production, from raw materials to the welding procedure, and allow frequent tests to be made of the welding quality to ensure our frames are robust enough for these conditions.

Frames are the second part of the MCT Brattberg concept. The dimensions and measurements of our frames have become the industry standard, simply because we were first. There are several designs. The difference is dependent upon the area of use and how they are to be installed: for example there are frames for marine and land-based applications.

We normally have four sizes. All frames can be extended by combining them, both vertically and horizontally. The range covers every conceivable need. Standard materials are mild steel, stainless steel and aluminium.

Mild steel is the material most used for frames, though stainless steel has become increasingly popular, not least at sea where the environment is corrosive.

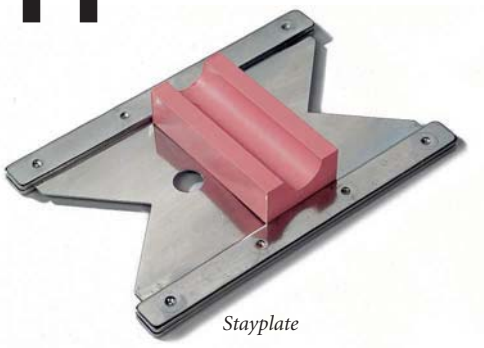
Aluminium is used, for example, in high-speed ferries where the designers have had to consider the weight of every component. Most of our frames are welded automatically, which considerably increases our delivery capacity. Mild and stainless steel frames are MIG welded and aluminium frames are TIG welded. After measurements have been checked, mild steel frames are painted with a rust resistant and welding approved paint.

The entire manufacturing chain is controlled by our quality control system, which is in accordance with ISO 9001.

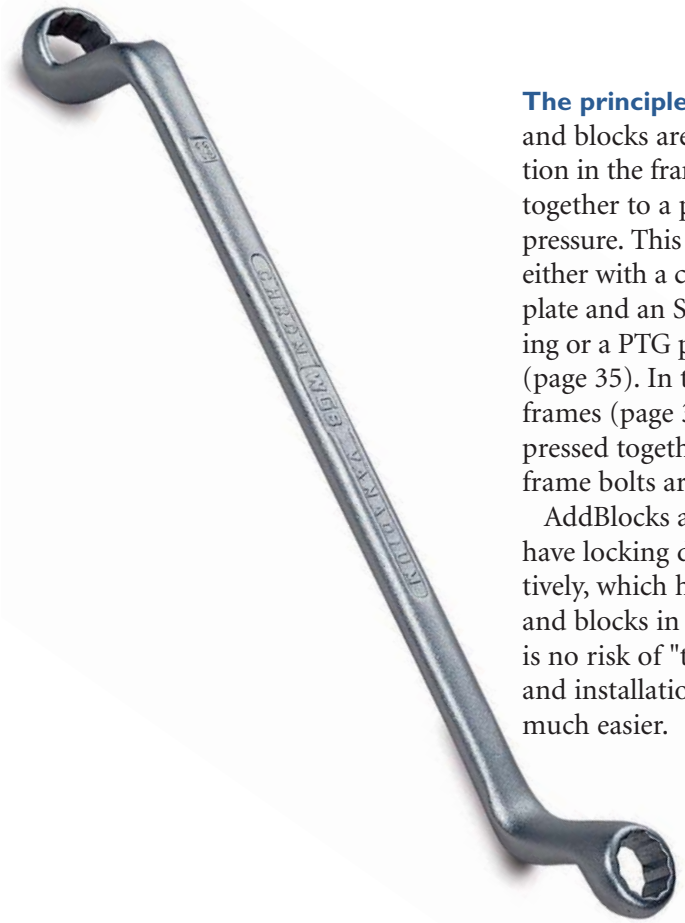
This weld passed the destruction test

Simple and secure
installation

Installing a cable transit from MCT Brattberg is a simple matter. No special tools are needed. Bolts do not have to be tightened with a torque spanner and the prelubricated blocks are easily and quickly fitted together. See the installation instructions at the back of the catalogue.



Stayplate



The principle is that cables and blocks are put into position in the frame and pressed together to a predetermined pressure. This is achieved either with a compression plate and an STG endpacking or a PTG presswedge (page 35). In the round frames (page 34) blocks are pressed together when the frame bolts are tightened.

AddBlocks and U-blocks have locking devices respectively, which hold the inserts and blocks in place. There is no risk of "telescoping" and installation is made much easier.

A stayplate is placed between each row of blocks. It holds them in place during installation and contributes to the integrity of the final transit.

Ready printed packing plans are available to facilitate the calculation and optimisation of the packing space. These can be ordered free of charge from MCT Brattberg.

Special instructions apply for ensuring pressure-tight installations, see pages 50 and 53.

Special products for special uses

MCT Brattberg manufactures a number of special products. High pressure secure cable transits, transits for wave guides and blocks with built-in protection against electromagnetic pulse due to lightning or nuclear blast.

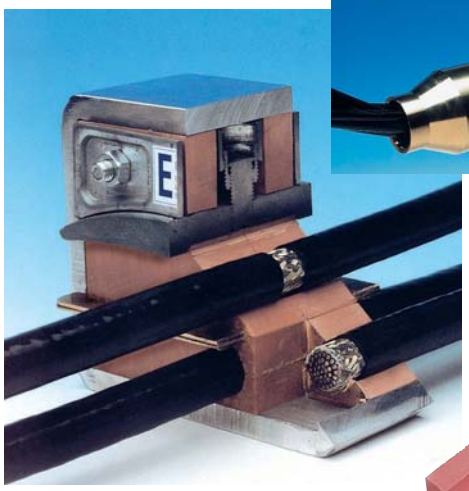
High pressure seals and blocks for wave guides are two examples of our special products. Several types of high pressure seals are available. Often these have been designed in collaboration with a customer. They are used, for example, in the supporting legs of oil rigs or in submarines. An example is the RGPH seal, which has been tested up to 100 bar.

Blocks for oval wave guides are also manufactured to order. These fit all Brattberg frames and are used mainly in radar stations.

The E-series frames and components provide the same protection as the standard MCT Brattberg system but with added, built-in protection against electromagnetic pulses caused by lightning or nuclear blast. They also give protection against interference, electronic sabotage (synthetic EMP) and static electricity.

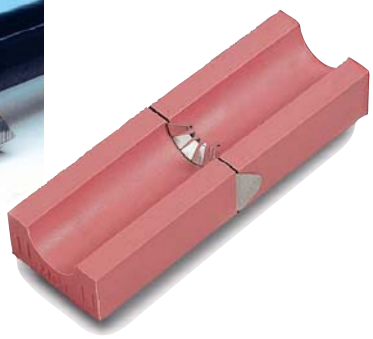
All dimensions are exactly the same as for the other MCT Brattberg components.

For special products please consult MCT Brattberg.



Products to protect against EMC.

PHP pressure hull penetrator for submarines.



Product-
programme

RGS
Pages 24-25

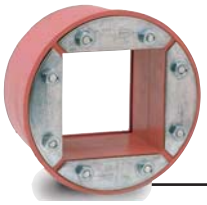
RGSF
Pages 26-27

RGSC
Pages 28-29

RGSK/RGSbtb
Pages 30-32

RGSR
Page 33

Multiple Frames
Page 33



RGP
Page 34

Components
Page 35

Standard Blocks
Pages 38-39

AddBlocks
Page 40

Plugs
Page 41

U-Blocks
Pages 42-43

RGS

RGSO WITH REMOVABLE END

RGS is MCT Brattberg's standard frame for marine applications. It has a standard internal width of 120 mm and is 60 mm deep. There are four sizes of RGS, denoted by 2, 4, 6 and 8 depending on their height. They may be used in both vertical and/or horizontal multiple frames.

The RGS is welded into an accurately pre-cut hole in the deck or bulkhead. As with all our frames, RGS is produced in steel, stainless steel, or aluminium. For installations where cables are already in place, specify RGSO, which has a removable end. RGS weight charts can be found on the next page.

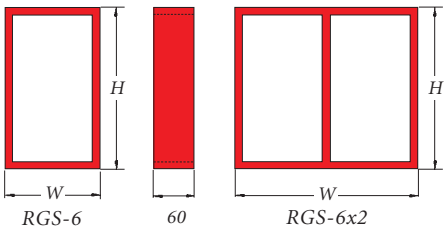
Size chart in mm

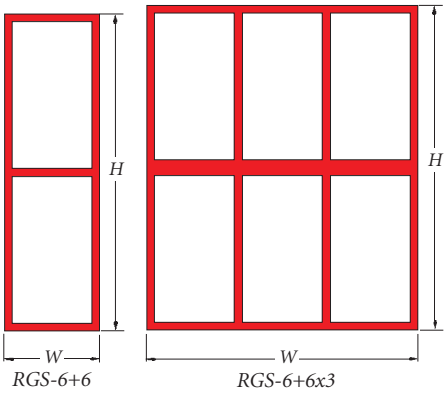
Size in mm

FRAME SIZE	H (height)	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6	x n
RGS-2	121	140,5	271	401,5	532	662,5	793	W = 10 +
RGS-4	179,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	130,5 x n
RGS-6	238	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-8	296,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-2+2	242		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-2+4	300,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-2+6	359		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-2+8	417,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-4+4	359		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-4+6	417,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-4+8	476		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-6+6	476		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-6+8	534,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-8+8	593		- „ -	- „ -	- „ -	- „ -	- „ -	
RGS-2+2	232	140,5						
RGS-2+4	290,5	- „ -						
RGS-2+6	349	- „ -						
RGS-2+8	407,5	- „ -						
RGS-4+4	349	- „ -						
RGS-4+6	407,5	- „ -						
RGS-4+8	466	- „ -						
RGS-6+6	466	- „ -						
RGS-6+8	524,5	- „ -						
RGS-8+8	583	- „ -						

n = number of frames wide.
Tolerance single frame:
Height ± 1 mm, Width ± 0,8 mm.
Material thickness is 10 mm.

All measurements are in millimeters.

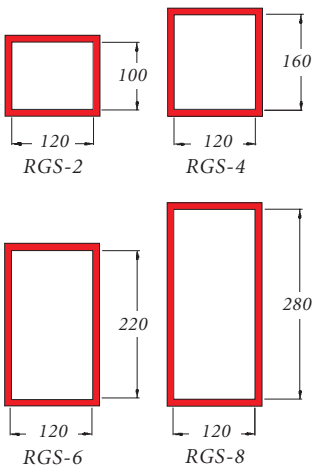




RGS

WEIGHT CHART

Standard frames come in four sizes: 2, 4, 6 and 8. They are all the same width. Height differences are shown below. The material is 10 mm thick.



Weight chart in kilograms

MATERIAL	FRAME SIZE	Weight in kilograms W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6
MILD STEEL SS1312 EN 10025-S235JRG2 DIN RST 37-2 ASTM A36 BS 4360 gr. 40 NS 17100	RGS-2	2,2	3,9	5,7	7,4	9,2	10,9
	RGS-4	2,7	4,6	6,5	8,4	10,3	12,2
	RGS-6	3,2	5,4	7,6	9,8	12,0	14,2
	RGS-8	3,8	6,3	8,9	11,4	14,0	16,5
	RGS-2+2	3,6	8,1	11,9	15,7	19,5	23,3
	RGS-2+4	4,2	8,8	12,8	16,7	20,7	24,6
	RGS-2+6	4,8	9,5	13,6	17,8	21,9	26,0
	RGS-2+8	5,5	10,3	14,7	19,1	23,5	27,9
	RGS-4+4	4,8	9,5	13,6	17,8	21,9	26,0
	RGS-4+6	5,5	10,3	14,7	19,1	23,5	27,9
	RGS-4+8	5,9	11,1	15,8	20,5	25,1	29,8
	RGS-6+6	5,9	11,1	15,8	20,5	25,1	29,8
	RGS-6+8	6,5	12,0	17,0	22,1	27,1	32,1
	RGS-8+8	7,2	12,9	18,3	23,7	29,1	34,5
STAINLESS STEEL SS2348 EN 10088/1.4404 ASTM/A316L BS 970 gr. 316	RGS-2	2,2	4,0	5,8	7,6	9,4	11,2
	RGS-4	2,8	4,7	6,7	8,6	10,6	12,6
	RGS-6	3,3	5,5	7,8	10,0	12,3	14,5
	RGS-8	3,9	6,5	9,1	11,7	14,3	16,9
	RGS-2+2	3,7	8,3	12,2	16,1	20,0	23,9
	RGS-2+4	4,3	9,0	13,1	17,1	21,2	25,2
	RGS-2+6	4,9	9,7	14,0	18,2	22,5	26,7
	RGS-2+8	5,6	10,6	15,1	19,6	24,1	28,6
	RGS-4+4	4,9	9,7	14,0	18,2	22,5	26,7
	RGS-4+6	5,6	10,6	15,1	19,6	24,1	28,6
	RGS-4+8	6,0	11,4	16,2	21,0	25,8	30,6
	RGS-6+6	6,0	11,4	16,2	21,0	25,8	30,6
	RGS-6+8	6,7	12,3	17,5	22,6	27,8	32,9
	RGS-8+8	7,4	13,2	18,8	24,3	29,9	35,4
ALUMINIUM SS4212 EN AW-6082 DIN ALMG SI 1F28 ASTM/A6082 BS 1474 gr. 6082 NS 17305	RGS-2	0,8	1,4	2,0	2,6	3,2	3,8
	RGS-4	1,0	1,6	2,3	3,0	3,6	4,3
	RGS-6	1,1	1,9	2,7	3,4	4,2	5,0
	RGS-8	1,3	2,2	3,1	4,0	4,9	5,8
	RGS-2+2	1,3	2,8	4,2	5,5	6,9	8,2
	RGS-2+4	1,5	3,1	4,5	5,9	7,2	8,6
	RGS-2+6	1,7	3,3	4,8	6,2	7,7	9,1
	RGS-2+8	1,9	3,6	5,2	6,7	8,3	9,8
	RGS-4+4	1,7	3,3	4,8	6,2	7,7	9,1
	RGS-4+6	1,9	3,6	5,2	6,7	8,3	9,8
	RGS-4+8	2,1	3,9	5,5	7,2	8,8	10,4
	RGS-6+6	2,1	3,9	5,5	7,2	8,8	10,4
	RGS-6+8	2,3	4,2	6,0	7,7	9,5	11,2
	RGS-8+8	2,5	4,5	6,4	8,3	10,2	12,1

RGSF/RGSFB

RGSFO/RGSFBO WITH REMOVABLE END

RGSF is a standard RGS frame with a flange that allows the frame to be welded into a hole which is slightly larger than the frame.

