TECHNICAL INFORMATION

CABLE JOINTS, CABLE TERMINATIONS, CABLE GLANDS, CABLE CLEATS
FEEDER PILLARS, FUSE LINKS, ARC FLASH, CABLE ROLLERS, CUT-OUTS

11KV 33KV CABLE JOINTS & CABLE TERMINATIONS
FURSE EARTHING
www.cablejoints.co.uk

Thorne and Derrick UK
Tel 0044 191 490 1547 Fax 0044 191 477 5371
Tel 0044 117 977 4647 Fax 0044 117 9775582

TECHNICAL INFORMATION

CUSTOMIZATION

- Hole punching
- Non standard sizes and colours
- Viewing area applied to standard doors
- Thermal management components fitted (fans, filters, air-conditioners etc.)

By adopting a flexible approach to manufacturing, Eldon can produce enclosures to your exact specification quickly and efficiently and with the quality you would expect from a major European manufacturer.

SPECIALS	CUSTOMIZATION													
	MAS MAD MAP	MCS MCD MKS MKD	MCI	MCM	ASR ADR AFS	KSS KDS	CSS CDS	UCP UDP	MPC MPCS MPG MPGS	IL ILF ILS HALP	DABP DPCP MGRP SABP SPCK SPCP OABP OPCP CPCF WPCP	TEN TED TEP	EDR	MCSL
Special height	X	X	X	X	X	X			X	X				X
Special width	X	X	X	X	X	X	X		X	X				X
Special depth	X	X	X	X	X	X	X		X	X			X	X
Special material thickness or finish		X	X	X									X	X
Special studs in box	X	X	X	X	X	X	X		X	X			X	X
Studs in mounting plate	X	X		X	X	X	X	X	X	X	X			
Studs of special dimensions	X	X	X	X	X	X	X		X					X
Special welded brackets		X	X	X	X	X	X		X					X
Brackets in special locations		X	X	X	X	X	X		X			X	X	X
Without or additional gland opening	X	X	X	X	X	X	X		X	X		X	X	X
Special gland plate		X	X	X	X	X	X		X			X	X	X
Special punching in box	X	X	X	X	X	X	X	X	X	X	X	X	X	
Special punching in door	X	X	X	X	X	X	X	X	X	X	X	X	X	
Special punching in back & side panels	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Special punching in mounting plate	X	X	X	X	X	X	X	X	X	X	X			
Special punching in gland plate	X	X	X	X	X	X	X	X	X	X	X	X	X	
Door instead of back plate		X			X	X	X		X				X	X
Special colours	X	X	X	X				X		X	X	X	X	X
Mounting standard accessories	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mounting special accessories	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Standard locks from catalogue	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Special locks other than those in catalogue	X	X	X	X	X	X	X		X			X	X	X
Special design or construction		X	X	X	X	X	X		X				X	X
Increasing or decreasing IP rating		X	X	X									X	
Standard parts left out of enclosure		X	X	X	X	X	X		X			X	X	
Glazed doors	X	X	X	X	X	X	X		X	X		X	X	X
Special components and wiring														

Enclosure Selection

A WIDE RANGE OF ENCLOSURES FOR ALL ENVIRONMENTS

Selecting an enclosure goes beyond the IP rating, additional consideration must be given to the environmental conditions in which the enclosure will be installed. Following these guidelines will help provide an enclosure to meet application needs.

Indoor Installation

The normal service conditions for INDOOR installations are:

- Ambient air temperature: It does not exceed +40ºC and its average over a period of 24h does not exceed +35ºC. The lower limit of the ambient air temperature is –5ºC.
- Atmospheric conditions: The air is clean and its relative humidity does not exceed 50% at a maximum temperature of 40ºC. Higher relative humidity may be permitted at lower temperatures, for example 90% at +20ºC. Care should be taken of moderate condensation which may occasionally occur due to variations in temperature.
- Pollution degree: Unless otherwise stated, for industrial applications, generally for use in a pollution degree 3 environment (Conductive pollution occurs or dry, non-conductive pollution occurs which becomes conductive due to condensation).
- Altitude: The altitude of the site of installation does not exceed 2.000 m.

