EATON | Holec

Halyester

low-voltage switchgear and controlgear assemblies

- A system of synthetic resin enclosures for single use or for multi-box type assemblies

Company Information

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Halyester

Halyester is a multi-box type low-voltage switchgear and controlgear assembly, designed for indoor and outdoor installation. It is designed as a 'total insulation' assembly, type tested in accordance with NEN-EN-IEC 60439-1, in order to guarantee optimal operator safety.

Halyester assemblies
Due to the outstanding mechanical and electrical properties of the synthetic enclosures Halyester guarantees long-standing service under stringent operating conditions, such as encountered on refineries, chemical plants, heavy industry, etc. Other typical fields of application are breweries, slaughter houses and shipyards. By its logic and simple design Halyester is an ideal system for own assembly by electrical contractors. For single use the boxes provide an excellent enclosure for a wide variety of electrical and electronic switch and control equipment.

Safety
Halyester is designed as a total-insulation system. This guarantees maximum safety to operators, since voltage transmission to the outside of the installation is absolutely impossible. Furthermore, the safety is improved by transparant covers, allowing easy determination of possible faults and failures.

Glass-fibre reinforced polyester (GRP)
Glass-fibre reinforced polyester has been chosen as the basic construction material of the Halyester system because of its excellent mechanical and electrical properties and corrosion-free characteristics. This guarantees a maintenance-free and reliable operation for many years. After its useful lifetime Halyester can be fully recycled. The polyester used is thermo setting, which means that mechanical and electrical properties are maintained also under higher temperatures.

System design
Halyester is a system of modular design, suitable for application as motor control centre or distribution board. It can accommodate circuit breakers as well as fuse switches.The modular design allows Form 4a separation in conformity with NEN-EN-IEC 60439-1. The Halyester system is designed for local assembly. Consequently, the availability through local authorized panel builders and distributors results in fast deliveries and short communication lines.

Flammability and self-extinguishing
The special composition of the applied polyester in the Halyester enclosures makes it self-extinguishing. That means that they withstand the different fire and flammability tests as specified by the relevant standards.

TTA-approval

Halyester is a Type Tested Assembly (TTA), which means that all boxes with busbars, fuse bases, switches, etc. are tested according NEN-EN-IEC 60439-1. The tests have been carried out in presence of KEMA. From each box a complete test report with KEMA-approval is available.

Assemblies for construction sites

Since Halyester has been tested as a TTA-system, it can be used on construction sites as (main) distribution board. The particular requirements concerning assemblies for construction sites (ACS) are specified in NEN-EN-IEC 60439-1. In the scope it said that:"This standard applies to type-tested assemblies (TTA) intended for use on construction sites, i.e. temporary places of work to which the public do not generally have access and where building construction, installation, repairs, alteration or demolition of property (building) or civil engineering (public works) or excavation or any other similar operations are carried out. These assemblies may be transportable (semi-fixed) or mobile". This means that Halyester can be used on construction sites without any exception. The degree of protection of all parts of the ACS shall be at least IP43, with all doors closed and all removable panels and cover plates fitted. Because of this a protective cover is not necessary, but sometimes used for maintenance purposes.

Application

The system is universally suitable for indoor and outdoor application as distribution board and motor-control centre. The enclosures are dust and jet water tight to a degree of protection IP66. Switchboards can be assembled for incoming feeders of 1600 A max. and busbars currents of up to 1500 A. The max. short-time withstand current of the busbar system is 50 kA - 1s; the peak withstand current is 110 kA (max.). Halyester high safety standard (total insulated) avoids the need of separate switchboard rooms or buildings. Padlocks can be installed in order to avoid unauthorized on or off switching while covers can be sealed. Halyester can be built as small as required thus minimizing floor space. Office blocks, green houses, warehouses, factories, food industries and many other places are all locations where Halyester assemblies can be custom-built meeting the highest demands of todays engineering standards.