RGSF comes in the four standard sizes, 2, 4, 6 and 8, and has the standard measurements of the RGS, but with the added width of the flange: 60 mm wide and 10 mm thick. RGSF can also be installed in multiple frames, se page 33.

For installations where cables are already in place, specify RGSFO which has a removable end.

The **RGSFB** frame is similar to RGSF except that it is bolted to the deck or bulkhead. The bolted frames can be used in areas where hot working is prohibited, or when the stress level induced by welding is unacceptable. RGSFB frames are supplied in kit form, complete with drilled holes, bolts, nuts, washers (all stainless) and a gasket or sealing compound. The latter to be installed between the flange and the deck or bulkhead to ensure a gas-tight installation. The standard sizes and weights are the same as for RGSF. For installations where cables are already in place, specify RGSFBO which has a bolted removable end.

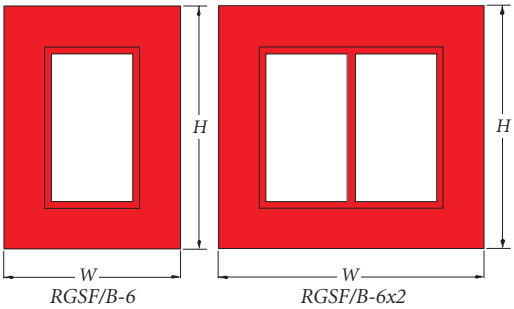
Size chart in mm

Size in mm

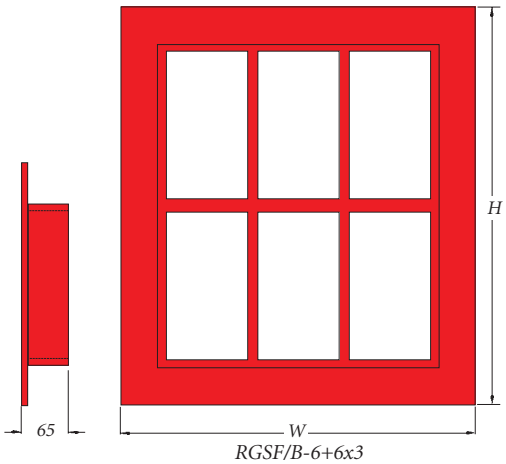
FRAME SIZE	H (height)	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6	x n
RGSF/B-2	241	260,5	391	521.5	652	782.5	913	W = 130+
RGSF/B-4	299,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	130,5 x n
RGSF/B-6	358	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-8	416,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-2+2	362		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-2+4	420,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-2+6	479		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-2+8	537,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-4+4	479		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-4+6	537,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-4+8	596		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-6+6	596		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-6+8	654,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-8+8	713		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSF/B-2+2	352	260,5						
RGSF/B-2+4	410,5	- „ -						
RGSF/B-2+6	469	- „ -						
RGSF/B-2+8	527,5	- „ -						
RGSF/B-4+4	469	- „ -						
RGSF/B-4+6	527,5	- „ -						
RGSF/B-4+8	586	- „ -						
RGSF/B-6+6	586	- „ -						
RGSF/B-6+8	644,5	- „ -						
RGSF/B-8+8	703	- „ -						

n = number of frames wide.
Tolerance single frame:
Height ± 1 mm, Width ± 0,8 mm.
Material thickness is 10 mm.

RGSF-frames are normally supplied with straight corners but are also available with round corners with a radius of 63 mm.

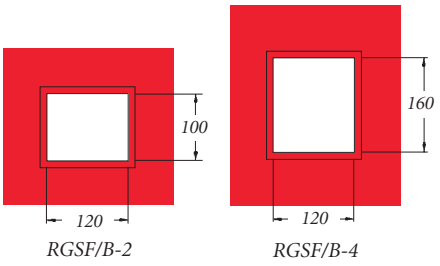


RGSF/B-6 RGSF/B-6x2

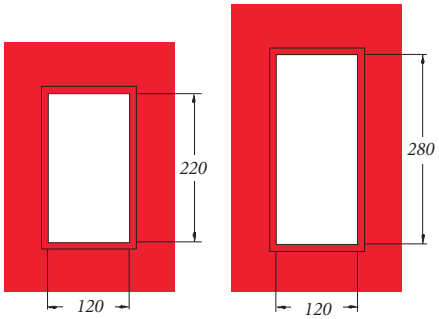


RGSF/B-6+6x3

Standard frames come in four sizes: 2, 4, 6 and 8. They are all the same width. Height differences are shown below. The material is 10 mm thick.



RGSF/B-2 RGSF/B-4



RGSF/B-6 RGSF/B-8

Weight chart in kilograms

Weight in kilograms

MATERIAL	FRAME SIZE	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6
MILD STEEL SS1312 EN 10025-S235JRG2 DIN RST 37-2 ASTM A36 BS 4360 gr. 40 NS 17100	RGSF/B-2	5,9	8,9	11,8	14,8	17,8	20,7
	RGSF/B-4	7,0	10,3	13,6	16,9	20,2	23,4
	RGSF/B-6	8,0	11,5	15,1	18,6	22,1	25,6
	RGSF/B-8	9,0	12,8	16,5	20,3	24,0	27,8
	RGSF/B-2+2	8,4	13,9	19,0	24,0	29,1	34,1
	RGSF/B-2+4	9,5	15,3	20,5	25,7	30,9	36,1
	RGSF/B-2+6	10,6	16,5	21,9	27,2	32,6	37,9
	RGSF/B-2+8	11,7	17,9	23,5	29,2	34,8	40,4
	RGSF/B-4+4	10,6	16,5	21,9	27,2	32,6	37,9
	RGSF/B-4+6	11,7	17,9	23,5	29,2	34,8	40,4
	RGSF/B-4+8	12,8	19,2	25,1	31,0	36,9	42,8
	RGSF/B-6+6	12,8	19,2	25,1	31,0	36,9	42,8
	RGSF/B-6+8	13,9	20,6	26,9	33,1	39,4	45,6
	RGSF/B-8+8	15,0	22,1	28,7	35,4	42,0	48,6
STAINLESS STEEL SS2348 EN 10088/1.4404 ASTM/A316L BS 970 gr. 316	RGSF/B-2	6,1	9,1	12,1	15,2	18,2	21,2
	RGSF/B-4	7,2	10,6	13,9	17,3	20,7	24,0
	RGSF/B-6	8,2	11,8	15,4	19,0	22,7	26,3
	RGSF/B-8	9,2	13,1	16,9	20,8	24,6	28,5
	RGSF/B-2+2	8,6	14,3	19,5	24,7	29,8	35,0
	RGSF/B-2+4	9,7	15,7	21,0	26,4	31,7	37,0
	RGSF/B-2+6	10,9	16,9	22,4	27,9	33,4	38,9
	RGSF/B-2+8	12,0	18,4	24,2	29,9	35,7	41,4
	RGSF/B-4+4	10,9	16,9	22,4	27,9	33,4	38,9
	RGSF/B-4+6	12,0	18,4	24,2	29,9	35,7	41,4
	RGSF/B-4+8	13,1	19,7	25,8	31,8	37,9	43,9
	RGSF/B-6+6	13,1	19,7	25,8	31,8	37,9	43,9
	RGSF/B-6+8	14,3	21,1	27,5	33,9	40,3	46,7
	RGSF/B-8+8	15,4	22,7	29,5	36,3	43,0	49,8
ALUMINIUM SS4212 EN AW-6082 DIN ALMG SI 1F28 ASTM/A6082 BS 1474 gr. 6082 NS 17305	RGSF/B-2	2,1	3,1	4,1	5,2	6,2	7,3
	RGSF/B-4	2,5	3,6	4,8	5,9	7,1	8,2
	RGSF/B-6	2,8	4,0	5,3	6,5	7,7	9,0
	RGSF/B-8	3,2	4,5	5,8	7,1	8,4	9,7
	RGSF/B-2+2	2,9	4,9	6,7	8,4	10,2	11,9
	RGSF/B-2+4	3,3	5,4	7,2	9,1	10,9	12,7
	RGSF/B-2+6	3,7	5,8	7,7	9,6	11,4	13,3
	RGSF/B-2+8	4,1	6,3	8,3	10,2	12,2	14,1
	RGSF/B-4+4	3,7	5,8	7,7	9,6	11,4	13,3
	RGSF/B-4+6	4,1	6,3	8,3	10,2	12,2	14,1
	RGSF/B-4+8	4,5	6,7	8,8	10,9	12,9	15,0
	RGSF/B-6+6	4,5	6,7	8,8	10,9	12,9	15,0
	RGSF/B-6+8	4,9	7,2	9,4	11,6	13,7	15,9
	RGSF/B-8+8	5,3	7,7	10,0	12,4	14,7	17,0

RGSC

RGSC is a frame with rounded corners, which reduces the risk of cracks forming in decks and bulkheads that are subjected to heavy loading. Similar to the RGS frame, it is available in sizes 2, 4, 6 and 8. RGSC can also be supplied as multiple frames. Available in mild steel, stainless steel and aluminium. Special cornerblocks and STG-endpackings with rounded corners are available.

Size chart in mm

Size in mm

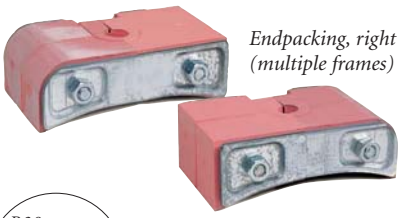
FRAME SIZE	H (height)	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6	x n
RGSC-2	121	140,5	271	401,5	532	662,5	793	W = 10 +
RGSC-4	179,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	130,5 x n
RGSC-6	238	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-8	296,5	- „ -	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-2+2	242		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-2+4	300,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-2+6	359		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-2+8	417,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-4+4	359		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-4+6	417,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-4+8	476		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-6+6	476		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-6+8	534,5		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-8+8	593		- „ -	- „ -	- „ -	- „ -	- „ -	
RGSC-2+2	232	140,5						
RGSC-2+4	290,5	- „ -						
RGSC-2+6	349	- „ -						
RGSC-2+8	407,5	- „ -						
RGSC-4+4	349	- „ -						
RGSC-4+6	407,5	- „ -						
RGSC-4+8	466	- „ -						
RGSC-6+6	466	- „ -						
RGSC-6+8	524,5	- „ -						
RGSC-8+8	583	- „ -						

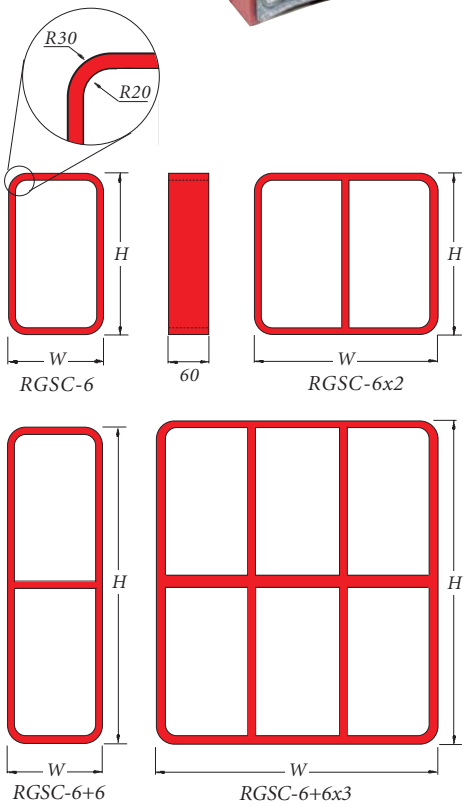
n = number of frames wide.
Tolerance single frame:
Height ± 1 mm, Width ± 0,8 mm.
Material thickness is 10 mm.

All measurements are in millimeters.


Cornerblocks

Endpacking, left (multiple frames)

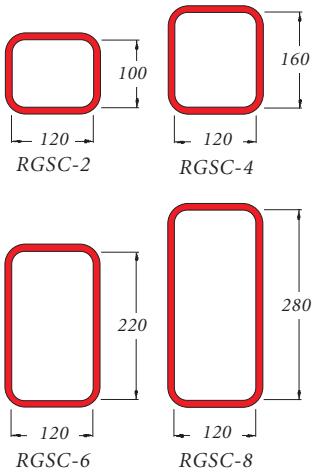

Endpacking, right (multiple frames)



RGSC

WEIGHT CHART

Standard frames come in four sizes: 2, 4, 6 and 8. They are all the same width. Height differences are shown below. The material is 10 mm thick.