Sometimes special service conditions can exist, and the enclosures must be suitable for each particular situation. Some of these special conditions are:

Degree of protection required:

The degree of protection provided by any enclosure against ingress of solid foreign bodies and liquid is indicated by the designation IP XX, according to IEC 60529. See our section on 'The European IP-Code'

The enclosure to be used will be defined depending on two factors:

i) The first IP digit indicates the protection against entry of objects and powder. Examples of application in which a high IP will be needed are the food or ceramic factories were the environment is full of small particles, which may penetrate the enclosures.

ii) Water spraying and splashing of any type, which the enclosure can receive. The second IP digit indicates the protection against entry of water. Many cleaning methods use water pressure, and in this situation it is useful to have a high IP degree in order to protect the equipment inside the enclosure.

Eldon has developed a range of products that provide IP55 / 66 degrees of protection

For more information visit our website
www.eldon.com or send us an email eldon.info@eldon.com

Exposure to strong electric or magnetic fields:

In some installations there are many types of electrical interference, signal or noise, which temporarily or permanently affects the ability of electrical or electronic equipment to function correctly. The solution for this is to ensure the enclosure acts as a Faraday Cage. Eldon offers two different attenuation levels:

- High EMC protection, the screening effectiveness is increased up to 30/40 dB.
- Environmental EMC protection, the screening effectiveness is increased up to 100 dB and more.

Chemical agents:

In certain installations a high degree of hygiene is needed for which chemical products are used. These products can affect the material with which the enclosure is made from. In these cases ELDON offers a range of Stainless Steel 304 and 316 grade enclosures that have a high resistance in aggressive environments. A good example of these installations are the chemical industry and in food processing.

ELDON, together with its complete range of Stainless Steel enclosures, has developed the new AFS that incorporates a sloping roof in its construction allowing liquids to be directed away from the roof and protecting the door gasket.

Outdoor Installation

The normal service conditions for OUTDOOR installations are:

- Ambient air temperature: It does not exceed +40ºC and its average over a period of 24h does not exceed +35ºC. The lower limit of the ambient air temperature is –25ºC in a temperate climate and –50ºC in an arctic climate.
- Atmospheric conditions: The relative humidity may temporarily be as high as 100% at a maximum temperature of 25ºC.
- Pollution degree: Unless otherwise stated, for industrial applications are generally for use in a pollution degree 3 environment (Conductive pollution occurs or dry, non-conductive pollution occurs which becomes conductive due to condensation).
- Altitude: The altitude of the site of installation does not exceed 2.000 m.

In outside installations the enclosure won't have any protection, and it is therefore important to consider the following issues carefully when choosing an enclosure.

The conditions that will determine the type of enclosure to be used will be:

Climate conditions:

In outside installations the enclosure is exposed to rain, wind, etc ... and therefore it is necessary to bear these conditions in mind and choose the enclosure with the sufficient IP (See IP Codes section), that guarantees that water will not penetrate. For the cases where an additional protection is necessary, ELDON recommends the use of rainhoods, such as the ARF or ASST. This helps protect the gasket, avoiding possible deterioration. As well as consideration to the type of material to be used (Stainless steel for example in outdoor application) consideration should also be given to temperature range and condensation.

Geographical conditions:

Depending on the environmental conditions and the geographical situation that the enclosure will occupy, (close or far from the coast, etc ...) it is possible that the enclosure has to be

protected against corrosion as well as water protection. Protection against corrosion is not related to the IP but it is reflected in the salt spray (ASTM B117) and Humidity (BS 3900 F2) tests. In cases where the values of the previous tests for the enclosures in sheet steel are not sufficient for the foreseen installation (saline environments or with high humidity), the alternative is the use of Stainless Steel enclosures, (304 or 316 grade depending on the exact conditions). Stainless steel performs significantly better against such corrosion problems, and ensures the performance of the enclosure.