General data

Rated voltage: 1000V a.c.
Rated current:
- incoming supply max. 1600 A
- busbar system max. 1500 A

Short-time withstand current: 50 kA/1s max.
Peak-withstand current: 110 kA max.
Degree of protection:
IP 66 max. NEN-EN-IEC 10529
IK 09* NEN-EN 50102
*Covers IK 10
Cable connection: top and/or bottom
Operation: front access
Erection: free-standing, against a wall or back-to-back
Extension: can easily be extended at either end
Standards and approvals:
Halyester complies with NEN-EN-IEC 60439-1, (previously BS 5486), Lloyds Register of Shipping, KEMA K111A, Veritas.

Total insulation

A high degree of safety for operating personnel is achieved with the applied principle of total insulation. The design fully complies with the protection aspects referred to in NEN-EN-IEC 364-4-41 and the derived construction measures recommended in NEN-EN-IEC 60439-1. Characteristic of the fully insulated system is the avoidance of any current conductive parts on the out-side of the box or assembly. Plastic cable glands are used; end covers are fixed by means of insulated nuts; insulated operating handles are fixed to the cover and are non-detachable so that metal switch shafts cannot be touched. In addition, the fixing points for wall or frame mounting are kept outside the interior of the box. Measures have been taken to prevent any risk of fault-voltage transmission between boxes mutually. Total insulation systems do not permit connection to safety earthing. Possible network earthing systems running through a Halyester assembly are also mounted fully insulated.

Design and construction

Introduction

Halyester is designed as a 'total insulation' switchboard system in accordance with NEN-EN-IEC 60439-1, to guarantee optimum operator's safety. Design and protection specifications are laid down in a visible and controlled Quality Assurance system, ISO 9001/EN29001 (BS 5750-1), which is certified by KEMA. The boxes and ancillary items are made of glass-mat reinforced polyester (glass fibre content 27% asymmetrical) and are standard supplied in RAL 7035 grey. The covers are transparent (blue) or opaque polycarbonate. The enclosures are dust and jet water tight to a degree of protection IP 56 for boxes with operating shaft for knob or handle through the cover, IP 66 for fully enclosed boxes.

Characteristics of the applied glass-mat reinforced polyester

The construction material of the Halyester boxes and ancillary items has a very high impact strength. It is flame retardant and self-extinguishing. The material is non-hygroscopic: the boxes do not warp as a result of moisture absorption and the insulation value is independent of the relative humidity. Halyester is insensitive to large temperature changes (from -40 °C to +115 °C) and also resistant to all kind of climatic conditions and aggressive atmospheres. The material is