Weight chart in kilograms

Weight in kilograms							
MATERIAL	FRAME SIZE	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6
MILD STEEL SS1312 EN 10025-S235JRG2 DIN RST 37-2 ASTM A36 BS 4360 gr. 40 NS 17100	RGSC-2	2,2	3,9	5,7	7,4	9,2	10,9
	RGSC-4	2,7	4,6	6,5	8,4	10,3	12,2
	RGSC-6	3,2	5,4	7,6	9,8	12,0	14,2
	RGSC-8	3,8	6,3	8,9	11,4	14,0	16,5
	RGSC-2+2	3,6	8,1	11,9	15,7	19,5	23,3
	RGSC-2+4	4,2	8,8	12,8	16,7	20,7	24,6
	RGSC-2+6	4,8	9,5	13,6	17,8	21,9	26,0
	RGSC-2+8	5,5	10,3	14,7	19,1	23,5	27,9
	RGSC-4+4	4,8	9,5	13,6	17,8	21,9	26,0
	RGSC-4+6	5,5	10,3	14,7	19,1	23,5	27,9
	RGSC-4+8	5,9	11,1	15,8	20,5	25,1	29,8
	RGSC-6+6	5,9	11,1	15,8	20,5	25,1	29,8
	RGSC-6+8	6,5	12,0	17,0	22,1	27,1	32,1
	RGSC-8+8	7,2	12,9	18,3	23,7	29,1	34,5
STAINLESS STEEL SS2348 EN 10088/1.4404 ASTM/A316L BS 970 gr. 316	RGSC-2	2,2	4,0	5,8	7,6	9,4	11,2
	RGSC-4	2,8	4,7	6,7	8,6	10,6	12,6
	RGSC-6	3,3	5,5	7,8	10,0	12,3	14,5
	RGSC-8	3,9	6,5	9,1	11,7	14,3	16,9
	RGSC-2+2	3,7	8,3	12,2	16,1	20,0	23,9
	RGSC-2+4	4,3	9,0	13,1	17,1	21,2	25,2
	RGSC-2+6	4,9	9,7	14,0	18,2	22,5	26,7
	RGSC-2+8	5,6	10,6	15,1	19,6	24,1	28,6
	RGSC-4+4	4,9	9,7	14,0	18,2	22,5	26,7
	RGSC-4+6	5,6	10,6	15,1	19,6	24,1	28,6
	RGSC-4+8	6,0	11,4	16,2	21,0	25,8	30,6
	RGSC-6+6	6,0	11,4	16,2	21,0	25,8	30,6
	RGSC-6+8	6,7	12,3	17,5	22,6	27,8	32,9
	RGSC-8+8	7,4	13,2	18,8	24,3	29,9	35,4
ALUMINIUM SS4212 EN AW-6082 DIN ALMG SI 1F28 ASTM/A6082 BS 1474 gr. 6082 NS 17305	RGSC-2	0,8	1,4	2,0	2,6	3,2	3,8
	RGSC-4	1,0	1,6	2,3	3,0	3,6	4,3
	RGSC-6	1,1	1,9	2,7	3,4	4,2	5,0
	RGSC-8	1,3	2,2	3,1	4,0	4,9	5,8
	RGSC-2+2	1,3	2,8	4,2	5,5	6,9	8,2
	RGSC-2+4	1,5	3,1	4,5	5,9	7,2	8,6
	RGSC-2+6	1,7	3,3	4,8	6,2	7,7	9,1
	RGSC-2+8	1,9	3,6	5,2	6,7	8,3	9,8
	RGSC-4+4	1,7	3,3	4,8	6,2	7,7	9,1
	RGSC-4+6	1,9	3,6	5,2	6,7	8,3	9,8
	RGSC-4+8	2,1	3,9	5,5	7,2	8,8	10,4
	RGSC-6+6	2,1	3,9	5,5	7,2	8,8	10,4
	RGSC-6+8	2,3	4,2	6,0	7,7	9,5	11,2
	RGSC-8+8	2,5	4,5	6,4	8,3	10,2	12,1

RGSK/RGSbtb

RGSK is an extended, standard RGS frame, with machined grooves for stayplates and compression plates. The material is 10 mm thick on the ends and 12 mm thick on the sides. RGSK is available in the four standard sizes: 2, 4, 6 and 8.

RGSK frames are recommended if pooling of water on the transit face makes it necessary to install packing blocks at a certain distance from the deck or bulkhead.

The frame is 120 mm deep (as opposed to 60 mm on a RGS) and of standard internal width (120 mm).

It may be used in multiple frames, see page 33.

RGSbtb is a double frame which is packed from both sides, enabling a pressure seal of up to 5 bar (test pressure) on either side of the penetration. Installations with this frame can be pressure tested from the space between the pack block units. They also conform to jet-fire rating.

An RGSbtb frame can be used to protect cables from water penetration, combined with EMC protection. One side of the packing takes care of water penetration and the other side gives EMC protection.

The frame is 10 mm thick on the ends and 12 mm thick on the sides. It is 200 mm deep. Other dimensions are the same as for the standard RGS.

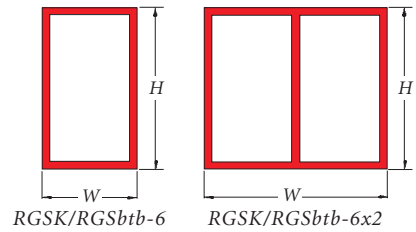
RGSbtb is available in the four standard sizes: 2, 4, 6, and 8. They may be used in multiple frames, see page 33. Welding instructions are on page 46, weight charts on page 32.

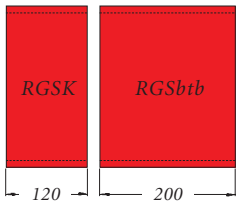
Size chart in mm

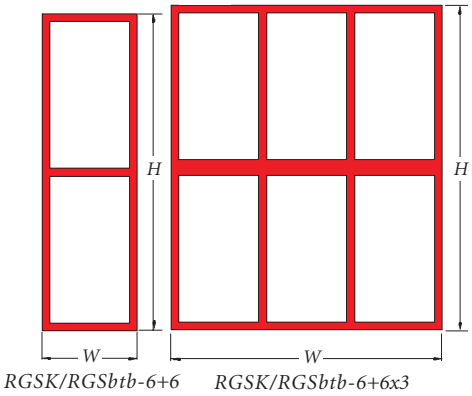
Size in mm

FRAME SIZE	H (height)	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x n
RGSK/RGSbtb-2	121	144,5	275	405,5	536	666,5	W =14 +
RGSK/RGSbtb-4	179,5	- „ -	- „ -	- „ -	- „ -	- „ -	130,5 x n
RGSK/RGSbtb-6	238	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-8	296,5	- „ -	- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-2+2	232		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-2+4	290,5		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-2+6	349		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-2+8	407,5		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-4+4	349		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-4+6	407,5		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-4+8	466		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-6+6	466		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-6+8	524,5		- „ -	- „ -	- „ -	- „ -	
RGSK/RGSbtb-8+8	583		- „ -	- „ -	- „ -	- „ -	

Tolerance single frame:
Height ± 1 mm, Width ± 0.8 mm.
Material thickness is 10 mm.



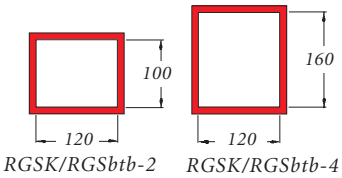




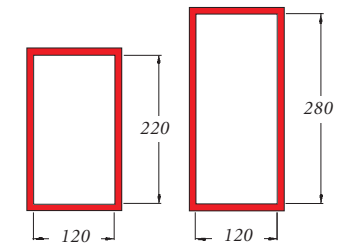
RGSK

WEIGHT CHART

Standard frames come in four sizes: 2, 4, 6 and 8. They are all the same width. Height differences are shown below.



RGSK/RGSbtb-2 RGSK/RGSbtb-4



RGSK/RGSbtb-6 RGSK/RGSbtb-8

Weight chart in kilogramms

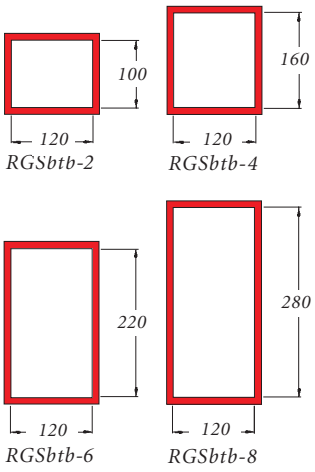
Weight in kilograms

MATERIAL	FRAME SIZE	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6
MILD STEEL SS1312 EN 10025-S235JRG2 DIN RST 37-2 ASTM A36 BS 4360 gr. 40 NS 17100	RGSK-2	4,7	7,7	10,7	13,7	16,7	19,7
	RGSK-4	6,0	9,3	12,6	15,9	19,2	22,5
	RGSK-6	7,3	10,9	14,5	18,2	21,8	25,4
	RGSK-8	8,7	12,5	16,4	20,4	24,3	28,2
	RGSK-2+2	7,8	11,9	16,1	20,4	24,6	28,8
	RGSK-2+4	9,2	13,6	18,1	22,6	27,1	31,6
	RGSK-2+6	10,6	15,2	20,0	24,8	29,5	34,3
	RGSK-2+8	11,9	16,9	22,0	27,0	32,1	37,1
	RGSK-4+4	10,6	15,2	20,0	24,8	29,5	34,3
	RGSK-4+6	11,9	16,9	22,0	27,0	32,1	37,1
	RGSK-4+8	13,2	18,4	23,7	29,1	34,4	39,7
	RGSK-6+6	13,2	18,4	23,7	29,1	34,4	39,7
	RGSK-6+8	14,5	20,0	25,5	31,0	36,5	42,5
	RGSK-8+8	15,9	21,6	27,4	33,2	38,9	45,2
STAINLESS STEEL SS2348 EN 10088/1.4404 ASTM/A316L BS 970 gr. 316	RGSK-2	4,8	7,9	11,0	14,1	17,1	20,2
	RGSK-4	6,2	9,5	12,9	16,3	19,7	23,1
	RGSK-6	7,5	11,2	14,9	18,6	22,3	26,0
	RGSK-8	8,9	12,8	16,8	20,9	24,9	28,9
	RGSK-2+2	8,0	12,2	16,5	20,9	25,2	29,5
	RGSK-2+4	9,4	13,9	18,5	23,2	27,8	32,4
	RGSK-2+6	10,9	15,6	20,5	25,4	30,3	35,2
	RGSK-2+8	12,2	17,3	22,5	27,7	32,8	38,0
	RGSK-4+4	10,9	15,6	20,5	25,4	30,3	35,2
	RGSK-4+6	12,2	17,3	22,5	27,7	32,8	38,0
	RGSK-4+8	13,5	18,9	24,4	29,8	35,3	40,7
	RGSK-6+6	13,5	18,9	24,4	29,8	35,3	40,7
	RGSK-6+8	14,9	20,5	26,3	32,1	37,8	43,6
	RGSK-8+8	16,3	22,1	28,2	34,2	40,3	46,3
ALUMINIUM SS4212 EN AW-6082 DIN ALMG SI 1F28 ASTM/A6082 BS 1474 gr. 6082 NS 17305	RGSK-2	1,7	2,7	3,7	4,8	5,8	6,8
	RGSK-4	2,1	3,3	4,5	5,6	6,8	7,9
	RGSK-6	2,6	3,8	5,1	6,4	7,6	8,9
	RGSK-8	3,1	4,4	5,8	7,2	8,5	9,9
	RGSK-2+2	2,7	4,2	5,7	7,2	8,6	10,1
	RGSK-2+4	3,2	4,8	6,4	8,0	9,5	11,1
	RGSK-2+6	3,7	5,3	7,0	8,7	10,3	12,0
	RGSK-2+8	4,2	5,9	7,7	9,5	11,2	13,0
	RGSK-4+4	3,7	5,3	7,0	8,7	10,3	12,0
	RGSK-4+6	4,2	5,9	7,7	9,5	11,2	13,0
	RGSK-4+8	4,6	6,4	8,3	10,2	12,0	13,9
	RGSK-6+6	4,6	6,4	8,3	10,2	12,0	13,9
	RGSK-6+8	5,1	7,0	9,0	11,0	12,9	14,9
	RGSK-8+8	5,6	7,6	9,7	11,7	13,8	15,8

RGSbtb

WEIGHT CHART

Standard frames come in four sizes: 2, 4, 6 and 8. They are all the same width. Height differences are shown below.



Weight chart in kilograms

Weight in kilograms							
MATERIAL	FRAME SIZE	W (width)/Multiple Frames x 1	x 2	x 3	x 4	x 5	x 6
MILD STEEL SS1312 EN 10025-S235JRG2 DIN RST 37-2 ASTM A36 BS 4360 gr. 40 NS 17100	RGSbtb-2	7,9	13,0	18,4	23,7	29,1	34,4
	RGSbtb-4	10,1	15,8	21,7	27,6	33,5	39,4
	RGSbtb-6	12,4	18,6	25,1	31,5	38,0	44,4
	RGSbtb-8	14,5	21,2	28,2	35,2	42,2	49,2
	RGSbtb-2+2	13,5	20,9	28,5	36,1	43,7	51,3
	RGSbtb-2+4	15,3	23,3	31,5	39,7	47,8	56,0
	RGSbtb-2+6	17,8	26,3	35,0	43,7	52,4	61,1
	RGSbtb-2+8	20,0	29,1	38,4	47,7	56,9	66,2
	RGSbtb-4+4	17,8	26,3	35,0	43,7	52,4	61,1
	RGSbtb-4+6	20,0	29,1	38,4	47,7	56,9	66,2
	RGSbtb-4+8	22,3	31,9	41,7	51,5	61,3	71,1
	RGSbtb-6+6	22,3	31,9	41,7	51,5	61,3	71,1
	RGSbtb-6+8	24,5	34,7	45,1	55,5	65,8	76,2
	RGSbtb-8+8	26,6	37,3	48,2	59,2	70,1	81,0
STAINLESS STEEL SS2348 EN 10088/1.4404 ASTM/A316L BS 970 gr. 316	RGSbtb-2	8,1	13,3	18,8	24,3	29,8	35,3
	RGSbtb-4	10,4	16,2	22,3	28,3	34,4	40,4
	RGSbtb-6	12,7	19,1	25,7	32,3	38,9	45,5
	RGSbtb-8	14,9	21,7	28,9	36,1	43,2	50,4
	RGSbtb-2+2	13,8	21,4	29,2	37,0	44,8	52,6
	RGSbtb-2+4	15,7	23,9	32,3	40,7	49,0	57,4
	RGSbtb-2+6	18,3	27,0	35,9	44,8	53,7	62,6
	RGSbtb-2+8	20,5	29,8	39,3	48,9	58,4	67,9
	RGSbtb-4+4	18,3	27,0	35,9	44,8	53,7	62,6
	RGSbtb-4+6	20,5	29,8	39,3	48,9	58,4	67,9
	RGSbtb-4+8	22,9	32,7	42,8	52,8	62,9	72,9
	RGSbtb-6+6	22,9	32,7	42,8	52,8	62,9	72,9
	RGSbtb-6+8	25,1	35,6	46,1	56,9	67,5	78,1
	RGSbtb-8+8	27,3	38,2	49,4	60,6	71,8	83,0
ALUMINIUM SS4212 EN AW-6082 DIN ALMG SI 1F28 ASTM/A6082 BS 1474 gr. 6082 NS 17305	RGSbtb-2	2,8	4,6	6,5	8,3	10,2	12,0
	RGSbtb-4	3,5	5,5	7,6	9,7	11,7	13,8
	RGSbtb-6	4,3	6,5	8,8	11,0	13,3	15,5
	RGSbtb-8	5,1	7,4	9,9	12,3	14,8	17,2
	RGSbtb-2+2	4,7	7,3	10,0	12,7	15,3	18,0
	RGSbtb-2+4	5,4	8,2	11,1	13,9	16,8	19,6
	RGSbtb-2+6	6,2	9,2	12,3	15,3	18,4	21,4
	RGSbtb-2+8	7,0	10,2	13,5	16,7	20,0	23,2
	RGSbtb-4+4	6,2	9,2	12,3	15,3	18,4	21,4
	RGSbtb-4+6	7,0	10,2	13,5	16,7	20,0	23,2
	RGSbtb-4+8	7,8	11,2	14,6	18,1	21,5	24,9
	RGSbtb-6+6	7,8	11,2	14,6	18,1	21,5	24,9
	RGSbtb-6+8	8,6	12,2	15,8	19,5	23,1	26,7
	RGSbtb-8+8	9,3	13,1	16,9	20,8	24,6	28,4

RGSR

RGSR is used in decks and bulkheads which are subjected to high degrees of stress. The additional, rounded ends prevent stress cracking. The radius of the ends is 70 mm on otherwise standard 2, 4, 6 and 8 model RGS frames.

