

GENERAL

Marine Cables

Marine Cables

(ship wiring cables, ship board cables)

Marine cables are for installations on board ships. They have been type approved by a classification society and they have a construction that follows standards for marine cables.

Conductor

Marine cable conductors are of stranded annealed copper combining the flexibility and small dimensions to provide excellent installability and economical solutions. To minimise the cable diameter and weight we use sector shaped conductors for bigger cross-section.

Insulation Material

XLPE (cross-linked polyethylene) is used as the main insulation material. It withstands higher temperatures than ordinary thermoplastic polyethylene. It is resistant against deformation and various chemicals. It has excellent mechanical and electrical properties. The maximum conductor temperature stipulated by IEC 60092-351 marine cable standard is 90 °C.

Sheathing Material

The sheath (jacket) is composed of halogen free, flame retardant thermoplastic compound. It fulfils the criterion of SHF1 according to IEC 60092-359. In case of fire the sheathing material offers advantages such as reduced emission of smoke and corrosive toxic gasses.

Quality Control

Each manufactured cable goes through a test procedure according to the IEC 60092-300 series standards.

Fire Testing Methods

Flame retardance of a single cable is tested in accordance with IEC 60332-1. It is performed on a 60 cm cable sample with a gas flame for 1-4 min depending on the cable diameter. The cable has to be self-extinguishing within certain limits to fulfil the test. Please see figure 1.

Fire retardance is tested on bunched cables in accordance with IEC 60332-3, simulating the fire behaviour of the cables installed in a bunch. The main category that is used is A. This is based on an amount of 7 litres of combustible material per metre.



Bunched cables being tested for fire retardance .

The bunch of cables has to be minimum 3.5 m high when it is in a burning chamber subjected to fire from a burner directed at the cables for forty minutes. The cable bunch may not burn more than 2.5 m above the burner. Please see figure 2.

Fire resistance test is aimed at verifying the behaviour of a cable that must work even when it is burning. There are two different testing methods, IEC 60331-21 and IEC 60331-31, used for power and control cables. Ship cable standards require the IEC 60331-21 test, where the cable sample is subjected to a flame at 750 °C for 90 minutes followed by a 15 minutes cooling period while the rated voltage is being applied between the conductors. No breakdown or short circuit is permitted during the test. Please see figure 3. The optional testing method for cables with diameter over 20 mm, is the more rigorous IEC 60331-31 test, in which a bent cable, affected by mechanical impacts, is subjected to a 830 °C flame for 120 minutes.

Smoke density is tested according to IEC 61034-1 (apparatus) and IEC 61034-2 (procedure and requirements). It is done by placing cable in a "smoke cube" (3x3x3 m). When the cable is burning, the light transmittance is measured using a photometric system. This test is aimed at simulating visibility when cables are burning on board a ship 60 % (70 % for a single cable) visibility is satisfactory if it is attained throughout the test.

Halogens. To test whether a material is halogen free or not, the tests IEC 60754-1 and 60754-2 are used. The acidity of the gasses from burning materials is measured. Being halogen-free means that the materials used in the cables do not contain any halogens – such as chlorine, bromine, iodine and fluorine. In order to attain the self-extinguishing effects that halogens have in cables, ATH based materials are used instead. This way the negative effects of halogens are avoided (corrosivity, toxicity etc.)

Approvals

All above mentioned test are part of the IEC test procedures for marine cables. As a confirmation of the successfully passed test our products have type approval certificates from the following classification societies:

ABS	American Bureau of Shipping
BV	Bureau Veritas
DNV	Det Norske Veritas
GL	Germanischer Lloyd
LRS	Lloyd's Register of Shipping
RINA	Registro Italiano Navale
RMRS	Russian Marine Register of Shipping

