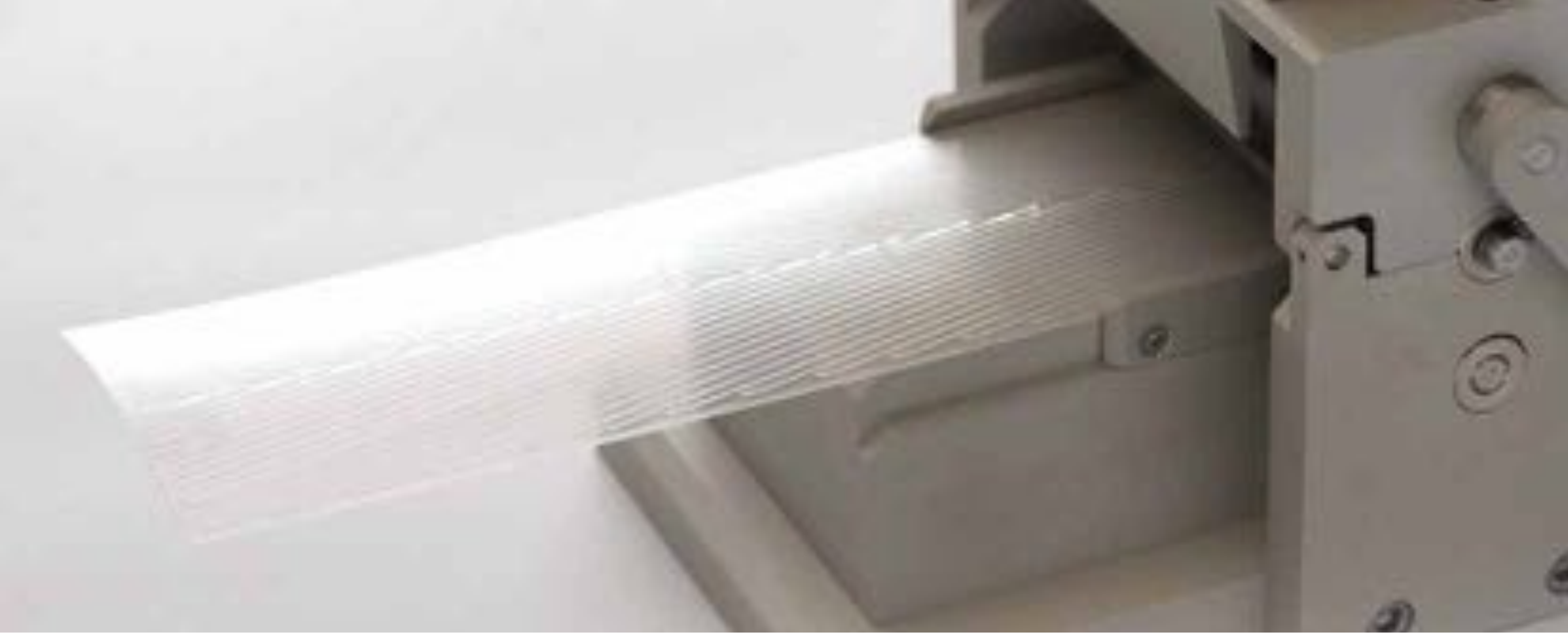
humeca

V-carriers & Mesher

SKIN TRANSPLANTATION TECHNOLOGY



V-CARRIERS & MESHER

MISSION

Our mission is to provide medical experts with materials and equipment for optimum treatment of their patients and to offer them the highest level of support and service. Our goal is continuous improvement of our products, the source of which we believe is intensive communication with experts in the field.

humeca

V-CARRIERS

Humeca introduces a new range of grooved skin graft carriers for expansion and perforation, called ‘V-carriers’.

The symmetrical V-shaped groove pattern of these carriers prevents unwanted sideward movement of the carrier in the mesher during cutting. The standard length of these carriers is 280 mm (11.0"), which is more than the standard length of existing carriers. Furthermore care has been taken to ensure that the groove pattern of a carrier connects exactly to that of another one. This enables cutting of extra long graft strips without any disturbance of the mesh pattern in the graft.

All V-carriers are compatible with the newly developed Humeca® skin graft mesher. V10-type carriers are also compatible with Zimmer® meshers and V15-type carriers are compatible with Aesculap® / B.Braun® meshers.