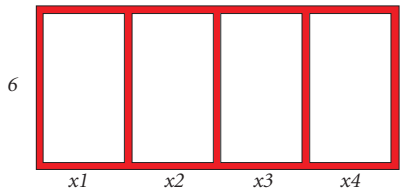
RGSR can be used in multiple frames.

For weight charts and installation details, singularly or in multiple frames, contact MCT Brattberg.

Multiple Frames

HORIZONTAL MULTIPLE FRAMES

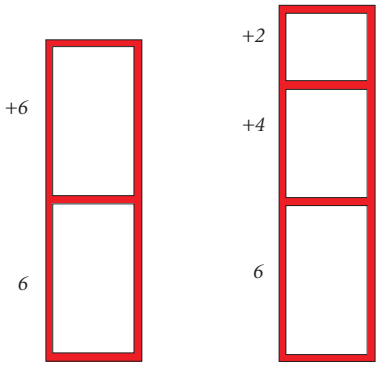
Horizontal multiple frames are described by listing the frame type and size *x* the desired number of horizontal openings.



Designation: *(frame type) 6x4*

VERTICAL MULTIPLE FRAMES

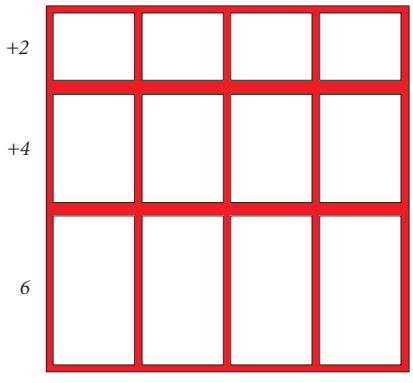
Vertical multiple frames are described by listing the bottom frame type and size + the next frame type and size.



Designation (starting at bottom): *(frame type) 6+ 6* *(frame type) 6+4+2*

VERTICAL AND HORIZONTAL MULTIPLE FRAMES

List the entire vertical frames *x* the desired number of horizontal repetitions.



Designation starting at bottom: *(frame type) 6+4+2x4*

NOTE: All multiple frame designations must be preceded by the frame type.

RGP-round holes

RGP is a round, Lycron frame for penetration seals in holes or pipes. There are six sizes (see chart) which are packed with the MCT insert blocks. The metal attachments are galvanized or stainless steel.

There is an open-sided variation on all six models (specify RGPO) for installation in holes where the cables are already in place.

RGP is a circular seal for holes or pipes.

Size in mm		
RGP SIZE	PACKING SPACE	MIN. DEPTH AND DIAMETER
RGP 50	20 / 20	50 [1] / 66
RGP 70	40 / 40	70 [1] / 72
RGP 100	60 / 60	100 [1] / 74
RGP 150	90 / 90	150 [1] / 80
RGP 200	120 / 120	200 [1] / 80
RGP 300	180 / 180	300 [1] / 80

[1] Ø + 2 mm - 0 mm

Weight in kilograms					
RGP 50	RGP 70	RGP 100	RGP 150	RGP 200	RGP 300
0,25	0,4	0,7	1,8	3,0	7,4

RGPO is an open-sided RGP frame.

Sleeves

The round sleeve is used together with the round RGP frame when one wants to install this in a deck or bulkhead. The sleeve is available in six different sizes.There are several types to choose from, with and without flanges, for welding and for bolting, plus an open version. For more information, request our special brochure, “RGP”.

Components

STAYPLATE

To be placed between each row of blocks. Stayplates simplyfies installation, increases stability and anchores blocks within the frame. Plates come in galvanized or stainless steel, aluminium and brass.

COMPRESSION PLATE

Usually assembled above top row of blocks. The plate bolt is tightened to compress blocks around cables, while providing room for STG endpacking. Comes in GRP, glassfibre reinforced polyester.

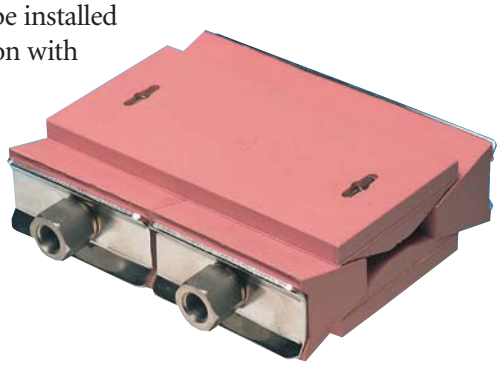
Weight in kilograms			
STG	PTG	COMPRESSION PLATE	STAYPLATE
0,6	0,82	0,24	0,13

STG-ENDPACKING

Installed between compression plate and the top of the frame, completing the seal. Made of Lycron with galvanized or stainless steel fittings.

PTG-PRESSWEDGE

Can be used as an alternative to compression plate and STG. Can also be placed anywhere in the frame. Made of Lycron, with galvanized or stainless steel fittings.
Must always be installed in combination with a stayplate.



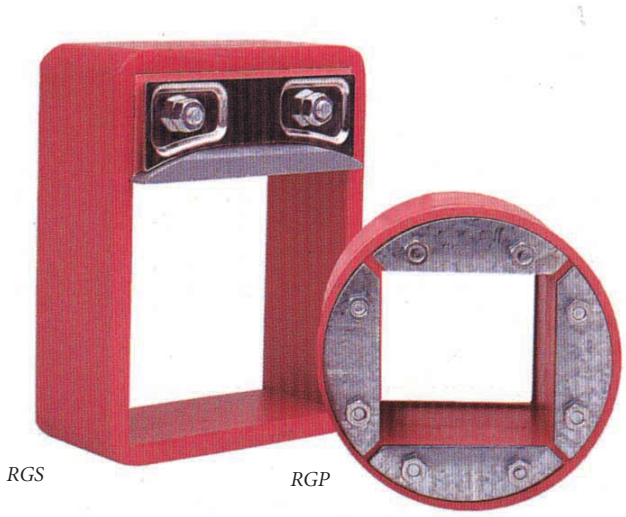
ENDPACKING PULLER

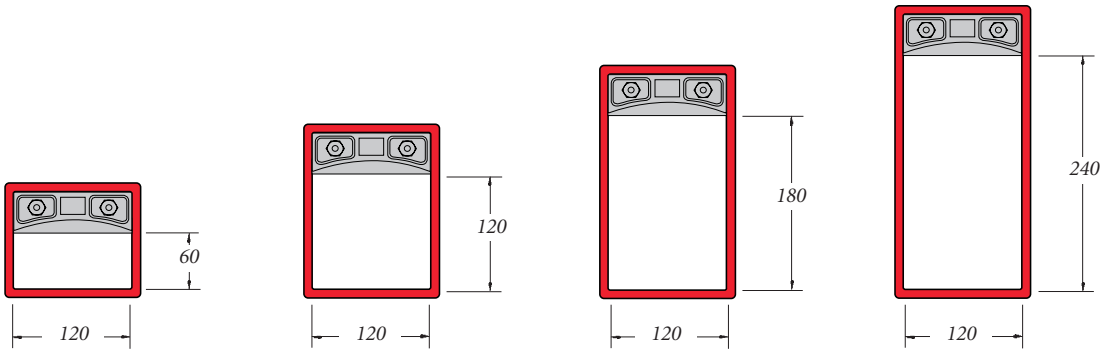
Planning the Packing Space

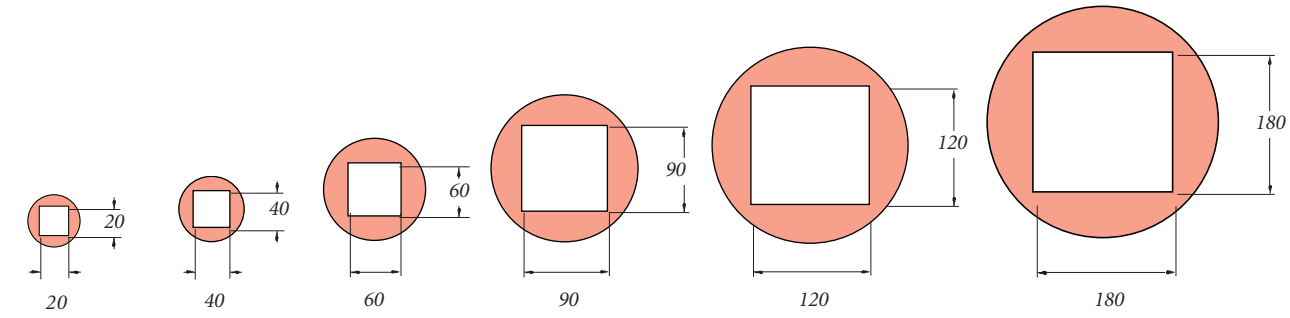
The space in a frame, which can be used exclusively for holding insert blocks, is called the packing space. In the RGS-type frames the compression system always occupy 40 mm of each frame.

In the RGP frames no compression system or stayplates are necessary. Therefore the packing space consists of the entire interior area of the frame.

Tables to help you determine which insert block to use are on pages 39 (the Standard system) and 40 (AddBlocks).





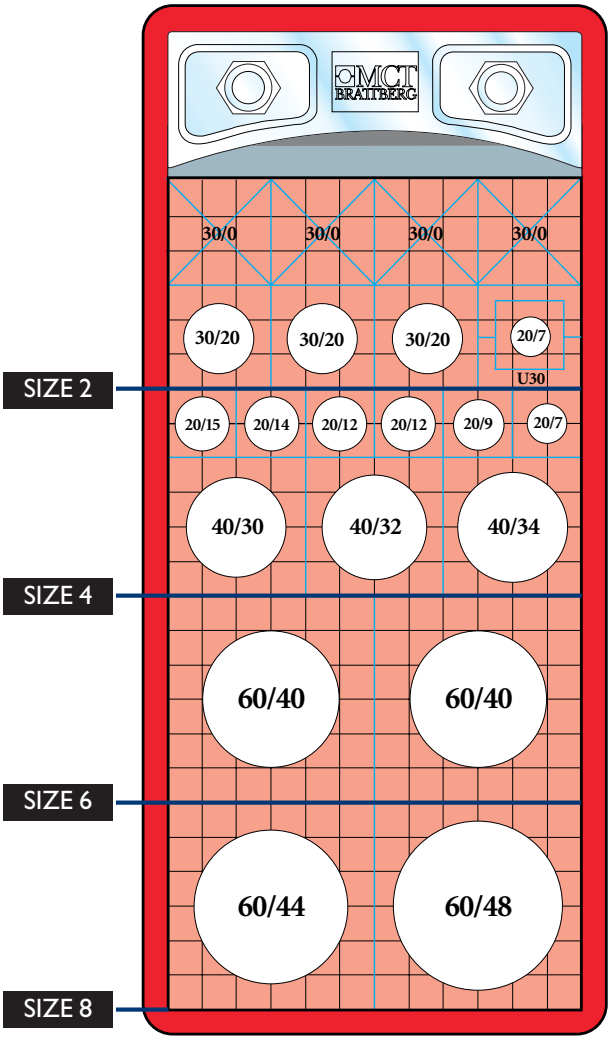


RGS-maximum number of cables and pipes

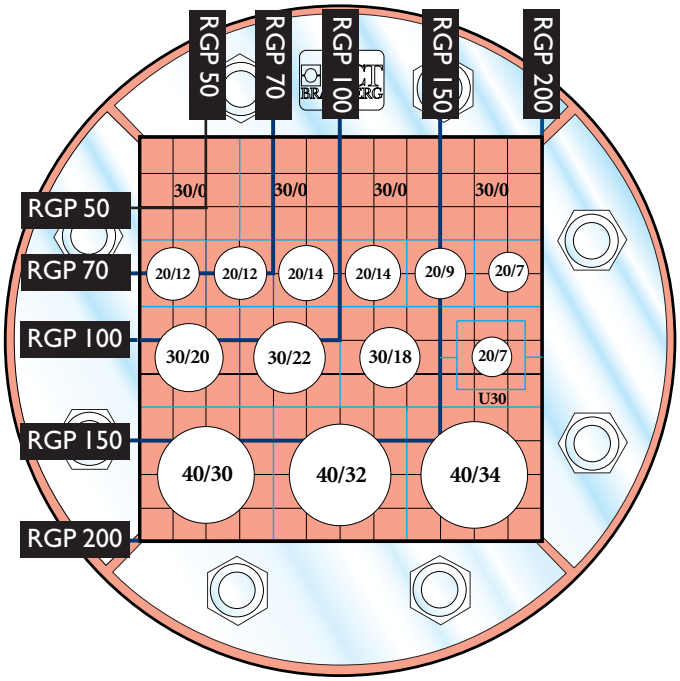
FRAME SIZE	BLOCK SIZE 15	20	30	40	60	90	120
	MAXIMUM NUMBER OF CABLES AND PIPES						
RGS 2	32	18	8	3	2	-	-
RGS 4	64	36	16	9	4	1	1
RGS 6	96	54	24	12	6	2	1
RGS 8	128	72	32	18	8	2	2

RGP-maximum number of cables and pipes

RGP SIZE	BLOCK SIZE 15	20	30	40	60	90	120
	MAXIMUM NUMBER OF CABLES AND PIPES						
RGP-50	1	1	-	-	-	-	-
RGP-70	4	4	1	1	-	-	-
RGP-100	16	9	4	1	1	-	-
RGP-150	36	16	9	4	1	1	-
RGP-200	64	36	16	9	4	1	1



Sample packing space plans (RG-Plans) for RGS (below left) and RGP (below right). We recommend placing the larger cables at the bottom.



