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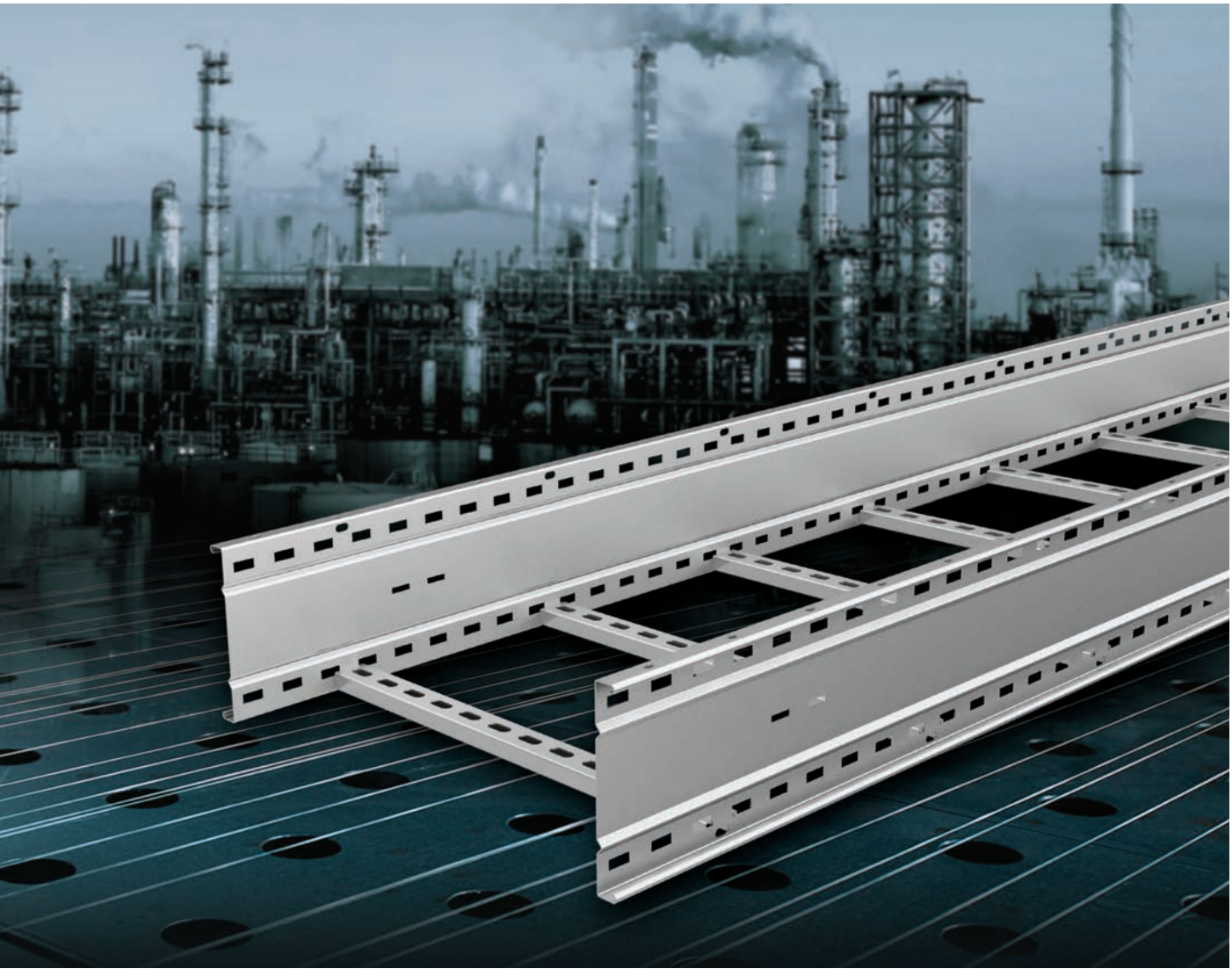
E-LINEKCA OG

Industrial Cable Ladder System



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ELINEKCAOG

▶▶ Company Profile

Over 40 years experienced EAE Cable Support System Department is proud to be presenting new Industrial Cable Ladder Serie "KCA OG".
With the participation of the new KCA OG, EAE can supply all ranges of demands.