Specially aggressive environments:

Certain environments are especially aggressive for the enclosures, such as:

i) In marine environments with a high salinity the use of Stainless Steel 304 is not sufficient and the Stainless Steel 316, has better qualities against corrosion, and ensures the performance of the enclosure.

ii) Environments with chemical products: In these cases it is necessary to analyse every case since the chemical agents affect stainless steel material in different ways.

Eldon offers the possibility of providing the enclosure in both Stainless Steel 304 and 316

Sharp temperature changes:

If the internal temperature of the enclosure is reduced rapidly, (which can and does occur under 'normal' weather conditions the pressure inside a high IP rating enclosure may be significantly lower than the ambient pressure outside, thereby inducing a suction effect through the gasket areas. This could result in moisture around the gaskets being drawn into the enclosure. Therefore consideration should be given to venting the enclosure.

For the compensation of the outside and inner pressure we can utilise venting devices, e.g. PVD accessory.

With the rainhoods ARF / ASST or the AFS with integral sloping roof we can protect the gasket areas from contact with the rain.

Condensation:

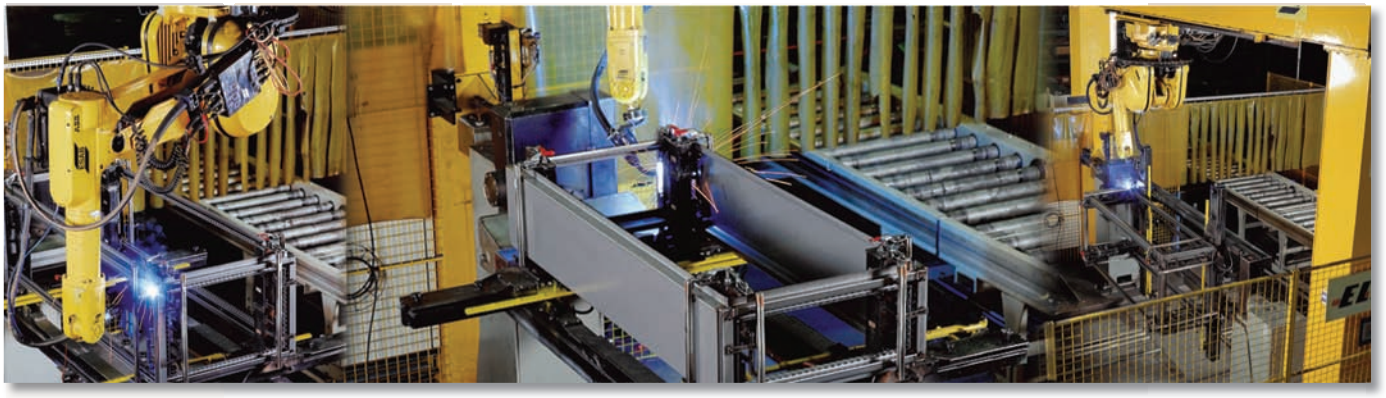
Due to differences in temperature between the inner and outer surfaces of the enclosure condensation takes place, and later the appearance of water in the lower part of the enclosure. Therefore condensation can also be produced on the inner components, which can cause the appearance of corrosion or defects. To avoid condensation, anti-condensation painting and or ventilation can be used.

For more information visit our website

www.eldon.com or send us an email eldon.info@eldon.com

TECHNICAL INFORMATION

ENCLOSURE SPECIFICATIONS



The Design

All Eldon enclosures are designed and developed with due regard to current, relevant international regulations, legislations and standards. Designs are developed from the many years of experience within Eldon to benefit our customers and to provide user friendly and safe enclosures to meet their requirements.