MULTIPLE FRAMES WIDTH vs CABLE TRAY WIDTH

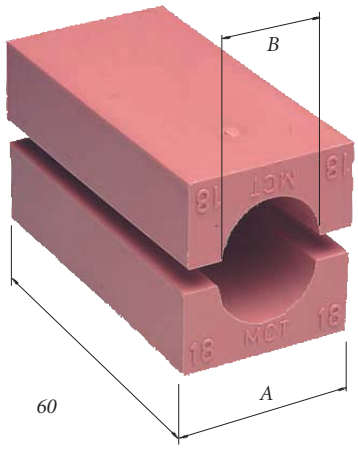
		Cable tray's width in mm 150	200	300	400	600
CABLE TYPE						
SIGNAL CABLE	FRAME SIZE	6	6 x 2	6 x 3	6 x 4	6 x 5
POWER CABLE	FRAME SIZE	4	4 x 2	4 x 3	4 x 4	4 x 5
COMBINED	FRAME SIZE	6	6 x 2	6 x 3	6 x 4	6 x 5

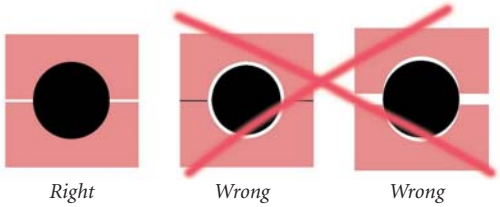
Standard Insert Blocks

Our range of blocks accomodates cables beween 4 and 100 mm in diameter. It is important that the insert block is the right size, with respect to the cable, to ensure a proper seal.

Measure the cable diameters carefully and choose insert blocks accordingly. With the sizing chart on next page you can choose the correct size of insert blocks.

Blocks are referred to by their width (A) and hole diameter (B). Thus a block with a width of 15 mm and a hole diameter of 4 mm is referred to as 15/4. This designation is moulded into the block.

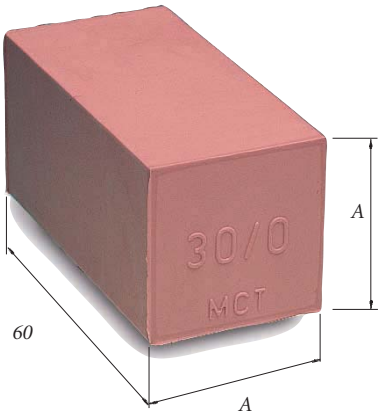




Spare Blocks

Surplus room in each frame is filled out with solid insert blocks. Called spares, they bear the designation A/0.

Blocks are referred to by their width (A), followed by the designation /0 (indicating solid). Thus a block with a width and height of 15 mm is referred to as 15/0. The length of insert blocks is always 60 mm.

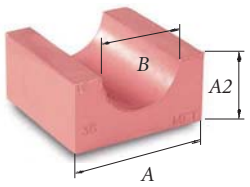


BLOCK SIZE Width (A) = Height (A)	BLOCK DESIGNATION
5 x5 Only in strips of 24 pcs	24 x 5/0
10 x10 Only in strips of 12 pcs	12 x 10/0
15 x 15	15/0
20 x 20	20/0
30 x 30	30/0
40 x 40	40/0
60 x 60	60/0
90 x 90	90/0
120 x 120	120/0
120 x 60	120 x 60/0

Size in mm

CABLE DIAM.	A				B
	15	20	30	40	
3.5-4.5	15/4	20/4			4
4.5-5.5	15/5	20/5			5
5.5-6.5	15/6	20/6			6
6.5-7.5	15/7	20/7			7
7.5-8.5	15/8	20/8			8
8.5-9.5	15/9	20/9			9
9.5-10.5		20/10			10
10.5-11.5		20/11			11
11.5-12.5		20/12	30/12		12
12.5-13.5		20/13	30/13		13
13.5-14.5		20/14	30/14		14
14.5-15.5		20/15	30/15		15
15.5-16.5		20/16	30/16		16
16.5-17.5			30/17		17
17.5-18.5			30/18		18
18.5-19.5			30/19		19
19.5-20.5			30/20		20
20.5-21.5			30/21		21
21.5-22.5			30/22	40/22	22
22.5-23.5			30/23	40/22	23
23.5-24.5			30/24	40/24	24

CABLE DIAM.	A			B
	40	60	90	
25.5-27.5	40/26			26
27.5-29.5	40/28			28
29.5-31.5	40/30			30
31.5-33.5	40/32	60/32		32
33.5-35.5	40/34	60/34		34
35.5-37.5		60/36		36
37.5-39.5		60/38		38
39.5-41.5		60/40		40
41.5-43.5		60/42		42
43.5-45.5		60/44		44
45.5-47.5		60/46		46
47.5-49.5		60/48		48
49.5-51.5		60/50	90/50	50
51.5-53.5		60/52	90/52	52
53.5-55.5		60/54	90/54	54



Blocks are referred to by their width(A) and hole diameter (B). Thus a module with a width of 15 mm and a hole diameter of 4 mm is referred to as 15/4.

CABLE DIAM.	A		B
	90	120	
55.5-57.5	90/56		56
57.5-59.5	90/58		58
59.5-61.5	90/60		60
61.5-63.5	90/62		62
63.5-65.5	90/64		64
65.5-67.5	90/66		66
67.5-69.5	90/68		68
69.5-71.5	90/70		70
71.5-73.5		120/72	72
73.5-75.5		120/74	74
75.5-77.5		120/76	76
77.5-79.5		120/78	78
79.5-81.5		120/80	80
81.5-83.5		120/82	82
83.5-85.5		120/84	84
85.5-87.5		120/86	86
87.5-89.5		120/88	88
89.5-91.5		120/90	90
91.5-93.5		120/92	92
93.5-95.5		120/94	94
95.5-97.5		120/96	96
97.5-99.5		120/98	98
99.5-101.5		120/100	100

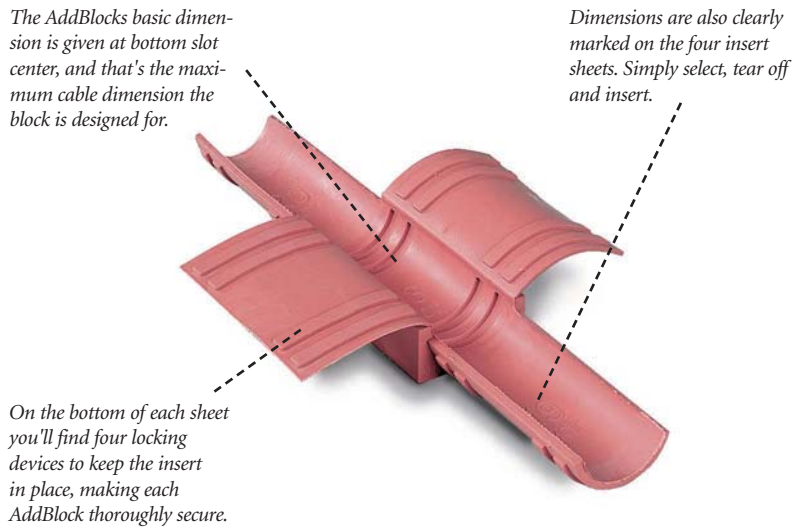
Weight in grams per half

BLOCK	WEIGHT	BLOCK	WEIGHT	BLOCK	WEIGHT	BLOCK	WEIGHT	BLOCK	WEIGHT
24 x 5/0	58	20/6	17	30/19	28	60/42	104	120/72	494
12 x 10/0	113	20/7	17	30/20	27	60/44	98	120/74	485
15/0	20	20/8	16	30/21	25	60/46	91	120/76	472
20/0	38	20/9	15	30/22	24	60/48	84	120/78	462
30/0	84	20/10	14	30/23	22	60/50	77	120/80	448
40/0	150	20/11	13	30/24	21	60/52	59	120/82	437
60/0	338	20/12	13	40/22	57	60/54	61	120/84	425
90/0	766	20/13	12	40/24	54	90/50	287	120/86	415
120/0	1,374	20/14	11	40/26	50	90/52	279	120/88	403
15/4	10	20/15	10	40/28	47	90/54	273	120/90	385
15/5	10	20/16	9	40/30	42	90/56	262	120/92	368
15/6	10	30/12	36	40/32	37	90/58	255	120/94	360
15/7	10	30/13	36	40/34	32	90/60	243	120/96	351
15/8	9	30/14	35	60/32	131	90/62	239	120/98	332
15/9	8	30/15	34	60/34	127	90/64	229	120/100	313
20/4	18	30/16	33	60/36	122	90/66	220	120/108	243
20/5	18	30/17	31	60/38	116	90/68	211		
		30/18	30	60/40	110	90/70	204		

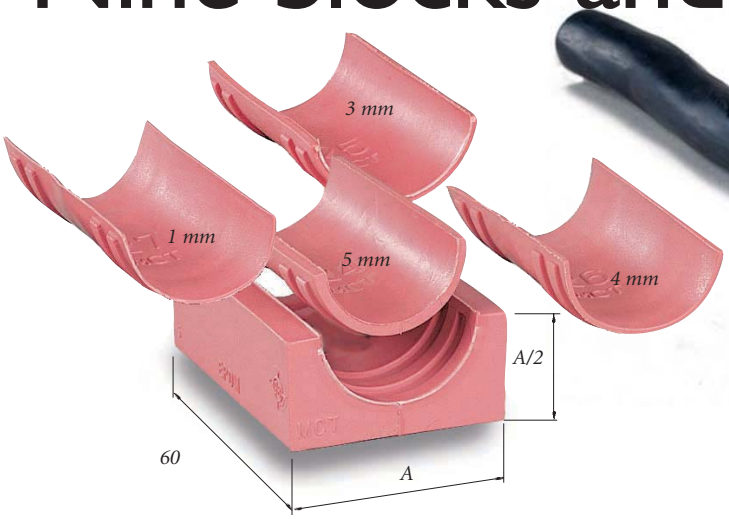
AddBlocks

There are nine AddBlocks. Using the removable inserts, "wings", each AddBlock can be made to fit any of five different cable or pipe dimensions. Both AddBlocks and inserts have sizes clearly cast into them. Together they cover 45 different pipe or cable dimensions from 3,5 to 48,5 mm. Measure the cable thickness carefully. It is important that you select the correct block and insert size. With plugs each AddBlock can be transformed into a spare block.

Inserts have four locking ridges on the underside which fit into recesses in the main block.



Nine blocks and 45 dimensions



There are nine AddBlocks and together they cover 45 pipe or cable dimensions. The length is always 60 mm and the width of the base block is 20, 30, 40 or 60 mm.

WEIGHT PER HALF (g)	ADDBLOCK DIMENSION	CABLE OR PIPE DIMENSION
23	20/4 - 8	3,5 - 8,5
23	20/9 - 13	8,5 - 13,5
45	30/14 - 18	13,5 - 18,5
43	30/19 - 23	18,5 - 23,5
71	40/24 - 28	23,5 - 28,5
62	40/29 - 33	28,5 - 33,5
150	60/34 - 38	33,5 - 38,5
136	60/39 - 43	38,5 - 43,5
128	60/44 - 48	43,5 - 48,5

Plugs and Wraps

P20/8
Plug, diameter 8 mm. Fits in AddBlock 20/4-8

P20/8
Plug, diameter 8 mm. With wrap-around casing
W-20-8/13 it fits in AddBlock 20/9-13

P30/18
Plug, diameter 18 mm. Fits in AddBlock 30/14-18

P30/18
Plug, diameter 18 mm. With wrap-around casing
W-30-18/23 it fits in AddBlock 30/19-23

P40/28
Plug, diameter 28 mm. Fits in AddBlock 40/24-28

P40/28
Plug, diameter 28 mm. With wrap-around casing
W-40-28/33 it fits in AddBlock 40/29-33

P60/38
Plug, diameter 38 mm. Fits in AddBlock 60/34-38

P60/38
Plug, diameter 38 mm. With wrap-around casing
W-60-38/43 it fits in AddBlock 69/39-43

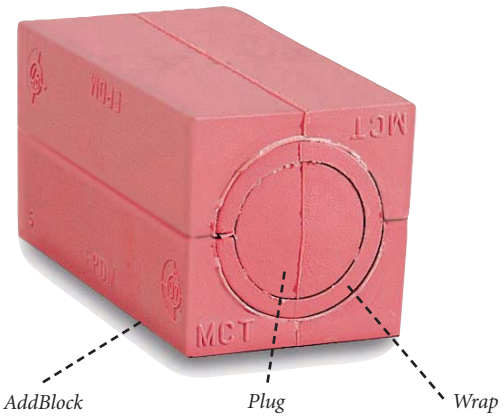
With additional casing
W-60-43/48 it fits AddBlock 60/44-48

The plug's main purpose is to prepare coming installations by creating a spare block together with an AddBlock.