V-carriers are available for expansions 1:1.5, 1:2 (type V10 only) and 1:3. These are used for conventional skin meshing, where expansion of the graft surface is the main goal.

For larger expansion ratios Humeca developed the modified MEEK technique. Especially in severe burns (large total burned surface area) the MEEK technique should be the method of choice because of faster epithelialization, more efficient use of skin (better graft take and smaller donorsites), easier handling of the graft and better final results.

In addition to the V-carriers for expansion, Humeca introduces a new type of a meshgraft carrier that only perforates the graft without the intention of expanding it: the 1:1 V-carrier. Perforations in a graft are intended to achieve sufficient drainage of the wound bed in case full sheet grafts are used, in order to prevent the occurrence of seroma or haematoma under the graft.

Full sheet grafts are frequently applied when skin grafting is required in cosmetically sensitive body parts, such as the face, the neck and the dorsal aspect of the hands, in order to avoid the appearance of an unaesthetic mesh pattern.

BRANDWONDEN RESEARCH INSTITUUT

The development of the Humeca® V-carriers for skin grafting was sponsored by the Dutch Burns Research Institute (BRI) in Beverwijk, The Netherlands.

V-carrier 1:3

V-CARRIERS FOR EXPANSION

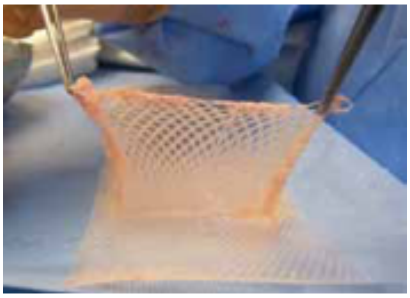
Detail of the V-shaped groove pattern of the Humeca V-carrier

Skin grafting is a well-known means of reconstructing a skin defect.

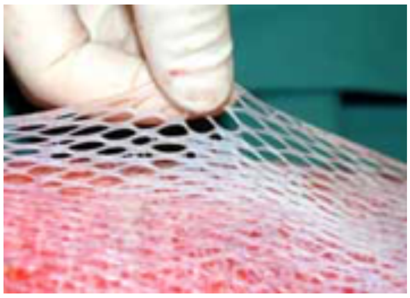
Because a wound is re-epithelialized from the edges towards the centre, the perimeter of the graft is the only part that contributes to the epithelialization process. Expansion techniques are used to speed up that process. An expanded graft presents a larger cumulative perimeter through which epithelial outgrowth can proceed. Besides, with graft expansion, larger areas of skin defects can be covered with smaller sections of graft.

One of the most popular expansion techniques, widely used in burn surgery, is the meshgraft method, introduced by Tanner and Vandeput in 1963. Meshing a graft gives it a three-dimensional flexibility that enables it to conform to irregular and concave surfaces. The slits in the graft allow sufficient drainage of fluid. At moderate expansions the results of the meshgraft technique are quite satisfying. Humeca supplies V-carriers for meshing grafts with an expansion ratio of 1:1.5, 1:2 (type V10 only) and 1:3.

At larger expansions, the graft becomes more fragile and difficult to handle. Draping it correctly (dermal side down) on a wound bed without damaging the mesh structure becomes increasingly difficult at larger expansion ratios. Besides epithelialization might be delayed due to the large distances the new epithelium has to grow. For such cases the MEEK technique is more appropriate.



Graft removed from a 1:1.5 V-carrier after cutting



Meshed graft 1:1.5 being applied to the wound

Graft, meshed with a Humeca V-carrier 1:1.5 and cut to fit the size of a burn

Example of a graft, meshed on a 1:1 Humeca® V-carrier

Example of a perforated piece of graft

V-CARRIERS FOR PERFORATION

The Humeca® V-carrier 1:1 is intended for perforation purposes, without expansion.

Why perforations?
Perforation is frequently applied when sheet skin grafts (either split-thickness or full-thickness) are used. Sheet grafts are perforated for the following reasons:

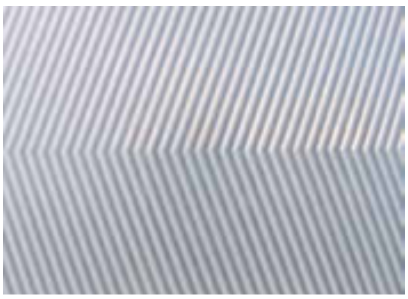
- **Drainage**
  The slits in the graft allow adequate drainage of fluid. Drainage prevents separation of the graft from its wound bed by haematoma or seroma. Sheet grafts are often used on the face and hands. It is however these two sites that have an extremely vascular bed, making the chances of the appearance of haematoma higher. Collection of fluid under a graft is said to be one of the major causes of graft loss. Consequently perforation leads to increased graft survival.