total insulation


resistant to corrosive atmospheres and adverse outdoor conditions


no earthing


insensitive to large temperature changes


high degree of protection


maintenance free


very high impact strength

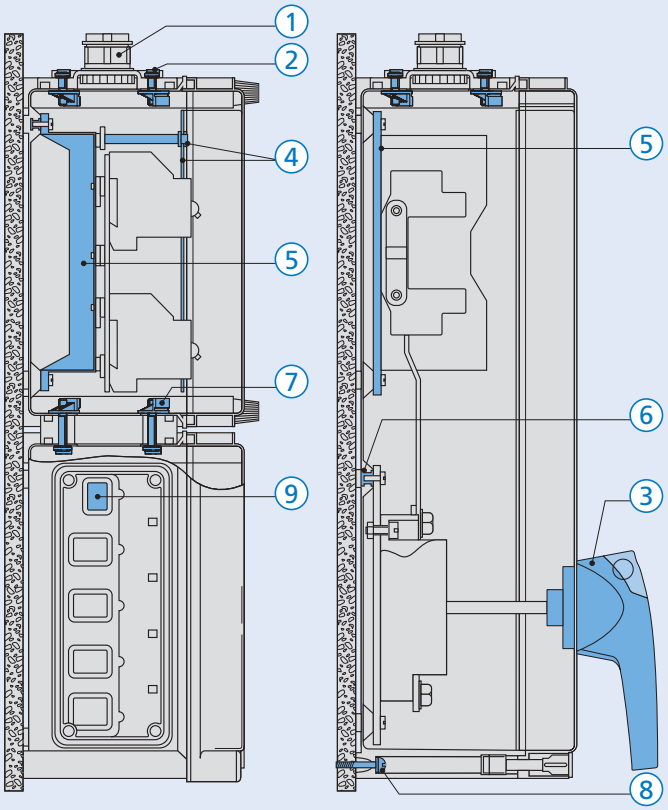

non-tracking

Measures against the possible occurrence of fault voltages on non-live metal parts.

① Only plastic cable glands are used.
② The end covers are fixed by insulated bolts and nuts, or quick-lock system.
③ In boxes with covers, provided with tool-operated locking screws, the operating knobs and handles are fixed to the cover and are non-detachable so that the metal operating shaft cannot be touched.
④ Plastic protection plates behind the covers serve to screen all live parts of normally accessible boxes, i.e. boxes of which the covers have handoperated locking screws.
⑦ All coupling devices (quick-lock) for the assembly of boxes are from glass fibre reinforced plastic.
⑧ The fixing points for wall and frame mounting are kept outside the interior of the box.

Provisions related to illicit earthing of non-live metal parts

⑤ All switchgear components are fitted on plastic frames or on synthetic resin base plates.
⑥ Fixing nuts for the mounting of frames and base plates are moulded in the bottom of the box.
⑨ The earth bar, like the phase bars and neutral bar, is running through the glass-mat reinforced polyester busbar support.



Provisions against transmission of fault-voltages via non-live metal parts and against earthing of non-live metal parts.

non-corrosive, so no surface treatment is needed even under adverse outdoor conditions. It is also resistant to UV-radiation. Measures have been taken to guarantee the stability of the materials in the tropics. Furthermore, Halyester is non-tracking, it is light-weight (assemblies are easy to handle and to erect) and it is easy to machine. All handling like punching, drilling, filing and sawing is easily accomplished.


self-extinguishing


light-weight


non-hygroscopic


easy to machine

Halyester: designed for local assembly

With only a limited number of items, Halyester can be build in virtually any size of distribution system or motor control centre. Ten boxes, ranging in size from 270 x 180 mm to 720 x 540 mm (the dimensions are based on a standard size of multiples of 90 mm), with a depth of 170 mm for the eight smallest boxes and 201 mm for the two largest, can be build together in any combination while the IP rating of 56 or 66 is maintained throughout the panel. All boxes are standard supplied with an unbreakable polycarbonate cover and an integrated polyurethane (PUR) seamless seal. This PUR outlasts rubber, is insensitive to UV light and many chemicals and is flame-resistant. Also it returns to its original configuration when the cover is removed, hence it maintains its tightness. As alternative, Eaton Holec supplies opaque polycarbonate covers on all boxes in the same color as the rest of the system, viz. RAL 7035 grey. To facilitate assembly, standard-size openings can easily be punched or sawn to allow coupling of boxes and mounting of the busbar system. Eaton Holec supplies a punch for standard size openings: three standard sizes (code 2, 3 or 4) are ▶

possible and depending on size, one or two openings can be made in the box. Blind or open intermediate coupling pieces connect the boxes fast and simple in any separation form, including Form 4a NEN-EN-IEC 60439-1. The covers of the boxes are provided with normal or fast-action sealable locking screws for hand or tool operation. All locking screws are retained in the cover. By the use of locking screws with flexible nylon straps, the cover can be hinged. For the system are also standard hinged covers available (without nylon straps but with doors). Flanges for increasing depth, busbar supports, cable entry covers and cable sealing boxes are all provided with PUR seals and complete the accessories for fast and easy assembly. Vent valves and drain valves are available for ventilation and condensation drainage purposes. These do not affect the IP rating. Standard cable entries are available for cables ranging from 4 mm to 80 mm. Particular for the larger size cables, segmented cable-sealing boxes are supplied for convenient installation as difficult cable bending can be avoided.