Plug

Wrap

Plug



AddBlock *Plug* *Wrap*

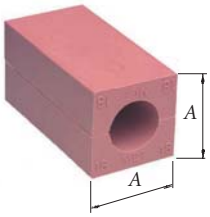
In the table you see which plug, or combination of plug and wrap-around casing, to use when turning an AddBlock into a spare block.

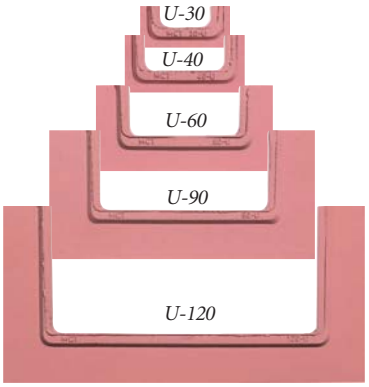
ADDBLOCK	PLUG	WRAP
20/4 - 8	P 20/8	
20/9 - 13	P 20/8 +	W 20/8-13
30/14 - 18	P 30/18	
30/19 - 23	P 30/18 +	W 30/18-23
40/24 - 28	P 40-28	
40/29 - 33	P 40-28 +	W 40/28-33
60/34 - 38	P 60/38	
60/39 - 43	P 60/38 +	W 60/38-43
60/44 - 48	P 60/38 +	W 60/38-43 and W 60/43-48

U-Blocks

Using U-blocks the outer measurement (A-measurement) can be changed on both Standard blocks and AddBlocks. The edges lock the blocks into each other; considerably simplifying assembly.

U-blocks are available in five sizes: a standard 20/4 block can, for example, be transformed into the following sizes: 30/4, 40/4, 60/4, 90/4 and 120/4.

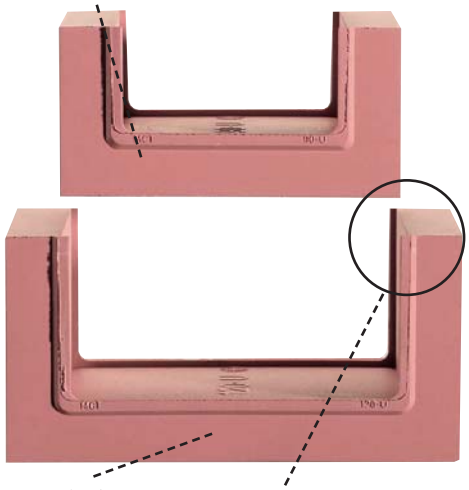




The total number of Spare blocks available once you start using U-Blocks.		
Standard spare	**Size available**	**Use the following blocks**
20/0	30/0	U-30 and 20/0
	40/0	U-40, U-30 and 20/0
	60/0	U-60, U-40, U-30 and 20/0
	90/0	U-90, U-60, U-40, U-30 and 20/0
	120/0	U-120, U-90, U-60, U-40, U-30 and 20/0
30/0	40/0	U-40 and 30/0
	60/0	U-60, U-40 and 30/0
	90/0	U-90, U-60, U-40 and 30/0
	120/0	U-120, U-90, U-60, U-40 and 30/0
40/0	60/0	U-60 and 40/0
	90/0	U-90, U-60 and 40/0
	120/0	U-120, U-90, U-60 and 40/0
60/0	90/0	U-90 and 60/0
	120/0	U-120, U-90 and 60/0
90/0	120/0	U-120 and 90/0

U-Blocks are pre-lubricated, saving valuable time.

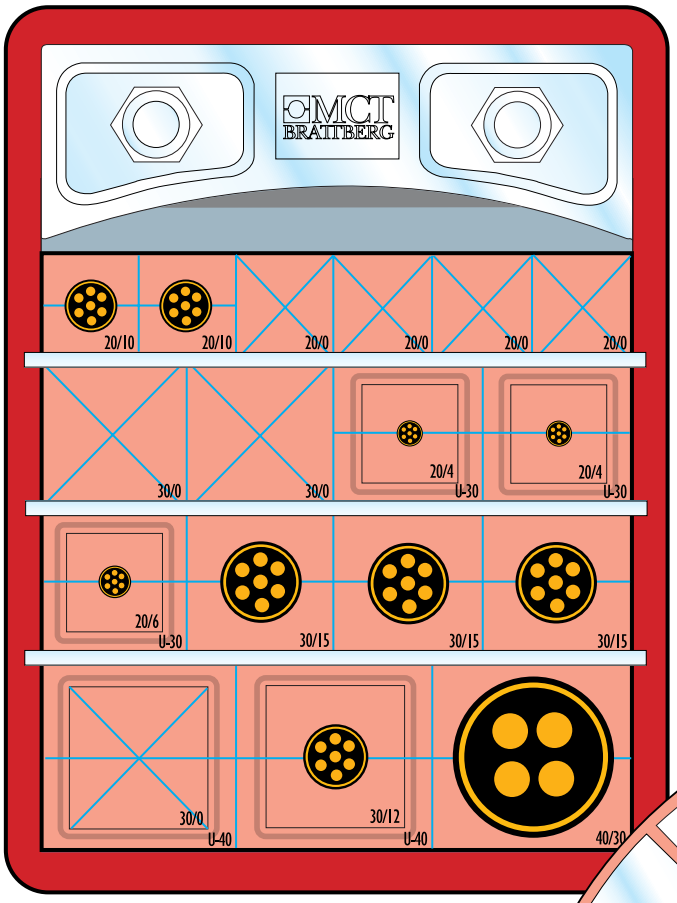
U-Blocks function according to the "Russian doll" principle.



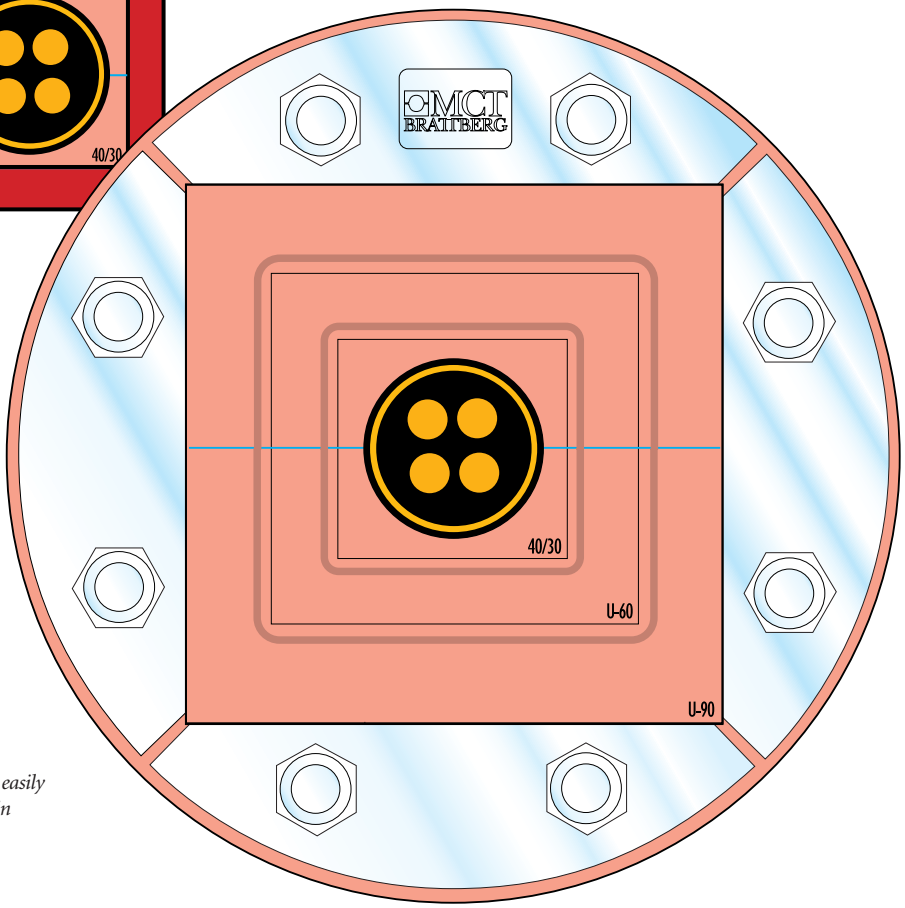
U-Blocks are made of Lycron, the same halogen free material used in all other MCT Brattberg blocks.

The edges lock the blocks into each other, considerably simplifying assembly.

Using U-Blocks



Regardless of cable diameter, you can retain the outer measurement of the block in any row.



With U-Blocks, you can easily center the cable or pipe in your RGP installation.

Installation

Transits from MCT Brattberg fulfill the most stringent requirements of shipyards and the off-shore industry.

Installation engineers must be familiar with the details of the procedure and understand how important it is that instructions are followed.

To simplify installation we have made the procedures simple, logical and straightforward. No special tools are required and all blocks are supplied pre-lubricated. Thanks to the elasticity of the blocks it is not necessary to tighten the bolts with a torque wrench.

The same applies when welding frames into position. To ensure that tensions and distortions do not occur, and that the fire-safety integrity of the bulkhead is maintained, the instructions printed on pages 50 - 53 must be followed carefully.

Welding Instructions

WELDING METHOD

Shielded metal arc welding (SMAW)
Flux cord arc welding (FCAW)

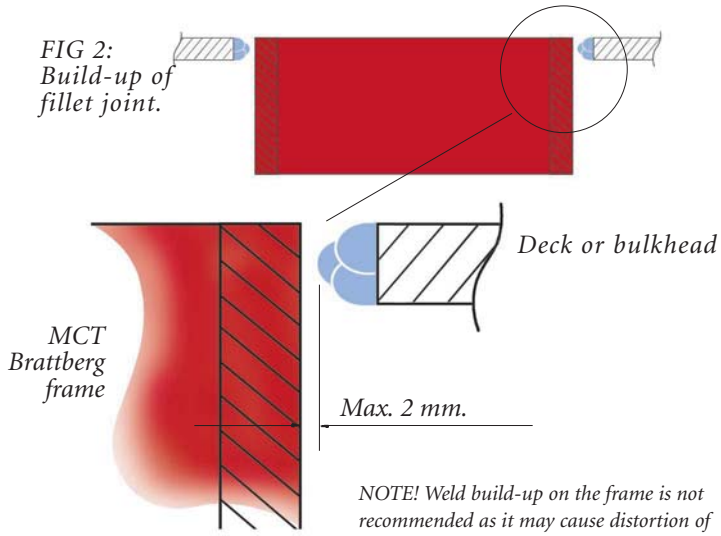
WELDERS' QUALIFICATION

Welders to be qualified according to AWS D1.1 latest edition

CONSUMABLE SMAW (AWS 7016, AWS 7018) FCAW (AWS E-71-T5)

Consumable to be handled and treated according to manufacturer's recommendation.

FIG 2: Build-up of fillet joint.



NOTE! Weld build-up on the frame is not recommended as it may cause distortion of the frame.

PREPARATION AND FIT UP

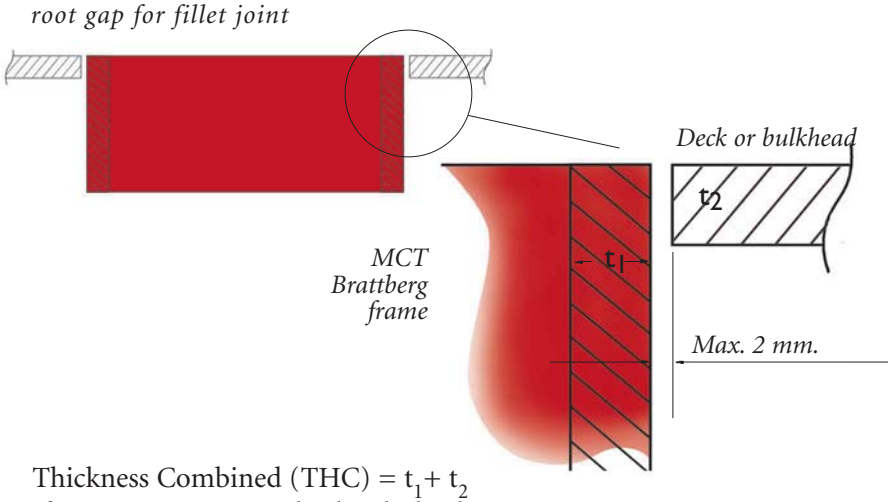
The prepared joint and surrounding areas shall be clean and free from moisture, oil, grease, loose or thick scale, oxides etc., or any protective coating except weldable primers.

Maximum allowed root gap for fillet welds is 2 mm (see fig 1).

PREHEAT AND INTERPASS TEMPERATURE

To avoid hydrogen cracking when welding MCT Brattberg frames made of carbon, manganese or micro alloy steel Rel. * 390N/mm² (not EN 10025-S235JRG2), the welding conditions in standard SS 06 40 25 (BS5135:74) are recommended.

FIG 1: maximum allowable root gap for fillet joint



Thickness Combined (THC) = $t_1 + t_2$
If root gap is too wide the deck plate or bulkhead may be built-up with weld to achieve a proper gap.
(see fig. 2)

WELDING SEQUENCE

Welding to be performed according to fig 3 and 4. Weld pass 3 is not to be started until welds 1 and 2 are completed.