- **Improved cosmetic results**
  Expanded meshed grafts are frequently criticised because of the poor appearance of the residual mesh pattern, making surgeons reluctant to consider this technique. By using a 1:1 mesh, where the graft perforations are narrowed to slits instead of holes, it is possible to prevent such a pattern to appear and get results similar to a sheet graft. It is also reported that a perforated graft gives a more matt appearance than the shiny surface of a sheet graft, which makes it more suitable when grafting the forehead.

- **Infection control**
  To reduce infection occurrence.

Methods to perforate grafts
One of the simplest methods often applied in the operation theatre is piercing a sheet graft with a scalpel blade by hand. This can be done either by piercing the graft directly or by placing a piece of graft on a grooved meshgraft carrier and cutting it with a scalpel at right angles to the grooves. These methods are labour intensive, and often the number of slits is insufficient to guarantee enough drainage. Nevertheless the method seems adequate in case of small grafts.

Another way of perforating is to use a 1:1.5 meshed graft without expanding it. After all theoretically the holes in the graft remain slits when the graft is not expanded. However it appears to be very difficult to apply such a graft to the wound bed without disturbing the pattern of slits. During transfer of the graft to the wound, due to internal friction the slits will become holes anyway and once this occurs it is almost impossible to regain the original shape of the graft. So this method is not recommended when the final cosmetic results of the perforated graft should be comparable to the results of a sheet graft.



Detail of the groove pattern of a 1:1 V-carrier

Finally, perforations in a graft can be achieved by a procedure sometimes referred to as "Sideways meshing" or "Reversed meshing". This procedure was first described by Davison et.al. in 1986 and it concerns crosswise cutting a 1:1.5 meshgraft carrier. Such cutted parts of the carrier are then covered with graft and introduced in the mesher at a sideward direction (the grooves turned 90º from normal). This results in smaller slits that can be used as perforations. Disadvantage however is that the maximum length of the graft equals the width of the carrier (approx. 75 mm or 3 inches), while mostly larger grafts are required.

To overcome the difficulties of making perforations in grafts, Humeca introduced a carrier especially developed for this goal: the 1:1 V-carrier. When using this carrier, making perforations in a graft becomes as easy as meshing. Maximum length of the graft is 280 mm or 11 inches, but even longer graft strips can be perforated when using a second carrier, from which the grooves connect exactly to the first one.
The Humeca 1:1 V-carriers are available in a V10-type for Humeca® and Zimmer® meshers and a V15-type for Humeca® and Aesculap® / B.Braun® meshers.
The 1:1 perforation V-carrier was developed and clinically tested in cooperation with the burn centre of the University Hospital of Gent, Belgium.

UZ Universitair Ziekenhuis Gent

The two pictures above show the application of a perforated sheet graft on a burn on the abdomen of a female patient. A perforated sheet graft autograft was fit to the size of the wound. The picture on the left was taken at operation. The picture on the right shows the same burn 2 weeks post-operatively. A smooth surface without any appearance of a mesh pattern in the residual scar was obtained.

Full sheet grafts on fingers, showing seroma, due to insufficient drainage

The two pictures at the right clearly show that the slits in a perforated graft allow drainage of fluids through a sheet graft. When the sheet graft is not perforated, seroma and haematoma might hinder a good graft take.

Graft perforated with V-carrier 1:1 on a foot. Drainage of fluids through the slits is clearly visible

FULL- AND SPLIT-THICKNESS SKIN GRAFTS

Picture showing an example of the application of a 1:1.5 mesghraft on a burn of the hand, showing hypertrophic scarring and an early stage of wound contracture. The mesh pattern is clearly visible. A 1:1 perforated sheet graft would probably result in a better appearance and functionality.

Skin grafts consist of the entire epidermis and a dermal component of variable thickness. If the entire thickness of the dermis is included, an appropriate term is 'full-thickness skin graft' (FTSG). If less then the entire dermis is included, appropriate terms are partial or 'split-thickness skin graft' (STSG).