1600 A Halyester

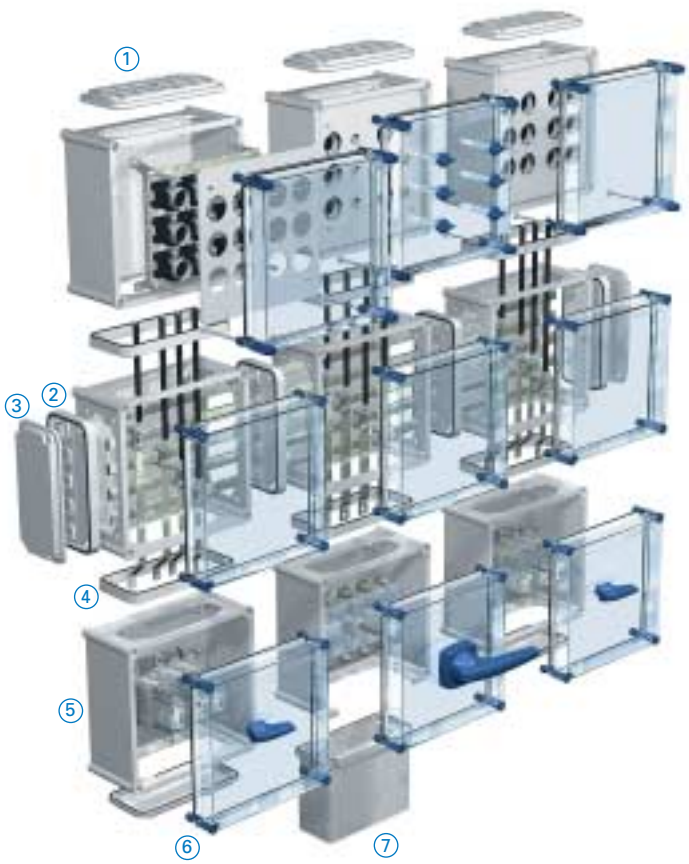
Incoming feeders are possible for 1600 A maximum. This is realized through a double busbar system, using standard components, with either a 1600 A Dumeco switch-disconnector. This 1600 A Halyester is suitable as main distribution board with 1000 kVA transformers.