The Standards

Eldon enclosures meet the current standards and specifications:

All enclosures

EN 60.204 part 1	Electrical equipment of machines. (Earthing)
EN 60.529 / IEC 529	Degrees of protection provided by enclosures.(European IP code)
NEMA 250	Enclosures for electrical equipment. (American TYPE code)

Industrial enclosures

DIN 41.844 part 1 - 3	Measurements for sub-divisions of enclosures.
DIN 43.660	Keys for cells or enclosure doors of electrical switchgear.
DIN 43.656	Paint for indoor electrical switchgear.

19 inch and Data enclosures

DIN 41.488 part 1	Measurements for sub-divisions of enclosures, communication technology, and electronics.
DIN 41.494 Part 1	Construction for electronic equipment, front plates and racks.
Part 3	Component stacking, dimensions.
ANSI/EIA-310-C-77	Racks panels and associated equipment.

Other local regulations and specifications concerning the siting of electrical switchgear must be observed by the user of the enclosures!

THE CE MARK

The CE mark (Conformité Européenne): which products must be provided with it? Who should apply it - the manufacturer, or an independent testing laboratory which is authorised to carry out the certification? When can or must the CE mark be used?

The object of the following brief information is to provide a background of the legal significance of the CE mark, combined with initial instructions for the handling of this mark and the procedure to be applied for the Eldon products.

The CE mark is directly connected to a resolution of the EC Council of May 7th 1985 on a new conception in the field of technical harmonisation and standardisation, for the reduction of technical trade barriers within the EC (and now also within the European Economic Area). It combines the harmonisation of the national regulations and technical standards with a mutual recognition of the testing and certification results. The new conception for technical harmonisation is based on four principles:

The CE mark indicates that a product fulfils the basic requirements defined in the respective EC guidelines, and that the supplier (manufacturer, importer, dealer, etc.) has carried out the conformity assessment procedures required by the guidelines. The CE mark represents a technical passport for the marketing of the product within the EC and the EEA. The CE mark is only of importance for products which fall within the application range of a guideline, that has been issued on the basis of the “new approach”. Products for which there are no legal or only nationally regulated quality requirements are not affected by the CE mark. Only 60% of the products on the European market need this CE marking, which means 40% of the products do NOT need it. The CE mark is a protected mark and unauthorised use is an offence. The CE mark is only allowed on products or installations, which fully comly with the safety demands of the Directives for the European market.

Harmonisation guidelines define the basic requirements which product have to meet before their introduction to the market so that they can be freely distributed within the Community.

Technical specifications for the manufacturing and the marking of products which meet the basic requirements contained in the guidelines are set out in European standards by the European standards organisations.

The application of the European standards is voluntary for the manufacturer and for the appropriate authorities or bodies, however, it is legally binding if a manufacturer refers to such standards.

If products are manufactured according to harmonised European standards, it can be assumed that these are in conformity with the basic requirements for the protection of the health and safety of consumers and the environment.

THE CE MARK

Eldon enclosures and the CE mark

At the moment of printing this catalogue there were three directives which concern Eldon products:

1. The Machine Directive, EU 89/393 effective 01-01-1995.
2. The EMC Directive, EU 89/336 effective 01-01-1996. Electromagnetic Interference
3. The Low Voltage Directive, EU 73/23 effective 01-01-1997.

Enclosures

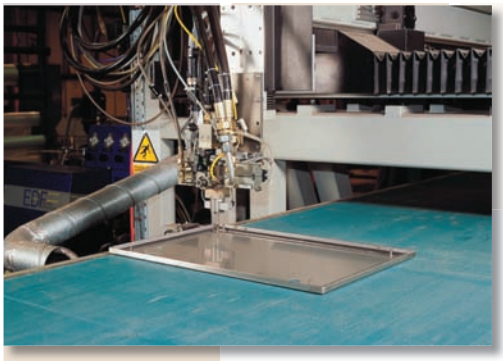
There is no legal basis for the labelling of an empty enclosure concerning the machine and EMC Directives. However based on the Low Voltage Directive, EU 73/23, the governments in some European countries find it necessary that all related products, which will be used in the finished product must carry the CE mark. Since Eldon does not know in which set-up the enclosures will be used, all enclosures are labelled with the CE mark. When the enclosure is used in a complete set-up, which is defined as a “machine” or an “installation” according to the Low Voltage Directive, then the manufacturer has to label the entire installation with the CE mark. All Eldon enclosures carry this marking. The installer can decide if the CE marking is relevant and make use of it.