STSG's are categorized further as thin (0.1-0.3 mm / 0.004-0.012"), medium-thickness (0.3-0.45 mm / 0.012-0.018") or thick (0.45-0.8 mm / 0.018-0.03"), based on the thickness of the harvested graft. The choice between FTSG and STSG depends on wound condition, location, size and aesthetic concerns. Split-thickness skin grafts require less ideal conditions for survival and have a much broader range of application than full-thickness skin grafts. They are for instance used to resurface large wounds, line cavities, resurface mucosal deficits, close flap donor sites and resurface muscle flaps. Full-thickness skin grafts are of limited availability. The ability to harvest them is restricted by the necessity of stitching up the donor site from which they were taken. FTSG's are ideal for repairing small defects where good cosmetic matching or functional restoration is important. STSG's do have some serious disadvantages compared to FTSG's that have to be considered:

Contraction

One of them concerns contraction: a skin graft begins to shrink immediately after being harvested from its donor site. This 'primary contraction' is about 40% in a FTSG, 20% in a medium thickness STSG and about 10% in a thin STSG. So a STSG has less primary contraction than a FTSG, which is an advantage of STSG, because less tissue is needed for grafting. However, after transfer to a recipient site, the skin graft will shrink further as it heals in a process known as 'secondary contraction'. FTSG's tend to remain the same size (after primary contraction) and do not show any secondary contraction. STSG's, on the other hand, contract whenever the circumstances allow. Unless STSG's are fixed to underlying rigid structures and cannot move, they will contract secondary. When transplanted on soft tissue, contraction will be significant. A contracted wound is often tight and immobile and there is distortion of the surrounding tissue. If such a wound crosses a joint, contracture will lead to position abnormalities and inadequate motion. Therefore a FTSG is advised for such areas (hand, wrist, elbow, neck).

Graft growing

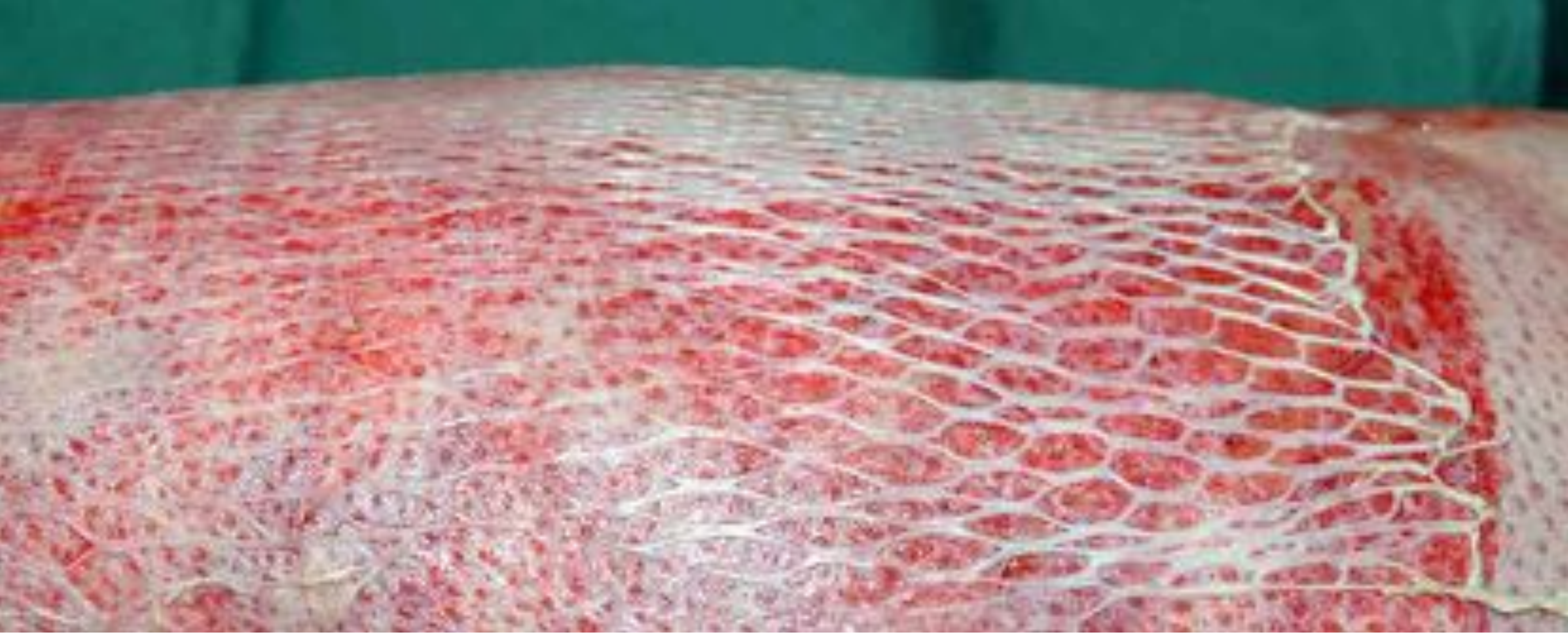
Once wound contraction ends, full-thickness skin grafts are able to grow with the individual, whereas split-thickness skin grafts tend to remain in a fixed contracted state and grow minimally, if at all.