Standard components for Halyester enclosures

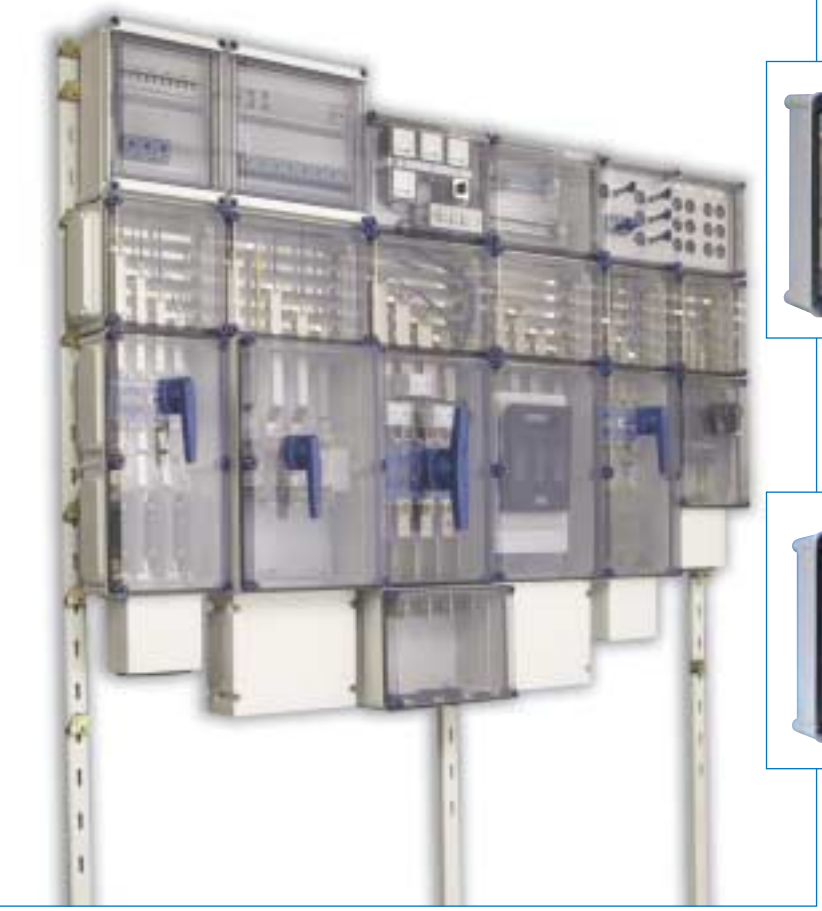
For the Halyester enclosures a wide range of components, such as Dumeco switch disconnectors, QSA switches (fuse switch disconnector), and moulded case circuit breakers are available. Eaton Holec laid down its experience on Halyester in an application guide for easier application engineering. An extended range of connection-strips for both incoming and outgoing feeders is available for quicker assembly. Pre-mounted devices in Halyester enclosures can also be delivered. Detailed information is laid down in the comprehensive Halyester ordering catalogue.

Frameworks

For each indoor or outdoor application of a Halyester system or enclosure an appropriate framework is available. Extension of existing frameworks afterwards is always possible. Frameworks are available for wall-mounting, floor-mounting, floor/wall mounting and detached mounting. To protect it against corrosion, the material can be hot-dipped galvanized for outdoor applications or powder-coated for indoor use. Furthermore, for extreme conditions a stainless-steel framework or a polyester framework are available. For extra protection under stringent conditions a canopy can be applied.



1. end cover/cable entry cover
2. busbar support
3. end cap
4. intermediate coupling piece
5. box
6. cover
7. cable sealing box



The Halyester system

QSA fuse switch in box type K444.

Dumeco switch disconnector in box type K444.

MCCB in box type K444.

Empty box with hinged cover.

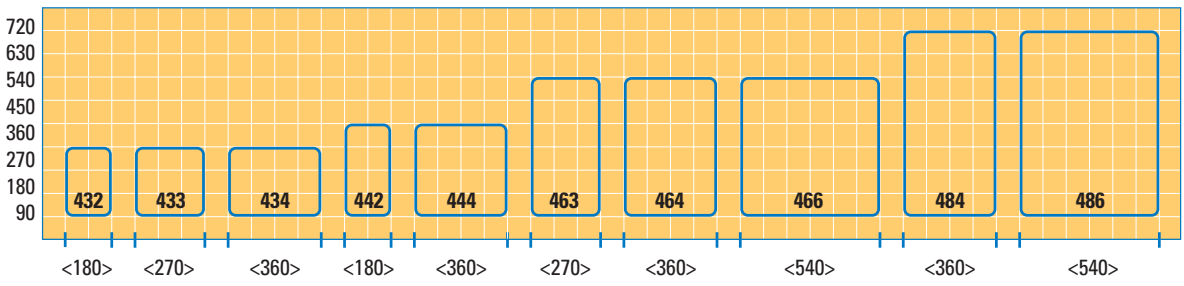
Enclosures

The Halyester system comprises the following range of enclosures (boxes of glass-mat reinforced polyester, covers of polycarbonate). Dimensions are given in mm.

