

RESISTANCE TO FIRE TESTING

27/03/24 – MATT RYDER, GROUP TECHNICAL STRATEGIST

INTRODUCTION

Currently there is no dedicated Resistance to Fire test standard for Cable Management Systems (CMS), which can lead to a degree of ambiguity and confusion in the marketplace when requesting fire rated products.

However, in lieu of a dedicated specification the German standard DIN 4102-12 can be used. This is a test for electric cable systems that are required to maintain circuit integrity, so is therefore written around and is dependent on the performance of the cables themselves as well as cable management products that feature as a support mechanism to the cables.

In order to guarantee the safety of our CMS products in the event of a fire Armorduct carried out testing to determine their performance in accordance with DIN 4102-12 at FIRES in Slovakia. FIRES is a Notified (NB), which is managed in compliance with EN ISO/IEC 17025 and EN ISO/IEC 17065.



Figure 1 – FIRES Notified Body, Batizovce, Slovakia

Armorduct Systems Ltd, trading as Armorduct, Building 9 Pensnett Estate Kingswinford, DY6 7TG. Co. Reg: 3551662 England & Wales.
Registered office: Milton Court, East Portway Business Park, Andover, Hampshire, SP10 3LU. VAT Reg: GB775396381.

TEST CONFIGURATION

The test configuration is in accordance with DIN 4102-12 and was verified by a Suitably Qualified and Experienced Person from FIRES. The assembly and installation of the product in the furnace was also inspected and verified.

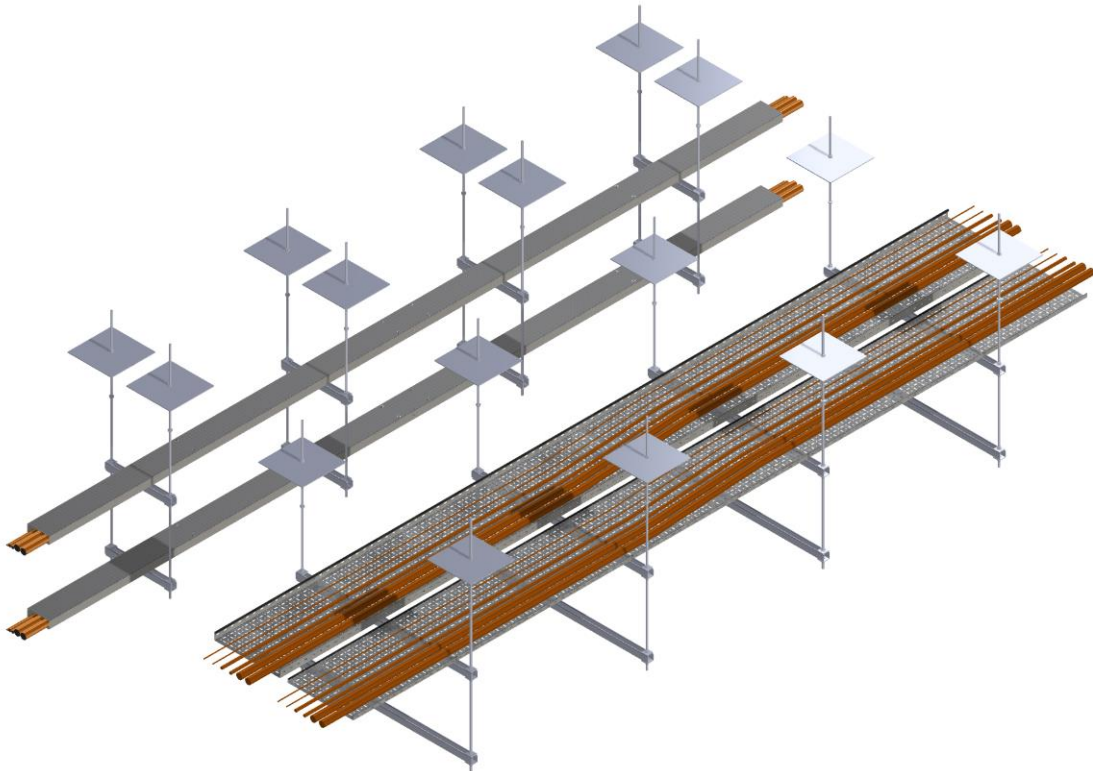


Figure 2 – Containment and cable arrangement.

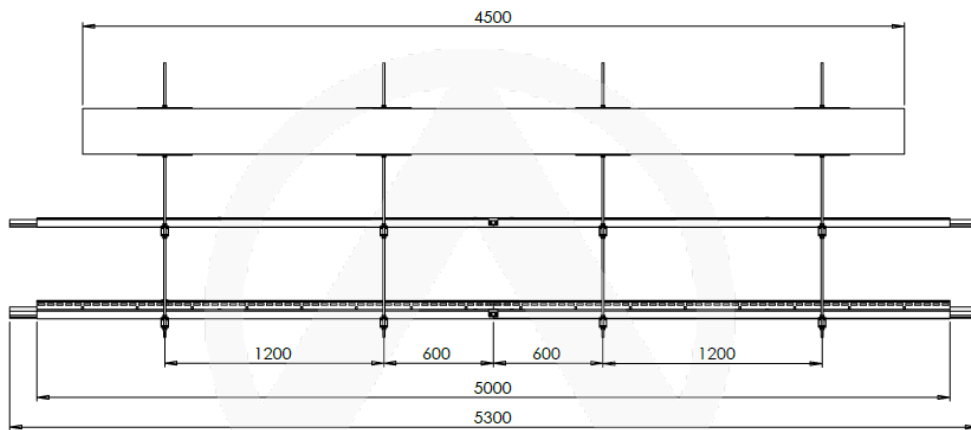


Figure 3 – Containment joint and support arrangement.