FIG 3:
welding sequence
(example shows a two-pass fillet weld)

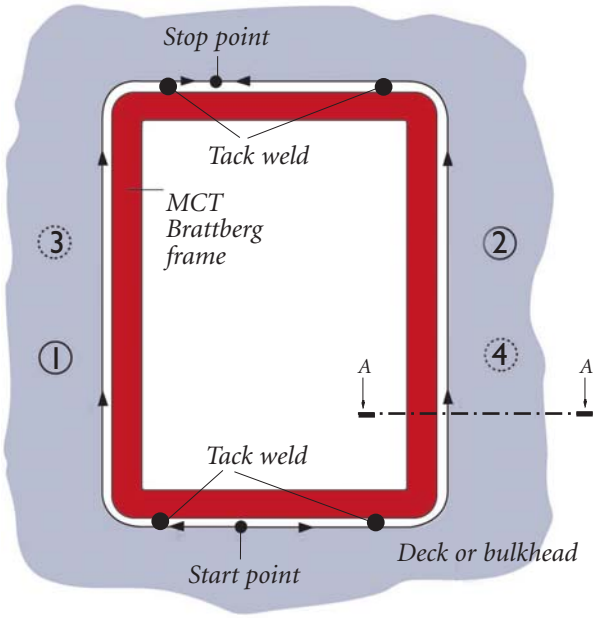


FIG 4:
Welding sequence

1.1 Root weld
2.1 Root weld
1.2 Fillet weld
2.2 Fillet weld
3 Seal weld
4 Seal weld

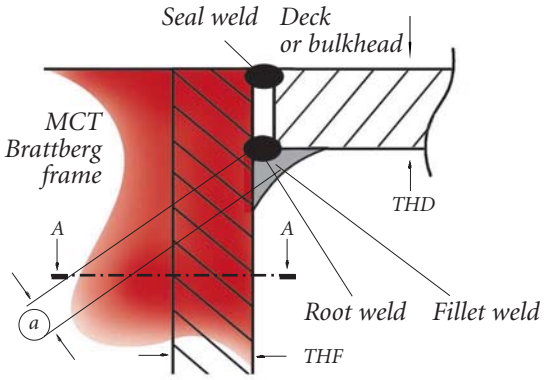
WELD SIZE

Fillet weld size (throat thickness) is to be 0.5 x plate thickness of the bulkhead or deck plate (THD). However fillet weld size is not to be greater than 0.7 x frame plate thickness (THF). See fig 5.

Thus:

$0.5 \times THD \leq (a) \leq 0.7 \times THF$

FIG 5:
Fillet weld size



(a) = fillet size (throat thickness).
THD = Thickness Deck plate.
THF = Thickness Frame plate.

NOTE!
Multi-pass welding is required if (a) ≥ 5 mm.

Type Approvals

MCT Brattberg has been tested and certified to cover all major requirements and regulations for cable and pipe transits given by established classification societies.

CLASS A

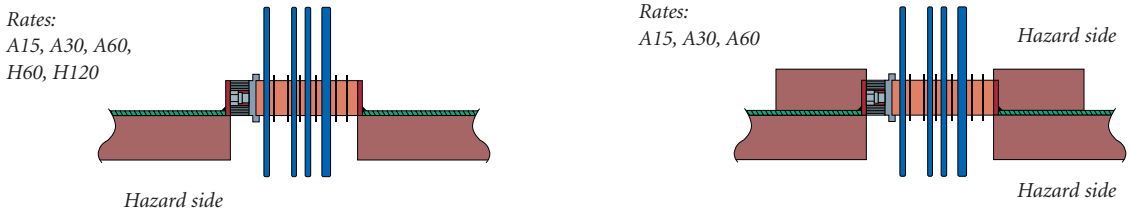
Standard time/temperature curve in accordance with IMO RES A517 (13) and 754 (18).

CLASS H

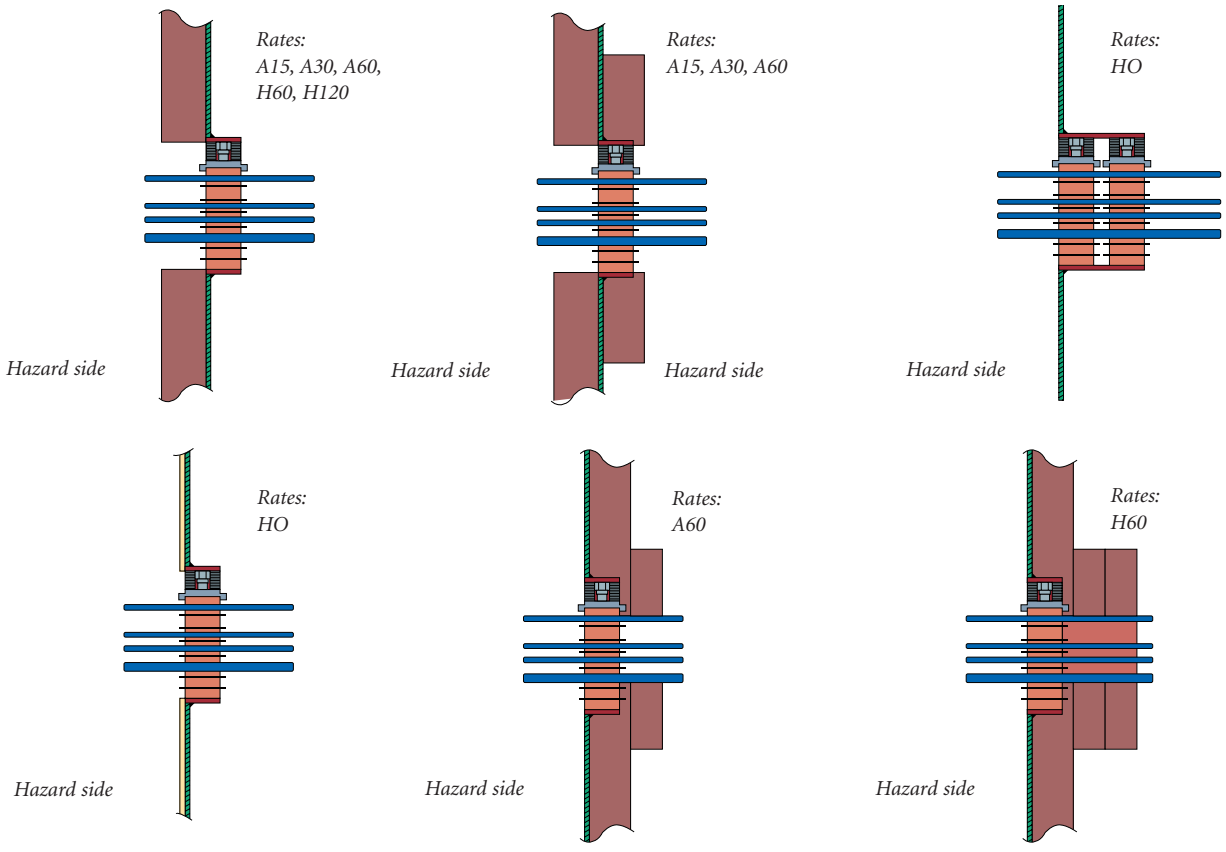
Hydro-carbon time/temperature curve according to the rules of Oljedirektoratet (N) and Department of Energy (UK).

DECK: CLASS A / CLASS H

The division which is penetrated has to be insulated.



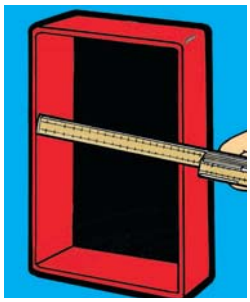
BULKHEAD: CLASS A / CLASS H



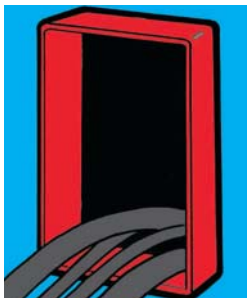
As testing is ongoing, please consult MCT Brattberg on approvals not shown.

Installation Guide

RGS, RGSR, RGSF, RGSK AND RGSbtb



1 *Measure the opening to ensure that its size conforms with tolerance standards 120,5 mm (± 0,5)*



2 *Make sure the frame is clean and lubricate the inside of the frame. Then pull cables through, placing the largest at the bottom.*

3 *Begin packing. A stayplate is inserted between each layer of insert blocks.*

PRESSURE APPLICATIONS RGS, RGSC, RGSF, RGSK, RGSR AND RGSbtb

Make sure the frame is clean and lubricate the inside of the frame thoroughly. Lubricate all Lycron parts carefully with the MCT Brattberg lubricant.

Place the compression plate in the centre so that the rubber can come up between the compression plate and the frame on both sides of the plate.

The seal may not be pressurized within 48 hours of installation. This allows for the settlement of the system (based on a 20°C ambient temperature). NOTE. The lower the temperature, the longer the needed settlement time.

Certified pressure 2 bar (29.4 psi), test pressure 5 bar.

NOTE. For pressurized applications, all components must be replaced with new material after removal and refitting.

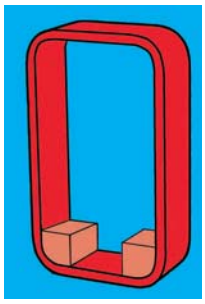
STG ENDPACKING

4 *Insert the compression plate in the frame before the last row of blocks.*

5-6 *Insert the last row of blocks. Tighten the bolt until there is 32 mm between the top of the plate and the inside of the frame.*

7 *Insert endpacking STG with the tongue around the compression bolt. Tighten the nuts on the endpacking to compress and complete the seal. Approximately 12 mm of thread should protrude on each bolt.*

RGSC

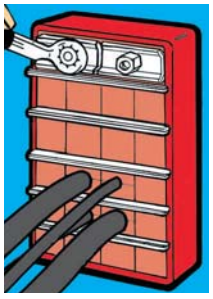


Begin packing with the special corner blocks. Insert endpacking STG with the tongue around the compression bolt. Tighten the nuts on the endpacking to compress and complete the seal. Approximately 12 mm of thread should protrude on each bolt.

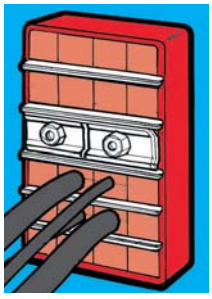
PTG PRESSWEDGE

4 *Insert the last two stayplates in the frame before the last row of blocks.*

5 *Fit first the PTG presswedge at top of the frame. Insert then the last row of blocks.*

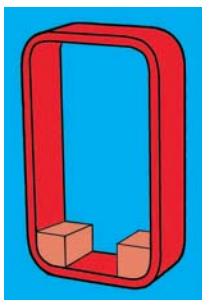


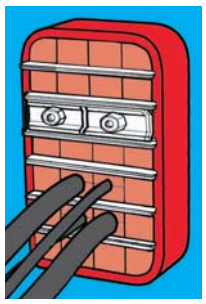
6 *Tighten the nuts until about 12 mm of thread protrudes on each bolt.*



7 *The PTG Presswedge can also be placed like this.*

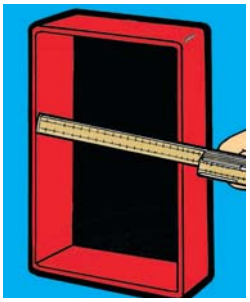
RGSC



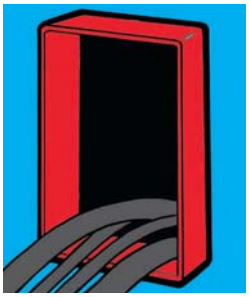


Begin packing using the special corner blocks. Place the PTG presswedge anywere, except at the top or bottom.

AddBlock

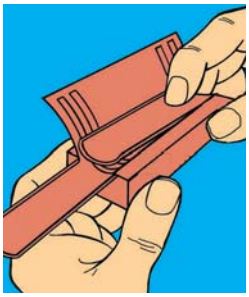


Measure the opening to ensure that its size conforms with tolerance standards 120,5 mm (±0,5).

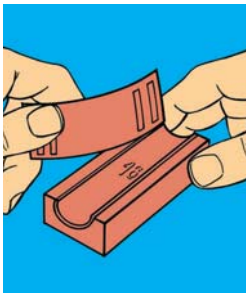


Select a suitable block for the largest cable in the row.

Tear off attached sheet to fit the dimension selected.

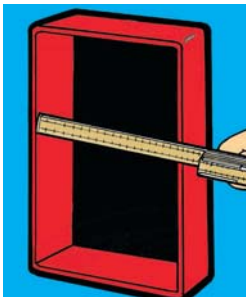


Place sheet into centre slot and affix it with the unique locking device.

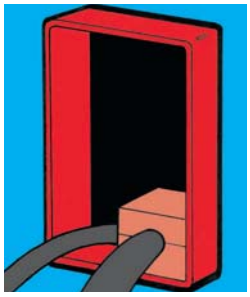


Tear off superfluous sheets.

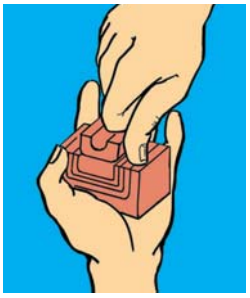
U-Block



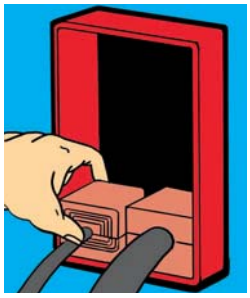
Measure the opening to ensure that its size conforms with tolerance standards 120,5 mm (±0,5).



Select a suitable block for the largest cable in the row.



Select a suitable standard Block or AddBlock for the small cable. Then create a base using U-Blocks. The external measurements should be the same as the previous block.



Start packing the frame.

Insert stayplates between each row of insert blocks.

Plug

PREPARING FOR A FUTURE INSTALLATION.

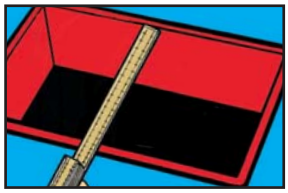
Choose an AddBlock suitable for the cable diameter.

The centre plug is a snug fit for any pre-selected AddBlock since its diameter i adjustable - all thanks to the wraparound casing.

Place the plug in the AddBlock and make sure the locking devices secure it in place.

Horizontal Installation Guide

RGS, RGSF, RGSK, RGSR AND RGSbtb



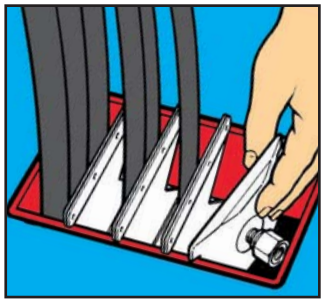
1 *Measure the opening to ensure that its size conforms with tolerance standards 120,5 mm (±0,5).*

2

Make sure the frame is clean, then lubricate the inside and pull the cables through, placing the largest farthest from the compression plate.