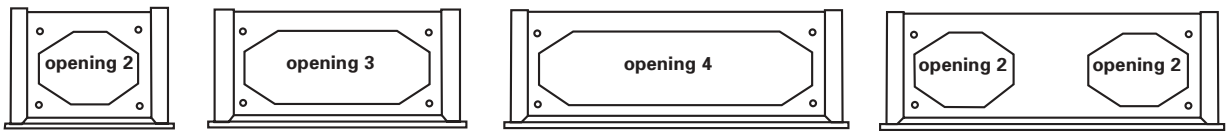
Type	K 432	K 433	K 434	K 442	K 444
Height	270	270	270	360	360
Width	180	270	360	180	360
Depth	170	170	170	170	170
Weight (kg)	1.4	1.7	2.4	1.7	3.0

Type	K 463	K 464	K 466	K 484	K 486
Height	540	540	540	720	720
Width	270	360	540	360	540
Depth	170	170	170	201	201
Weight (kg)	3.4	4.6	8.2	6.0	11.4

90 x 90 mm modules



Openings



Type	K 432	K 433	K 434	K 442	K 444
Openings					
At sides	1 x no.3	1 x no.3	1 x no.3	1 x no.4 or 2 x no.2	1 x no.4 or 2 x no.2
Top/bottom	1 x no.2	1 x no.3	1 x no.4 or 2 x no.2	1 x no.2	1 x no.4 or 2 x no.2

Type	K 463	K 464	K 466	K 484	K 486
Openings					
At sides	2 x no.3	2 x no.3	2 x no.3	2 x no.4	2 x no.4
Top/bottom	1 x no.3	1x no.4 or 2 x no.2	2 x no.3	1 x no.4 or 2 x no.2	2 x no.3

Flange for increased depth.

Locking screws with and without nylon straps.

Service window

Accessories

A number of accessories can be provided, such as:

- **Flanges for increased depth**
  Boxes type K434, K444, K463, K464 and K466 can be equipped with one or more flanges to increase the mounting depth. Effective depth per flange is 62.5 mm. Box type K466 can be equipped with one or more flanges with an effective depth per flange of 125 mm. All flanges are provided with PUR foam sealing and fixing screws.

- **Covers with locking screws**
  Covers are made of transparant or opaque polycarbonate. They are provided with PUR foam sealing. The locking screws can be hand-operated (knob) or screw-driver operated (slotted). Sealable screws are also available. The covers can then be drilled or sawn to obtain a hole or groove for wire or tape sealing. To hinge a cover to the box, the locking screws can be equipped with flexible nylon straps with threaded ends.

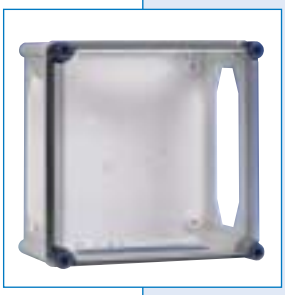
- **Service window**
  Service windows for easy and rapid operation of MCBs, RCBOs, RCDs, etc. can be mounted in the cover. Three different sizes of hinged windows are available.

- **Coupling pieces**
  Intermediate coupling pieces, suitable for openings 2, 3 or 4, are used for coupling the boxes mounted below and/or above the busbar boxes. These coupling pieces are grooved and provided with a PUR foam sealing. Blank coupling pieces for sealing of openings 2, 3 or 4 are also available.


Coupling pieces.


Blank coupling pieces.

- **Busbar boxes and busbar supports**
  Special busbar boxes with locking screws for tool operation and openings at all sides are available in three sizes: type R432, R433 and R434. Glass-mat reinforced polyester busbar supports are for busbars 15 x 4 mm up to 15 x 24 mm. They also serve as coupling piece between two busbar boxes and are provided with a PUR foam sealing. For sealing the busbar boxes at either end of a distribution board the relevant busbar supports are fitted with appropiate end caps. A range of busbar clamps and branch joints for main and auxiliary busbars is also available.


Busbar box.


End cap.