Electrical products

Electrical related products, which can not function on their own can not be labelled, but need a declaration. All Eldon products are within those regulations.

TECHNICAL INFORMATION

THE EUROPEAN IP-CODE



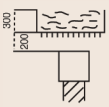
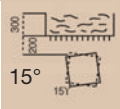
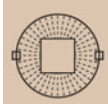
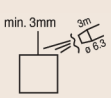
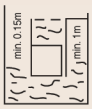
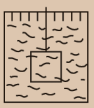
To help the design engineer identify the degree of protection provided by an enclosure, EN62208 (10/91 / IEC 529 (11/89) (International Electrotechnical Commission) was introduced.

Both harmonised standards classify the extent to which an enclosure will resist the ingress of solid bodies and water under designated tests.

After successful testing the enclosure will be allocated a classification code with the letters IP (International Protection) prefixing that code.

IP 55 W

- Code letters
  International Protection
- First Characteristic numeral
  (dust protection, numerals 0-6, or letter X)
- Second Characteristic numeral
  (water protection, numerals 0-8, or letter X)
- Optional letter for application in specified weather conditions
  (normally agreed between user and manufacturer, example: Rain hood)

1st numeral: Degree of protection with respect to persons and solid objects.	2nd numeral: Degree of protection with respect to harmful ingress of water.								
	0	1	2	3	4	5	6	7	8
	Non protected	Protected against dripping water	Protected against dripping water of +/- 15° angle	Protected against dripping water of +/- 60° angle	Protected against splashing water	Protected against water jets	Protected against heavy seas	Protected against immersion	Protected against submersion
	Test time 10mins.	Test time 10mins.	Test time 10mins. max 200	Test time 10mins.	Test time 10mins.	Test time 1min/m² minimum 3 mins.	Test time 1min/m² minimum 3 mins.	Test time 30mins.	Test time 30mins.
									
Non protect. 0	IP 00	IP 01	IP 02	10l/min 80kN:m²	10l/min 80kN:m²	12.5l/min 30kN:m²	100l/min 100kN:m²		
Protected against solid objects greater than Dia. 50 mm. 1	IP 10	IP 11	IP 12	IP 13					
Protected against solid objects greater than Dia. 12 mm. 2	IP 20	IP 21	IP 22	IP 23					
Protected against solid objects greater than Dia. 2.5 mm. 3	IP 30	IP 31	IP 32	IP 33	IP 34				
Protected against solid objects greater than Dia. 1.0 mm. 4	IP 40	IP 41	IP 42	IP 43	IP 44	IP 45	IP46		
Dust protected. 5					IP 54	IP 55	IP 56		
Dust-tight 6						IP 65	IP 66	IP 67	IP 68

TECHNICAL INFORMATION

At present a third numeral is defined by the French standard UTE C20 010. This is a classification number system ranging from 0 - 9 which is used to define the protection against impact. (Example: IP 559) Eldon enclosures types AS and CS(S) / CD(S) can withstand an impact of 60 Joules, thereby tripling the old standards.

Tests were carried out according to Det Norske Veritas standards demanding a weight of 15 kilo's falling down from 40 cm on a surface of 70 x 70 mm.

IK grade	IK 00	IK 01	IK 02	IK 03	IK 04	IK 05	IK 06	IK 07	IK 08	IK 09	IK 10
Energy (J)	-	0,15	0,2	0,35	0,5	0,7	1	2	5	10	20
Weight and height of pedulum	-	0.20 kg 70mm	0.20 kg 100mm	0.20 kg 175mm	0.20 kg 250mm	0.20 kg 350mm	0.50 kg 200mm	0.50 kg 400mm	1.70 kg 295mm	5kg 200mm	5kg 400mm

NEMA

The American TYPE-code

The National Electrical Manufacturers Association (NEMA) is a US Manufacturers Organisation which actively promotes standardised product specifications for electrical apparatus.