Vertical flame propagation test

IEC 60332-1

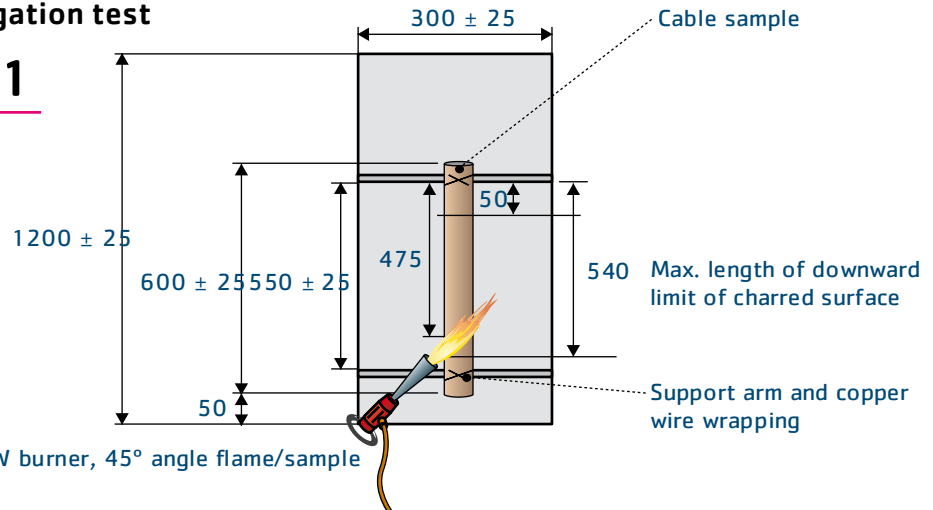


Figure 1.

Vertical flame spread of bunched cables

IEC 60332-3-22 cat.A

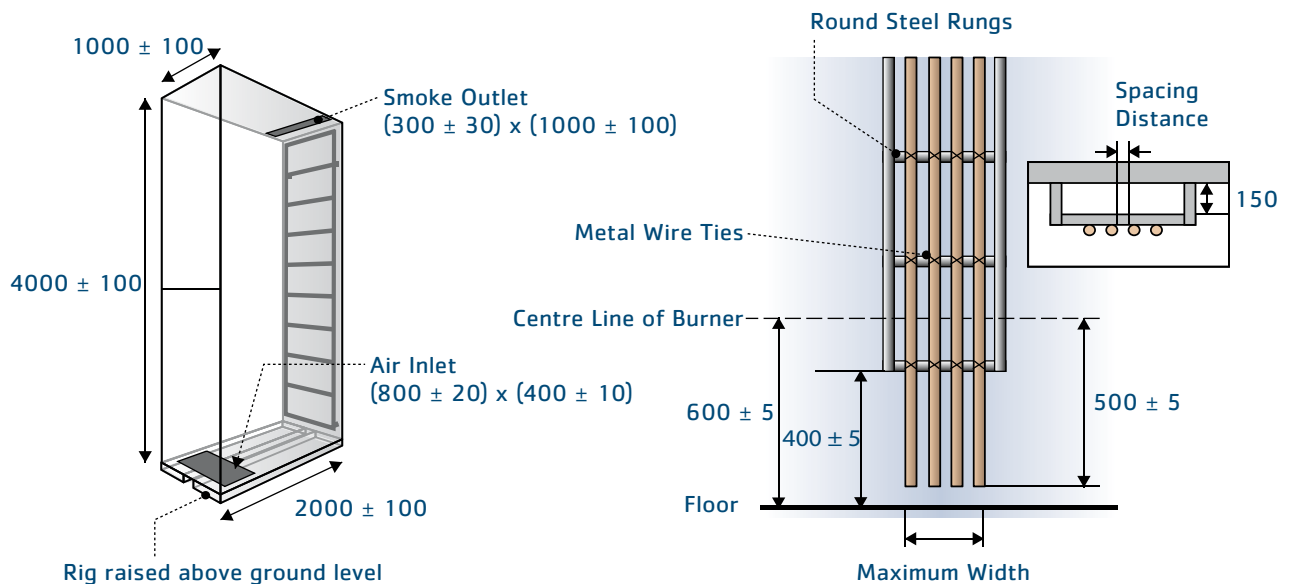


Figure 2.

Fire resistance test

IEC 60331-21

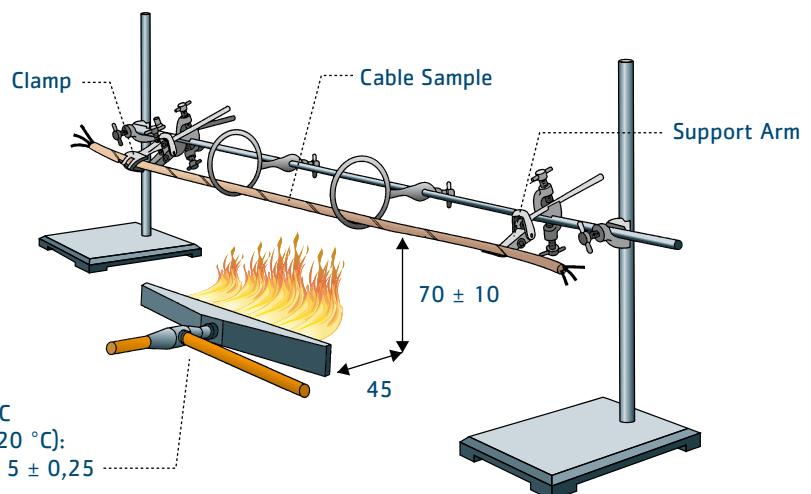


Figure 3.