- **End covers and cable-entry covers**
  Two versions for sealing of openings 2, 3 and 4 can be applied: end covers for fixing from the inside, made of glass-mat reinforced polyester and end covers/cable-entry covers (gland plates) for fixing from the outside, both made of glass-fibre reinforced polycarbonate. Cable entry covers have prepressed knockouts size Pg 16 up to size Pg 42 (depending on opening code number) for standard plastic cable glands.


End covers.

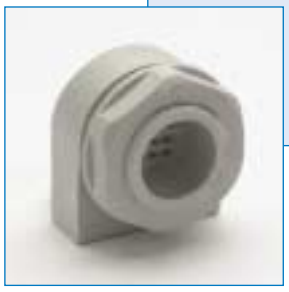

Cable-entry covers.

- **Cable sealing boxes**
  For heavier cabling that require extra spreading space, glass-mat reinforced polyester cable boxes can be used. They are suitable for mounting to boxes with openings 3 and 4 and supplied with one, two or three rubber grommets for cable diameter 80 mm max. Segmented cable sealing boxes are also available.


Cable sealing box.


Segmented cable sealing box.

- **Vent valves and drain valves**
  For ventilation purposes, plastic vent valves can be supplied. Two items are required per box or panel. To drain moisture as a result of condensation, a drain valve can be fitted in the lowest part of the box or the panel. These valves do not reduce the IP-rating of the boxes.


Vent valve.


Drain valve.

Technical data

Copper busbar details (ECu F 25)

The specified current ratings apply for an ambient air temperature not exceed +40 °C and its average over a period of 24h not exceed +35 °C. The lower limit of the ambient air temperature is -25 °C. The system has been designed and tested for a temperature rise of 100 K (permissible temperature rise of the insulating materials in contact with conductors), and has been approved by KEMA. Higher temperatures than stated are possible; contact Eaton Holec for more detailed information.

TN-S busbar system*

Load	Busbar							
			Dimensions in mm			Rated short-time withstand	Rated ** peak withstand	
Single-side	Central	Max. support distance	L1, L2, L3,	N	PE	current Icw	current Ipk	
315 A	500 A	360 mm	15x 4	15 x 4	15 x 3	12 kA - 0.5 s	24	kA
500 A	800 A	360 mm	15x 8	15 x 4	15 x 4	24 kA - 0.75 s	50	kA
630 A	1000 A	360 mm	15x 16	15 x 8	15 x 6	32 kA - 1.0 s	67	kA
800 A	1000 A	360 mm	15x 24	15 x 8	15 x 6	32 kA - 1.0 s	67	kA
1500 A	1600 A	360 mm	2 x (15x 24)	2 x (15 x 12)	2 x (15 x 6)	50 kA - 1.0 s	110 kA	

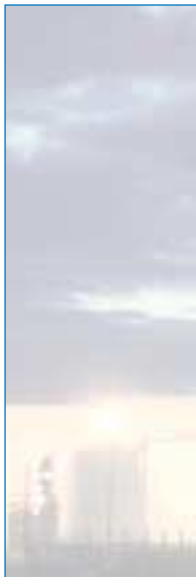
* For TN-C busbar systems, combined neutral and protective conductors (PEN), use neutral size bar.

** For rated fused short circuit current Icf, please contact Eaton Holec.

Characteristic properties of resins applied in the Halyester system

Typical properties	Test method	Unit	Poly-carbonate	Glass-mat reinforced polyester*
Mechanical				
Tensile strength	ISO 527	N/mm^2	63	73
Modulus of elasticity	ISO 527	kN/mm^2	2.3	12
Flexural strength	ISO 178	N/mm^2	90	176
Notched impact strength (Izod)	ISO 180	kJ/m^2	25	–
Thermal				
Flammability class	UL 94	–	V2 (1,47 mm)	–
Heat resistance VICAT B/120	ISO 306	°C	141	–
Martens degree	ISO 75	°C	–	> 200
Operating temperature (max.)	UL 764B	°C	100	165
Glow wire	IEC 60695-2-10	°C/mm	750/3,2	–
Physical				
Water absorption	ISO 62	mg/4d	–	<60
Water absorption equilibrium	ISO 62	%	0.35	–
Electrica				
Volume resestivity	IEC 60093	ohm.m	$>10^{13}$	$>10^{16}$
Surface resestivity	IEC 60093	ohm	$>10^{15}$	$>10^{11}$
Tracking resistance	IEC 60112	CTI	250	600