While NEMA does not actually test products, it establishes the performance criteria for enclosures intended for specific environments.

NEMA standards describe each type of enclosure in general and functional terms, and specifically omits reference to construction details.

In other words NEMA specifies what an enclosure must do, not how to manufacture it. This is also true about the EN 60.529 / IEC 529.

NEMA performance criteria and test methods are used by Underwriters Laboratories (UL) and Canadian Standards Association (CSA) as guidelines for investigation and listing of electrical enclosures.

The tested enclosures are then authorised to carry a label by UL or CSA to prove it has passed the required tests.

NEMA Classification and approximate IP equivalents

TYPE 1 / IP 30

Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.

TYPE 4 / IP 66

Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.

TYPE 4X / IP 66

Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.

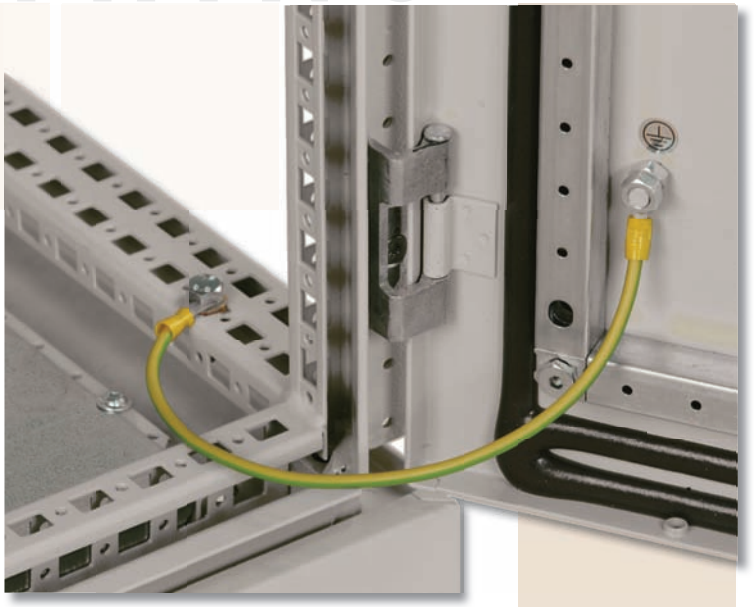
TYPE 12 / IP 55

Indoor use primarily to provide a degree of protection against circulating dust, falling dirt and dripping noncorrosive liquids.

TYPE 13 / IP 65

Indoor use to provide a degree of protection against dust and spraying of water, oil and noncorrosive coolants.

EARTHING



Personal protection

The Eldon enclosures are provided with various earthing points. All panels (excluding certain gland plates) are equipped with a copper-plated or stainless steel earthing stud.

The frame or body of the Stainless steel enclosures, and the wall mounting enclosures (Multi-Mount®) have two studs so one can be used as a Protected Earth (PE).

The frames of the Multi-Flex® series, MCS, MCD, MKS, MKD are equipped with contact washers so the earthing points can be mounted on any space available. To ensure that these earthing points will give you the desired protection, Eldon has verified their products by testing at the independent institute TNO in The Netherlands.

TECHNICAL DETAILS MEASURED BETWEEN:

Panel earthing

PE - mild steel copper-plated stud M6	1,19 mΩ
PE - mild steel copper-plated stud M8	1,06 mΩ

Frame earthing

PE - mild steel copper-plated stud M8	0,51 mΩ

General earthing

PE - mild steel zinc-plated bolt connection with contact washers M6 (bottom plate)	1,64 mΩ
PE - mild steel zinc-plated bolt connection with contact washers M8 (Open frame)	1,83 mΩ
PE- mild steel zinc-plated bolt connection with contact washers M10 (Suiting frames together)	0,78 mΩ

Earthing cables

ECFA 220, 6 mm2 copper, cable eyes for M6/M8,length 220 mm	1,05 mΩ
ECFA 300, 6 mm2 copper, cable eyes for M8 length 300 mm	1,29 mΩ

NB For stainless steel the resistance is approximately 3 times higher than for mild steel.