Fragility

STSG's are more fragile than FTSG's, especially when placed over areas with little underlying soft tissue support.

Pigmentation and other cosmetic considerations

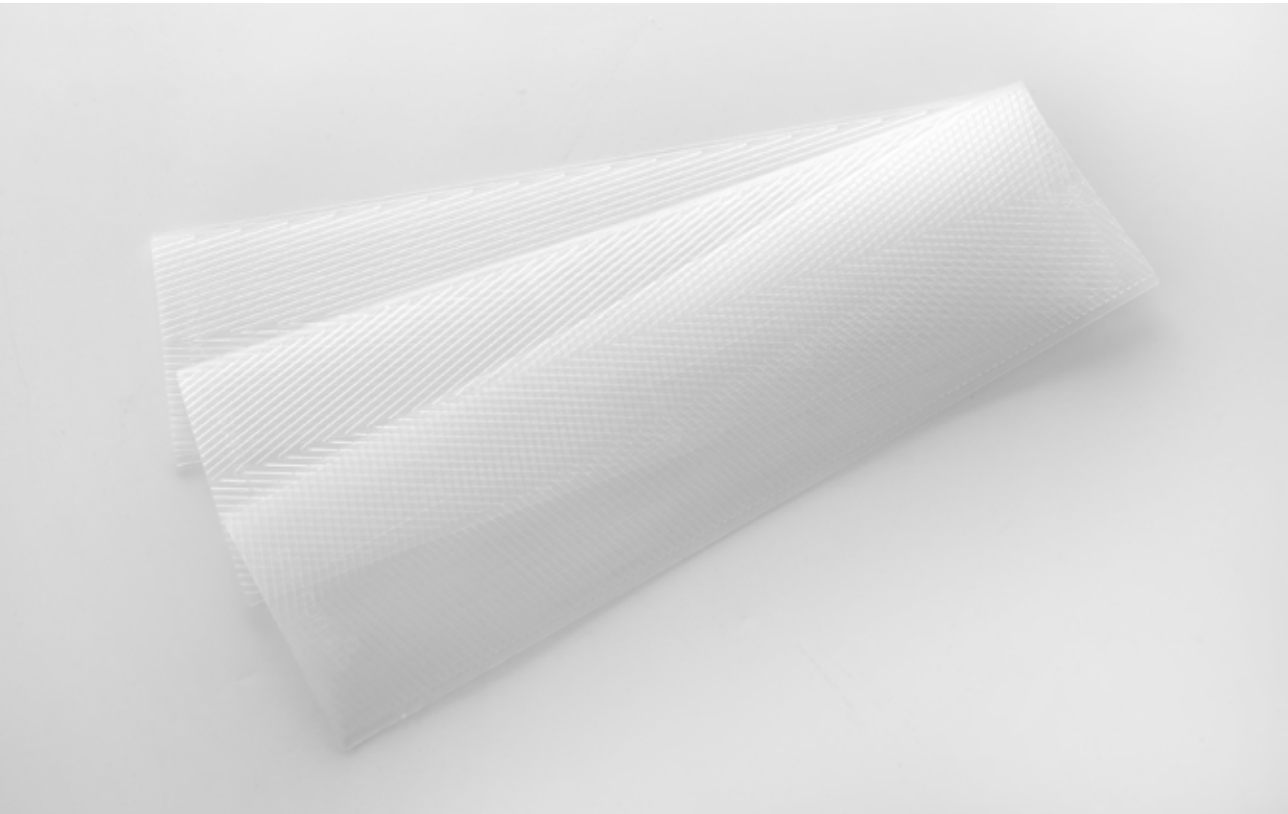
Split-thickness skin grafts tend to be abnormally pigmented (either pale or white) or hyperpigmented, particularly in darker-skinned individuals. Their thinness, abnormal pigmentation and frequent lack of smooth texture and hair growth, make STSG's more functional than cosmetic. When used to resurface large burns of the face, STSG's may yield an undesirable mask like appearance.