*) Glass-content: 27% weight, 60% volume



Resistance to chemicals

	reinforced polyester	poly-carbonate
Acetone	-	-
Ammoniac, liquid 10%	+	-
Ammoniac, vapour 25%	+	-
Soda lye, liquid 33%	x	-
Acetic acid	+	-
Hydro-fluoric acid, vapour 40%	x	+
Potassiummetabisulphide,		
Vapour 15%	+	+
Sodium sulphide	+	+
Glycerol, liquid	+	+
Mixture of 3 parts propyl-		
Alcohol with 1 part toluene	+	+
Benzene	+	-
Toluene	x	-
Xylene	+	-
Dichloride ethylene	+	-
Synthetic oil	+	-

+ = resistant
x = resistant (limited)
- = non-resistant

Resistance against cleaning agents, glues, etc.
With the exception of solvents the polycarbonate covers allow cleaning with all general purpose agents. Standard adhesive lettering tapes are allowed but restricted use is advised for most synthetic glues.

Resistance against rodents, termites and micro organisms
Halyester is resistant to rodents, termites or micro organisms. More detailed information available on request.

Safety

Halyester has been designed as an indoor and outdoor system. It is a safe system, not only electrically safe for operating and maintenance staff, but also in respect to fire hazards. Due to its self-extinguishing and flame-retardant properties it will reduce the damage caused by fire or short-circuit in the system.

Resistance
Due to the excellent thermal insulating properties of Halyester, external heat sources will cause hardly any damage to the internal equipment, while metal enclosures can cause considerable damage to internal components due to a much better heat conductance as well as burning paint at the inside and the outside of the box. Sun radiation, particular in tropical countries, will cause comparable internal heating in both Halyester boxes and metal boxes. Again, this is due to the painted surface of metal boxes. Halyester with opaque covers have an almost identical heat transmission coefficient. Corrosion, a serious and expensive problem all over the world, is completely solved by Halyester. It's surface needs no painting, cannot corrode and keeps its color. What is more: a dent in a metal box always starts corrosion, as do edges, locks, etc. A dent in Halyester cannot occur: Halyester is flexible and strong at the same time.

Reliability
Halyester has proved its reliability over more than 30 years in many countries from the very cold northern Europe till very hot tropical countries in the Middle and Far East, the American continent and Africa. It is ready to serve you till well in the 21th century.

Quality assurance
Eaton Holec's organisation and manufacturing are in accordance with the internationally recognized Quality Assurance system, ISO 9001/EN29001 standard and certified by the Dutch KEMA authorities. This guarantees a constant level of high quality and reliability of products throughout the production process and during many years of operation.

Company Information

Eaton Electrical Inc. is a global leader in electrical control, power distribution, and industrial automation products and services. Through advanced product development, world-class manufacturing methods, and global engineering services and support, Eaton Electrical® provides customer-driven solutions under brand names such as Cutler-Hammer®, Durant®, Heinemann®, Holec® and MEM®, which globally serve the changing needs of the industrial, utility, light commercial, residential, and OEM markets. For more information, visit www.EatonElectrical.com.

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Eaton Electric N.V. :
Eaton Holec Low Voltage
P.O. Box 23, 7550 AA Hengelo
The Netherlands

tel: +31 - 74 246 34 73
fax: +31 - 74 246 33 61
holec-info@eaton.com
www.holec.nl

1993.338
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EATON | Holec