VIBRATION TESTS

The tests give important information when enclosures have to be installed:

- on ships
- in earthquake risk areas
- in nuclear power plants
- in military areas
- etc.

The tests are carried out according to the “Rules for Ships” of Det Norske Veritas Class A.

Technical information

Frequency range:	3 - 100 Hz
Velocity amplitude:	50 mm/sec below 22 Hz
Acceleration amplitude:	0,7 g above 30 Hz

Including impact tests of 60 Joules. A weight of 15 kg falling down from 400mm on a 70 x 70 mm surface). Enclosures carrying the DNV mark have passed these tests. Since the tests have been carried out on empty enclosures it is recommended to do separate testing with the enclosure fully equipped for the final installation.

Other local regulations and specifications concerning the siting of electrical switchgear must be observed by the user of the enclosures!

TYPE TESTED ASSEMBLY

According to EN 60 439-1

Includes:

- busbar systems from 400 A to 4.500 A
- incoming unit with fuse boards
- main switch incoming units
- busbar system on the back side of Form-4 compartments
- switches

Approved by:

KEMA KEUR

TECHNICAL INFORMATION

STANDARD COATING OF ELDON ENCLOSURES

Eldon enclosures being placed in various environments, which demand resistance against corrosion, scratching and ageing, require a high quality painting process. The Eldon enclosures are therefore painted with a protective polyester type oven dried paint. The electrostatic powder painting process gives a tough surface and a good build up on corners and edges. Good adhesion ensures that the paint does not crack or split when the material is drilled or punched. The paint has very good chemical characteristics: is resistant to sunlight, is not flammable and contains no heavy metals like lead or cadmium. Eldon applies a Polyester Structured Powder Coating to colour RAL 7035, 7032 grey, according to the DIN 43.656 standard.

Repainting

Eldon enclosures can be easily re-painted after de greasing and lightly abrading of the standard painted surface and a careful cleaning to remove all traces of dirt and dust. A suitable paint is a 2-component polyurethane paint or alternatively an ordinary alkyd paint can be applied.

For example:

- Automobile paints
- DD gloss paints
- 1-component stove enamels
- 2-components gloss paints (acrylate enamels)
- Powder coating

Surface characteristics

Powder type paint on cold-rolled steel plate characteristics.

Colour RAL 7035, grey

Layer thickness Approx. 80 µm

STANDARD COATING OF ELDON ENCLOSURES

Mechanical characteristics:

Adhesion	BS 3900 E6	No detachment
Scratch	BS 3900 E2	Pass 4 kg
Impact	BS 3900 E3	Pass 2,0 m/0,5 kg
Bend	BS 3900 E1	Pass 6 mm.
Cross Cutting	ISO-2409	GT 0

Corrosion test:

Salt spray	ASTM B117	No rusting or blistering after 200 hrs (iron phosphated steel)
Humidity	S3900F2	No blistering after 200 hours (iron phosphated steel)

Chemical resistance:

Heat Stability No yellowing on continuous exposure up to 130°C or intermittent exposure up to 140°C.

Accelerated weathering less than 50% loss of gloss, little colour change QUV 'A' 1.000 hrs.

The Eldon coating is resistant to solvents, mineral oils (briefly, such as during cleaning processes), lubricants, machining emulsions, weak acids and alkalines.