Cable Ladder Series:

- KM : Light Duty Cable Ladder
- KC : Heavy Duty Cable Ladder
- **KCA OG : Extra Heavy Duty Cable Ladder**

KCA OG is designed to satify highly performance of all Industrial Market.

▸ Stainless Steel Finishes:
For the off-shore applications, KCA OG can be manufactured with Stainless Steel (316L) which can supply high performance against the corrosive effect of salt water combined with very changeable weather conditions.

▸ High Load Performance:
For the long span applications, KCA OG can be manufactured in 6000 mm standard length. Form of latitude lines on the siderails help KCA OG to upgrade loading capacity.

▸ Integral Joints on Fittings:
The installation time can be reduced by the innovative design of the KCA OG fitting which has integral joints.

▸ Largest Capacity:
H: 200mm serie cable ladder supplys largest cable capacity and air flow features.

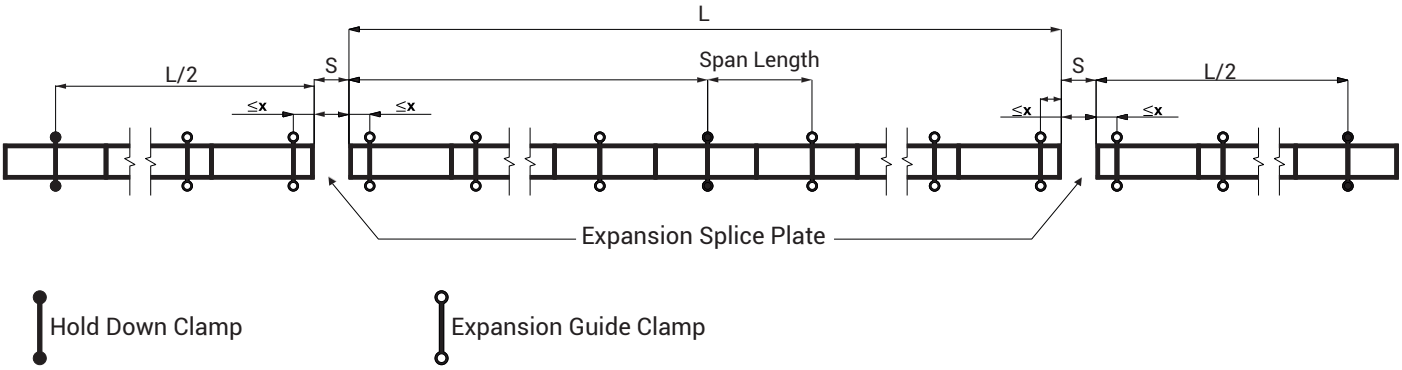
Oil&Gas Industry

Power Generation Industry

Petrochemical Industry

3. Support Installation

Supports should be located within 600 mm of each side of the expansion splice plates. The expansion guide clamp should allow ladder to slide during thermal movements. 1 pc M10x30 Mushroom head bolt +1 pc M10 plain washer + 2 pcs hex. head nuts should be used to supply lock nut solution and prevent self-loosening. EAE Cable Ladders are capable of carrying loads in between two supports close to expansion splice plates.
Consult our Technical Office for details about the installation requirements of expansion splice plates.



S : Gap setting(Thermal Expansion & Constraction)-Step-1
L : Maksimum Spacing between Expansion Joints(Thermal Expansion & Constraction)-Step-2
X : Supports and Expansion Guide should be located within 600mm(2ft.) of each side of vertical adjustable splice plates.

*Number of Expansion Guides required for length" L"

$$=\left(\frac{L}{\text{Span Length}}-1\right) x2$$

Calculation Example;
Let L length be 42m from(Thermal expansion&Consruction-Determining of max. spacing between two expansion joints)
Span length is 6m.
Number of expansion guides required for length "L"
=((42/6)-1)*2=12 pieces

*Number of Hold-down Clamp required for length "L"
2 pieces hold-down clamp required.