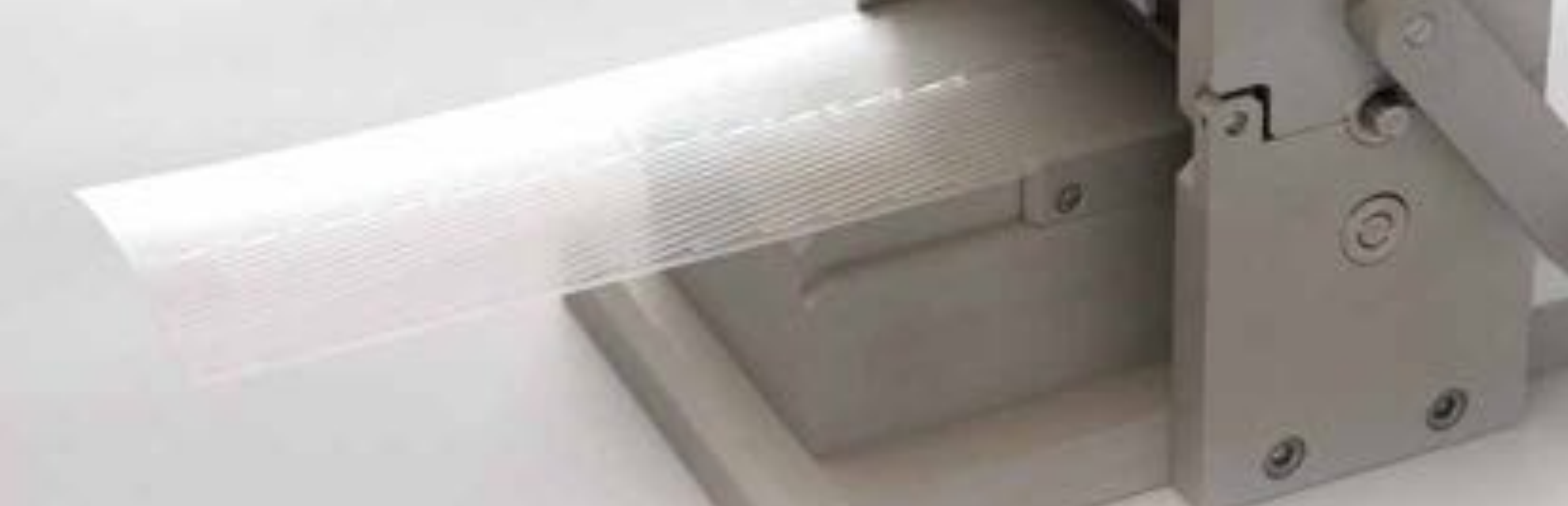


V-CARRIERS FEATURES

- Compatible with existing Zimmer® and Aesculap® / B.Braun® meshers
- Symmetric V-pattern of grooves prevents sideward movement
- Standard length 280 mm (11.0"), width 78.8 mm (3.1")
- Expansion ratio 1:1.5, 1:2 (type V10 only) and 1:3
- Special carrier for 1:1 perforation (drainage) of sheet grafts
- Groove patterns of carriers connect to each other
- Highly flexible medical grade polypropylene material
- Individually sterile packed in peel pouch; standard boxes 10 pcs.
- Attractively priced

Ordering information
Ordering information is given at page 11.





M E S H E R

In addition to the V-carriers, Humeca developed a mesher to complete the product line for meshgrafting.

The Humeca® mesher is provided with a unique spring mechanism that prevents the blades from excessive pressure on the carrier during cutting. Due to their production process (injection molding) all meshgraft carriers have inevitable variations in thickness. When the thickness of a certain section of the carrier exceeds the maximum distance between the blades and the lower roller, the pressure exercised by the blades on the carrier surface will increase exponentially. Such high pressure manifests in increased friction and in the end it will damage the blades. On the other hand the mesher might not cut the graft completely at a thinner section of the carrier. To avoid such undesired phenomena, Humeca provided the mesher with springs that can meet with thickness variations in carriers. The mesher can be adjusted in two positions for the V10 or the V15- types of V-carriers.