3

In horizontal installations, gravity makes it necessary to use the stayplates to hold the insert blocks in place. Therfore, place the stayplates in the frame first, dividing up the rows of cables according to your RG-plan. Also insert the compression plate at this stage.

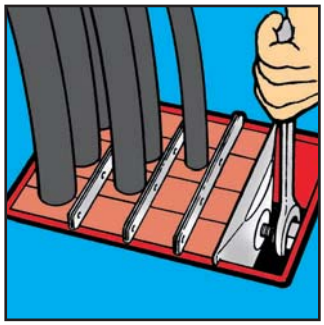


4

Insert the outer blocks first (A, B, C etc.). Then insert the remaining blocks. Note. The block A should be turned 90°, as shown in the picture.

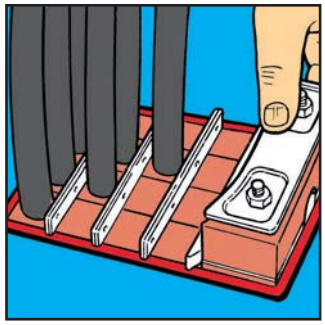
5

Pack the last row, then tighten the bolt on the compression plate counter-clockwise until there is 32 mm of space between the top of the plate and the frame or enough to fit the endpacking tounge around the bolt.



6

Insert endpacking STG with the tongue around the compression bolt. Tighten the nuts on the endpacking to compress and complete the seal. Approximately 12 mm of thread should protrude on each bolt.

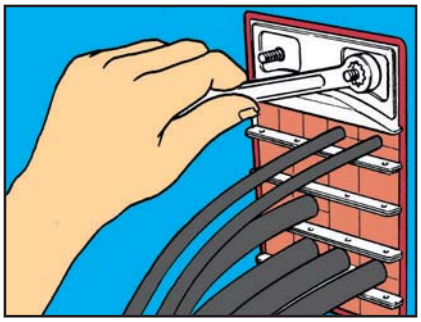


Disassembly Guide

STG

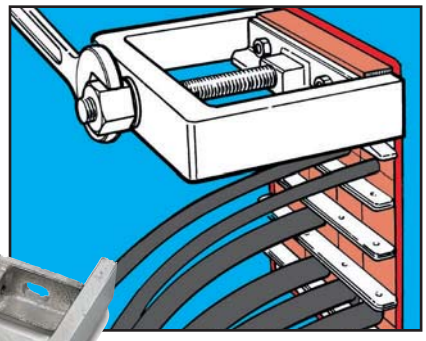
1

Remove the nuts and the hardware from the face of the endpacking.



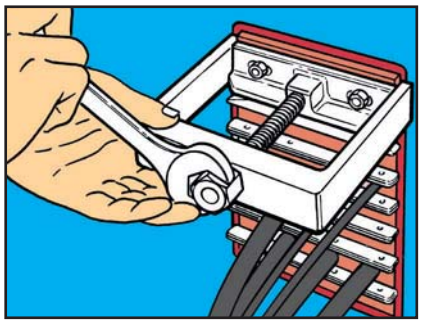
2

Attach the endpacking puller to the bolts with the nuts.



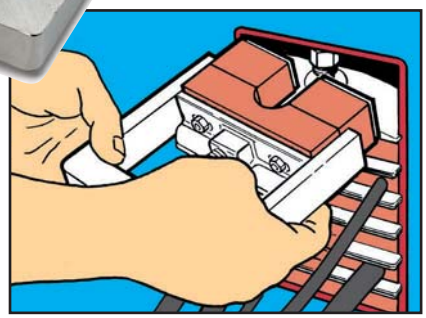
3

Tighten the bolt on the puller and the endpacking slides out.



4

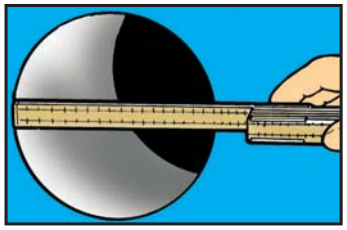
Remove the endpacking.



RGP Installation Guide

1

Measure the opening to ensure that its size conforms with tolerance standards (page 34).

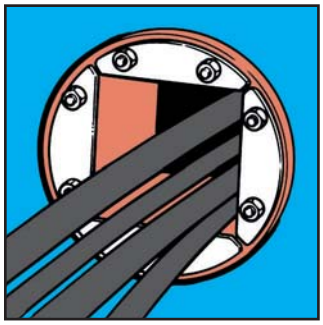


2

Insert the RGP frame in the opening. No lubricant should be applied to the hole or to the outside of the frame.

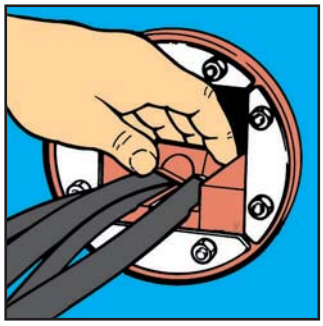
3

Pull the cables through, placing the largest at the bottom of the frame.



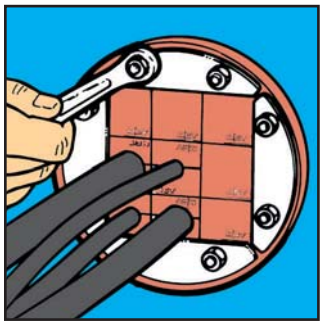
4

Begin packing.



5

Tighten the bolts to compress and complete the seal. Approximately 10 to 12 mm of thread should protrude on each bolt.



PRESSURE APPLICATIONS RGP

Clean the inside of the pipe and the outside of the RGP prior to installtion, but apply no lubricant to either surface.

Lubricate all the Lycron parts carefully with the MCT Brattberg lubricant.

The RGP seal may not be pressurized within 48 hours of installation - this allows for the settlement of the system (based on a 20°C ambient temperature). NOTE. The lower the temperature, the longer the needed settlement time.

Certified pressure 1.8 bar (26.5 psi), test pressure 4.5 bar. In the case of higher pressure, please contact MCT Brattberg.

NOTE. For pressurized applications, all components must be replaced after removal and refitting.

Packing Plan

RGS, RGSF, RGSK, RGSR AND RGSbtb

The correct frame size can be determined by using this plan.

The numbers 2, 4, 6 and 8 in the margin represent the packing space available in frames size 2, 4, 6 and 8 respectively.

It is not neccessary to show stayplates and compression components as the required space has already been allowed for.
RG-Packing Plans will be supplied free of charge upon request.

STG

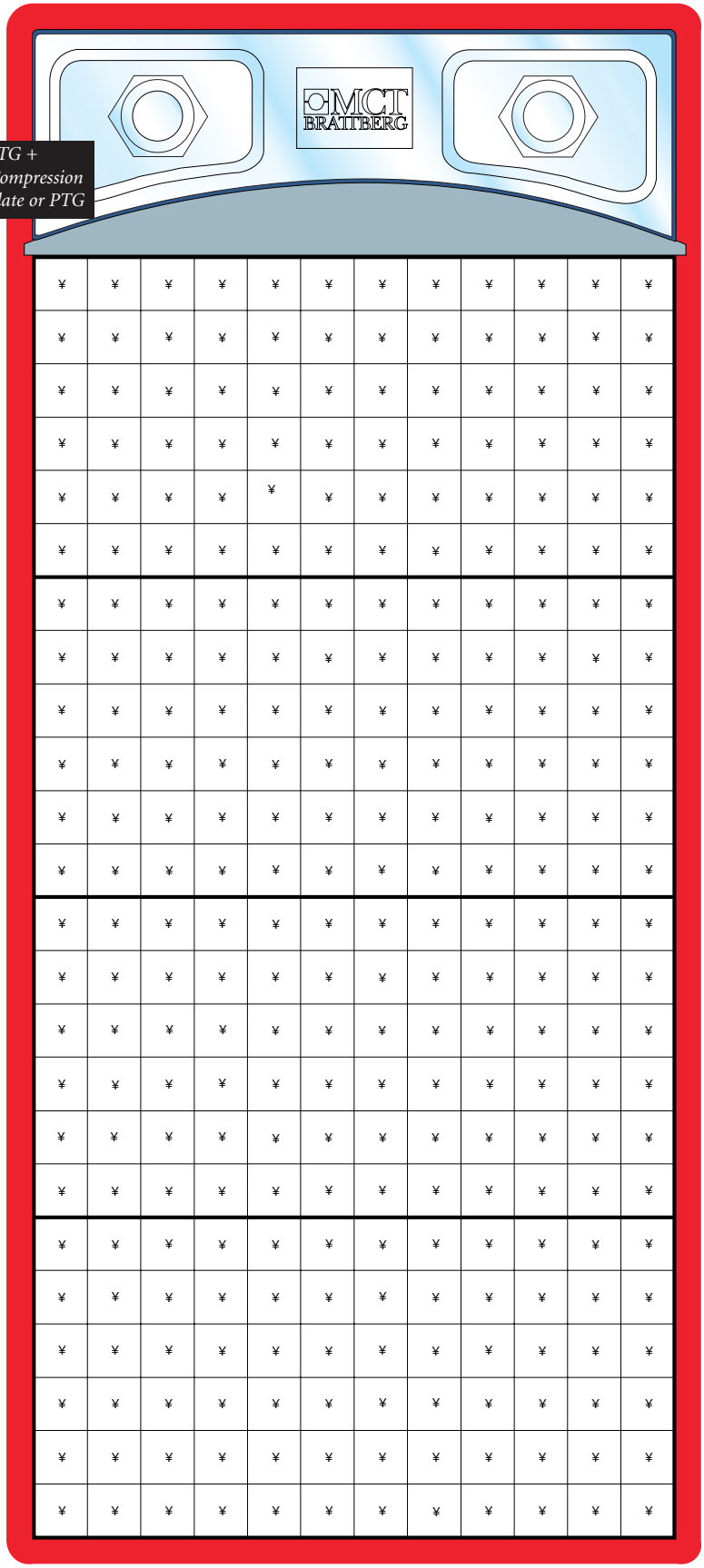
Compression plate

PTG

Stayplate

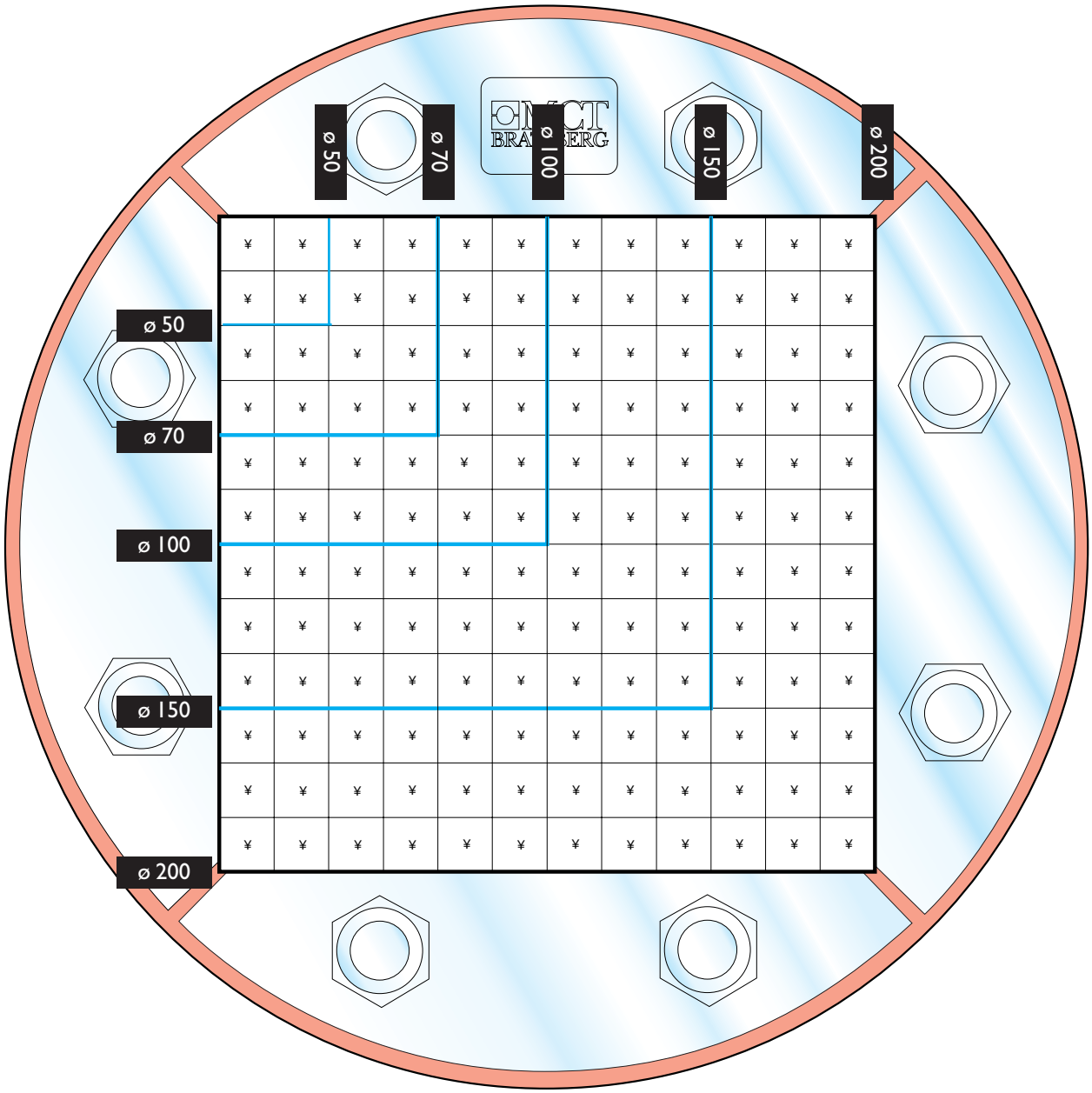
Lubricant

Blocks



RGP

Blocks



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Contact MCT Brattberg for information on your nearest distributor.

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