NOTE:
EAE products KCAOG SDE, ME and EXPANSION Joint provide electrical continuity according to IEC 61537 & NEMA VE 1.
The use of bonding jumper depends on the customer's request.

▶ Dissimilar Metal's Corrosion

When iron is extracted from its ore, a fundamental common tendency of nature is immediately reversed. Iron and steel unprotected will corrode in most environments, thus returning to their natural states.

- All metal surfaces exposed to the environment are affected by corrosion. Corrosion is the deterioration of metals by direct chemical or electrochemical attack. The three commonly recognised forms of corrosion are:

- Direct chemical attack which can best be handled by not allowing the chemical attack agent to come into contact with the metal (see chart for further information).

- Electrochemical attack or electrical current flow through the metal is a common form of cable tray corrosion. It occurs in the presence of a conducting agent, or electrolyte. Usually this electrolyte is made up of a combination of rain, orsprays mixed with an industrial residue andchemical deposits.

- A third form of corrosion is Bimetallic Electrochemical corrosion, commonly referred to as galvanic corrosion. Although not normally a problem with cable trays, it can become a problem when two dissimilar metals come in contact in the presence of an electrolyte. Corrosion is reasonably preventable. Through selection and use of the appropriate product, material and protective finishes, savings can be made in plant maintenance costs by deferring the longer term replacement of the cable support systems. This catalogue is designed to assist you in protecting your cable support products through the correct selection of materials based on the prevalent conditions. Information is provided outlining whichmetals are safe to put into contact with each other,and how various steel products react to the exposureof certain chemicals.

The Table of Dissimilar Metals groups metalsthat have little galvanic effect on each other andare therefore relatively safe to put into contact.

The groups have been arranged with the corroded(ANODIC) metals at the top, and the protected(CATHODIC) metals at the bottom.

Any metal in the group above would corrode when in contact with a metal in the group below. Avoid pairing metals from widely separated groups, as the risk of corrosion will be greater. By using this table as a guide and analysing the local conditions of each site, it is more likely that a wise decision concerning material and finish selection can be made to minimise direct chemical attack and electrochemical corrosion.

CORRODED END (ANODIC)
MAGNESIUM
ZINC
ALUMINIUM 1100
CADMIUM
ALUMINIUM 2017

STEEL/IRON
LEAD/TIN
NICKEL
BRASS/COPPER/BRONZE
SILVER SOLDER
STAINLESS STEEL 304/STAINLESS STEEL 316
TITANIUM
SILVER
GRAPHITE/GOLD/PLATINUM
PROTECTED END (CATHODIC)

▶ Design & Deflection

E-Line KCA OG cable ladder sections are designed and manufactured to achieve the loading requirements of the IEC 61537, and are available in various load and span performances .
A sample of each section has been tested and certified by a DEKRA approved facility, ensuring that we continue to provide the benchmark in product performance.
All reported results are based on uniformly distributed static loads.
150 mm and 200 mm Height KCA OG ladders are suitable for NEMA 20C standard .
Whilst NEMA publication does not specify a limitation on deflection, a guide to deflection has been included for easy reference.
All cable support deflections, within this catalogue, pertain to continuous cable support systems and do not take into consideration simply supported or end bay sections.
It should be noted that the positioning of splice joints and loading techniques can significantly impact upon the actual deflection. Refer to Nema VE2 installation guidelines for further information.
Special consideration should always be given to live loads resulting from cable pulling to ensure this does not exceed the static cable support load limit.
All load results detailed in this section have been derived from testing 600mm wide sections of mild steel cable ladders in the various configurations.

▶ Technical Specification

1) Cable Ladder shall be used in the places designated in the project for supporting power cables in their horizontal and vertical distribution.
2) Side rail of the cable ladder should have these features;
- Different height according to different load capacity as 100 mm, 125 mm, 150 mm and 200 mm.
- Height 100 mm has got 1 pc, Height 125, 150 and 200 mm have got 2 pcs of longtitude bend lines for upgrade the load capacity
- Thickness of the metarial can be 1,5 mm , 2 mm and 2,5 mm according to load capacity
- Finishes and metarials can be Hot Dip Galvanized, Silicon Rich Steel Sheet (DG) or Stainless steel according to corrosion protection level.
- Upper side holes can supply opportunities for mounting cover to ladder, Lower side Holes can help to drainage the water.