TECHNICAL INFORMATION

APPLICATION

Degreasing, Iron phosphating and Rinsing

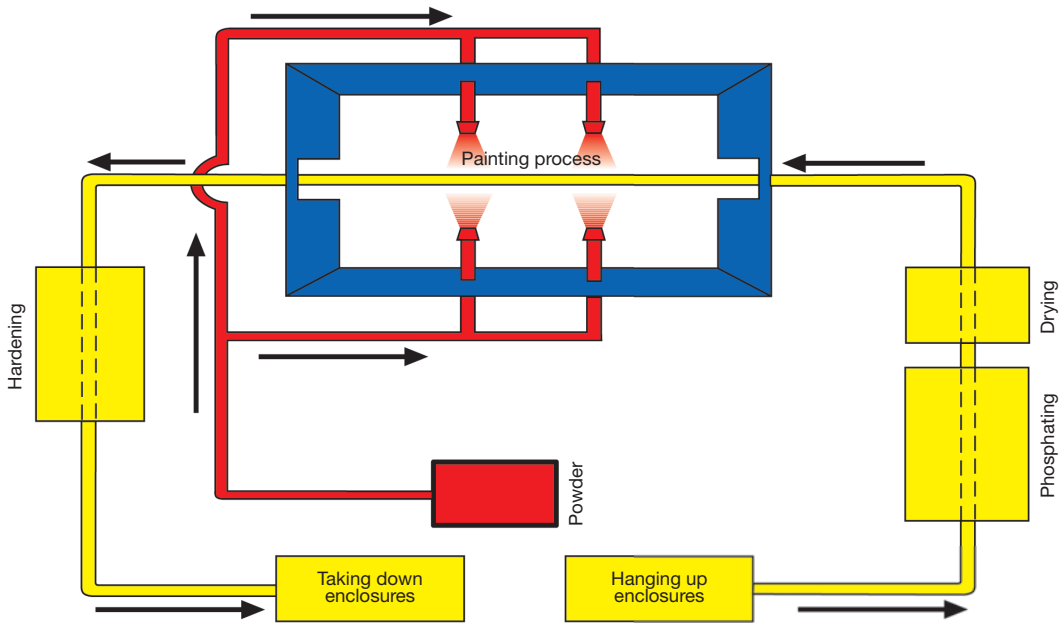
During this process the steel is cleaned and passivated. This way the product will not corrode and good adhesion of the paint to the steel surface is achieved.

Forced drying

To make sure that the products are completely dry before the painting process starts, they are dried at 100° C.

Structure powder coating

The powder coating is electrostaticly applied. This way ALL faces are covered inside and outside assuring high mechanical strength, very good corrosion protection and resistance to chemicals, temperature and weather variations. The powder coating can easily be re-painted and is free from heavy metals, chromate and silicon.



CERTIFICATES AND APPROVALS

Most Eldon products have international certification and approvals. Eldon is a leading company in this field with at least nine different certificates and approvals. Every enclosure which leaves the factory is labelled on the inside with a type label. This label carries all relevant information such as the product name, protection rate, production date and the logo's of the institutes which have approved the Eldon products.

ELDON works together with the following institutes:

- Underwriters Laboratories USA
- Canadian Standards Association Canada
- KEMA The Netherlands
- Verband Deutscher Elektrotechniker Germany
- TÜV Product Service Germany
- Germanischer Lloyd Germany
- Lloyd's Register of Shipping England
- Det Norske Veritas Norway
- Union Technique de l'Électricité France
- TNO The Netherlands

ISO 9000:2000 CERTIFICATION

Quality without boundaries

To ensure the quality of our products world wide, Eldon has chosen to certify their companies against the highest level of Quality Assurance. This means a quality management system according to the ISO 9000:2000 standard. The international acceptance of this standard will assure, that our products live up to customer expectations. Quality management is a continuous process involving planning, development as well as production. From the drawing board up to the release into the market and even further... in our customers work shop the quality system will do it's work.

Products are tested and re-tested to make sure, that the market demands regarding standards are met. Testing can involve corrosion resistance, level of protection, vibration resistance or customer special requirements. The products will receive a certificate from an independent institute to achieve the highest level of acceptance all over the world.