During cutting the carrier is guided both at the left and the right side to assure straight movement, thus enabling exact connection of the grooves of a second carrier if applied. Unlike most conventional meshers, where the carrier is moved through the device by means of intermittent pulling a ratchet, the Humeca® mesher is driven by the continuous rotation of a handle. A gearwheels set limits the required force. The rotation makes the meshing procedure less time consuming and the design is far more ergonomic.

Side view of the Humeca® mesher

Bridge opened for cleaning and access to the cutting axis

Cutting axis

The 50 blades (diameter 36 mm / 1.42") of the mesher are mounted on an axis, with an interspace of 1.5 mm (0.06") between the intersecting lines. Both the cutting axis and individual blades can be replaced if desired.

Opening the bridge of the mesher allows easy access to the cutting axis for cleaning and inspection.

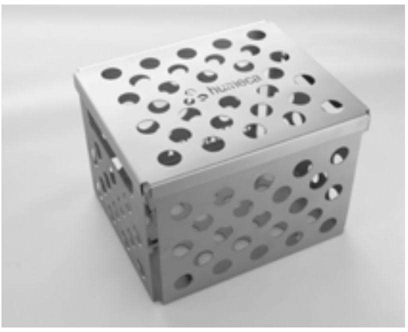
The mesher can be washed and steam sterilized before use. A compact stainless steel sterilization case is available.
A second small sterilization case can hold the cutting axis.

Ordering information

Ordering information is given at page 11

MESHER FEATURES

- Robust and durable construction
- Compatible with Humeca® V-carriers of all types (V10 and V15)
- Compatible with Zimmer® and Aesculap® / B.Braun® carriers
- Spring mechanism prevents blades damage
- Continuous rotational drive; no intermittent pulling of a ratchet
- Measures lxwxh: 220x212x183 mm (8.7x8.3x7.2"). Weight: 4.4 kg (9.7 lb)
- Cutting axis can easily be replaced
- Individual blades can be replaced
- Compact st. steel sterilization case available, lxwxh: 277x232x197 mm (10.9x9.1x7.8")



Sterilization case for the Humeca mesher

Sterilization case for the axis of the Humeca mesher

For ordering, please contact your local dealer. You can find dealers via the link in www.humeca.nl
If Humeca has no dealer in your territory, please contact Humeca for inquiry, preferably via email info@humeca.nl

In order to provide Humeca quickly with brief and most adequate information and to assure soonest reply, the preferred method is to fill in the contact form that is displayed when using the contact link in the Humeca site www.humeca.nl

Humeca is a small organization with short communication lines.
This allows very quick response and a high level of service.
In case of ordering or request for quotation, please refer to the article codes given below.

ORDERING INFO

HUMECA® V-CARRIERS

6.V10-1.0	V-carrier, perforation 1:1, for Humeca and Zimmer® meshers, box 10 pcs.
6.V10-1.5	V-carrier, expansion ratio 1:1.5, for Humeca and Zimmer® meshers, box 10 pcs.
6.V10-2.0	V-carrier, expansion ratio 1:2, for Humeca and Zimmer® meshers, box 10 pcs.
6.V10-3.0	V-carrier, expansion ratio 1:3, for Humeca and Zimmer® meshers, box 10 pcs.
6.V15-1.0	V-carrier, perforation 1:1, for Humeca and Aesculap® / B.Braun® meshers, box 10 pcs.
6.V15-1.5	V-carrier, expansion ratio 1:1.5, for Humeca and Aesculap® / B.Braun® meshers, box 10 pcs.
6.V15-3.0	V-carrier, expansion ratio 1:3, for Humeca and Aesculap® / B.Braun® meshers, box 10 pcs.

HUMECA® MESHER

6.HM01	Humeca® mesher
6.KN50/36	Cutting axis with 50 blades Ø 36 mm (1.42")
6.HMAC01	Sterilization case 275x230x179 mm (10.8x9.1x7.0") for Humeca® mesher
6.HMAC02	Sterilization case 180x51x45 mm (7.1x2.0x1.8") for the cutting axis of the Humeca® mesher

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