3)The holes opened on the sides of Cable Ladders for the purpose of making joints shall be 10mm x 25 mm in size.
4) The rungs of Cable Ladders shall be welded to the sides at intervals of 300mm.
5) The Cable Ladders should be produced in equal lengths of 3m and 6m..
6) The rungs of Cable Ladders should be produced in type C Strud.
a) C rungs should have a height of 21mm with holes of 13 mm x 25mm opened at intervals of 50mm from centre to centre.
7) Finishes;
- Hot Dip Galvanized ISO EN 1461 : min 45 micron , avarage 55 micron ZİNC
- Silicon Rich Steel Sheet (DG) : 80-120 micron Zinc

8) In places where the Cable Ladder descends or ascends, the level adaptation modules or level adaptation Coupler pieces should be used.
9) The connection of Cable Ladders to each other should be made by means of two joining pieces for each Ladder. The mounting of all turning pieces to the Cable Ladder should be made using coupler.
10) In places where the Cable Ladder changes direction, the 90° horizontal elbows, “T” shaped horizontal connecting pieces and cross shaped horizontal turning pieces should be used.
11) In the case of densely placed Cable Ladders, the connections of Cable Ladders of different width should be realized using the "Z" type reduction modules. The central reduction module should comprise two symmetrical pieces. The left and right reduction modules should comprise a combination of one normal reduction piece and one joining piece.
12) In the mounting of couplers, the lacquer coated M10 x20 bolt set should be used. The bolts should be round headed, flanged and capable of self locking into their holes. The M10 nuts should be flanged and snug headed.
13) For the mounting of both joining modules and reduction modules, 4 joining bolt and nut sets(M10x20) should be used for Cable Ladders having a side height of 100 mm , 125 mm , 150 mm and 200 mm .
14) Cable ladders should not be walked on or used as walkways.

▶ SAFETY

Heavy duty cable ladders are designed for rugged conditions and can withstand some abuse. However they are not designed or intended for use as walkways or scaffolds and proper working platforms or temporary access scaffolding must be provided for the use of installation personnel.
If any welding of equipment carry out , fumes should be removed with the proper ventilation and operator should wear the protective face mask.

EAE recommends to work under these levels of Zinc Oxide Fumes,

Short Term Exposure : 10 mg/m3
Long Term Exposure : 5 mg/m3

▶ STORAGE

EAE reccomends , pallets should be unload and set by Fork Lift Vehicle.
By the virtue of its composition, the galvanized sheet metal is known to be particularly sensitive against the effects of materials of acidic character, polluted air, water and relative humidity present above a certain rate. The service life of galvanized sheet metal is shorter in the industrial areas where the air is densely polluted. The most important element of atmospheric air pollution is sulphur dioxide.

$C + H + S + O2 \longrightarrow Co2 + H2O + So2$
$SO2 + ½\ O2 \longrightarrow SO3$
$SO2 + H2O \longrightarrow H2SO3$
$SO3 + H2O \longrightarrow H2SO4$

The sulphurous and sulphuric acid forming at various rates reacts with the zincand causes corrosion in the layer of galvanization. Decreasing the rate of atmospheric pollution or reducing it to zero will not be possible on an individual basis. To prevent the likely corrosion of the galvanized layer due to air pollution in stockpiling will be possible only by stockpiling the galvanized sheet metal in well protected warehouses. The matter causing the greatest concern regarding galvanized sheet steel are the white coloured spots called white rust, which develop on the surface of sheet metal during the course of stockpiling. Its development,however, can be minimized, even completely eliminated, by taking proper measures. The white rust is the result of a chemical reaction between zinc and the carbon dioxide, oxygen and water or moisture in the air.

$C + O2 \longrightarrow Co2$
$Zn + ½\ O2 \longrightarrow ZnO$
$4Zn + 3H2O + CO2 \longrightarrow ZnCO3.3Zn(OH)2$

The white rust phenomenon occurs during the stockpiling of galvanized sheet metal as a result of combined action of above-stated parameters and mostly in the case of stock-piled sheet metal. As the air with a high rate of moisture will be trapped between the pieces of stocked sheet metal, any differences in temperature will cause the trapped air to reach the dew point, leading to formation of droplets of water on the surfaces of sheet metal pieces. As a result, the oxygen dissolved in water will react with Zn to produce zinc hydroxide while the carbon dioxide present in the air will react with zinc to produce zinc carbonate. The combined result of these two reactions will lead to the development of zinc carbonate zinc hydroxide, called white rust.
In order to protect the stacked sheet metal against the effects of white rust for a certain period of time, although not for long, the pieces of sheet metal are subjected to a process named passivation. During this process,a protective film is produced on the surface of galvanized sheet metal through a chemical reaction. That protective film will protect the galvanized sheet metal against the formation of white rust for a certain period of time. In order to ensure said protection, however, the following conditions must be strictly observed.
- Stacked sheet metal must never be allowed to come in contact with water .
- There must be sufficient space provided for continuous circulation of air in the place where they are stacked.
- There must be sufficient space provided for proper circulation of air between the stacks of sheet metal (min 300mm between the two stacks).
- The temperature differences in the places of stockpiling must be small (between 5-10°C).
- The relative humidity in the places of stockpiling must not exceed 70%.
- The sheet metal must not be stockpiled in places where there is air pollution.
- Where the stacked sheet metal is to be stockpiled for long periods of time, each piece of sheet metal must be examined periodically, and any droplets of water likely to be formed on the surfaces of sheet metal must be wiped off and the surfaces must be dried.
- The stacks must be placed, without fail, on wooden palettes or props as to prevent the sheet metal to come in contact with the floor.
When the above conditions are fulfilled, it will be possible to ensure proper circulation of air in the place of stockpiling, thereby ensuring the formation of white rust at a reduced level.

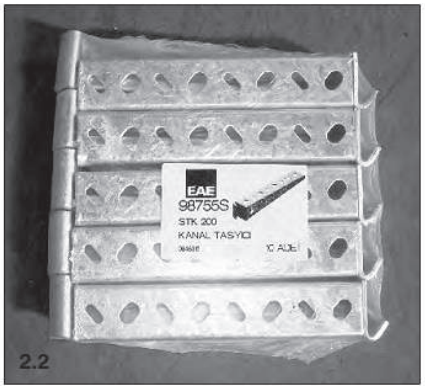
▶ PACKAGING

Standard Packing

Cable Trays&Ladders and Modules are packed using wooden paletts in order to ensure safe transportation to site. After being stacked on the wooden pallets the products are bound to the pallet using PVC strapping to prevent the goods sliding from the pallet. Wooden laths nailed on the sides and onto the palette ensure protection against forces that may possibly come from above and sides.

The specially designed wooden framework enables lifting of the pallet by fork lift vehicle from either side or one end only. It is also designed to prevent insertion of the forks between components which will cause damage

Support and suspension equipment used in the installation of the cable tray is covered using shrink wrap. Packages do not contain more than a total weight of 25 kg of product to facilitate the ease of transport.Product amount within the package are stuck onto the packageare arranged in 10 units or tenfold unit to facilitate counting. Labels containing the code, Description, small technical drawing of the product and specifying the content and amount within the package are adhered onto the packages for easy product identification. Small product packages then are stacked onto wooden palette and wrapped against scattering and supported on the sides using PVC strapping.



Accessories such as joint components, screws, nuts, dowels etc, are packed within cardboard parcels. İn order to prevent screws, nuts, washers and dowels from rusting., they firstly are put into nylon bags. All parcels are prepared not exceeding 25kg and are identified by labels indicating product information. Small product packages then are stacked onto wooden palette and wrapped against scattering and supported on the sides using PVC strapping.
All palettes are identified with labels indicating product information contained within. Palette labels also contain customer information and palette total weight.
Package type above is for large scale projects. It may differ for small deliveries and warehouses.