Figure 4 – External view of the test furnace.

Containment Details

Part Code	Description	Material
ATB62/PG	Armorduct 6" x 2" IP4x Cable Trunking	Pre-Galvanised
ATB62/MAG	Armorduct 6" x 2" IP4x Cable Trunking	Magnelis®
AD-HD18/PG	Armorduct Heavy Duty 450mm Wide Cable Tray	Pre-Galvanised
AD-MD18/MAG	Armorduct Medium Duty 450mm Wide Cable Tray	Magnelis®

Table 1 – Details of the Armorduct CMS products used in the test.



Figure 5 – Armorduct IP4x Cable Trunking installed in the test furnace.



Figure 6 – Armorduct IP4x Cable Trunking joint.



Figure 7 – Armorduct Cable Tray installed in the test furnace.



Figure 8 – Armorduct Cable Tray with additional load applied in the form of chains to meet the maximum load of 10kg/m in accordance with DIN 4102-12.

Armorduct Systems Ltd, trading as Armorduct, Building 9 Pensnett Estate Kingswinford, DY6 7TG. Co. Reg: 3551662 England & Wales.
Registered office: Milton Court, East Portway Business Park, Andover, Hampshire, SP10 3LU. VAT Reg: GB775396381.

Cable Details

Supplier	Type	Part Code	Formation (No. Cores & CSA)
PRAKAB	Control	JEHStH Bd FE180 E30 E90	1 x 2 x 0.8
PRAKAB	Power	NHXCH FE180 E90 ENG	4 x 1.5 RE/1.5
PRAKAB	Power	NHXCH FE180 E90 ENG	4 x 50 RE/1.5

Table 2 – Details of the cables used in the test.



Figure 9 – Samples of the PRAKAB cable used in the test.

TEST PROCEDURE



Figure 10 – The completed furnace and cables connected to the current monitoring system.

Testing is carried out in accordance with subclauses 6.2.1 and 6.2.3 to 6.2.5 of DIN 4102-2. The furnace temperature is increased following a standardised fire curve (see Figure 11) to a temperature of 1000°C for a duration of 90 minutes (the maximum time covered by DIN 4102).

Armorduct Systems Ltd, trading as Armorduct, Building 9 Pensnett Estate Kingswinford, DY6 7TG. Co. Reg: 3551662 England & Wales. Registered office: Milton Court, East Portway Business Park, Andover, Hampshire, SP10 3LU. VAT Reg: GB775396381.

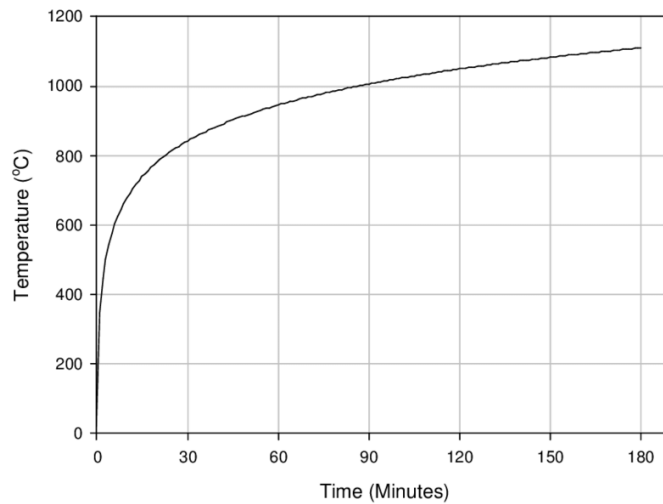


Figure 11 – The standard fire curve as per DIN 4102-1 and ISO 834.

A current with a voltage as specified in subclause 2.6 of DIN VDE 0472-814 is passed through the cable system and the current flow is monitored. If there is an interruption in the current flow, the time interval that has elapsed is recorded and the equivalent Fire Rating, as shown in Table 3, is achieved.

Time Interval	Fire Rating
30 minutes	E30
60 minutes	E60
90 minutes	E90

Table 3 – DIN 4102 Fire Ratings and associated test durations.



Figure 12 – Internal view of the furnace during the test.

Armorduct Systems Ltd, trading as Armorduct, Building 9 Pensnett Estate Kingswinford, DY6 7TG. Co. Reg: 3551662 England & Wales.
Registered office: Milton Court, East Portway Business Park, Andover, Hampshire, SP10 3LU. VAT Reg: GB775396381.

RESULTS AND CONCLUSION

Part Code	Fire Rating
ATB62/PG	E90
ATB62/MAG	E90
AD-HD18/PG	E90
AD-MD18/MAG	E90

Table 4 – Maximum Fire Rating achieved in test.

All of Armorduct’s Cable Management Systems maintained circuit integrity on cables throughout the test for over 90 minutes, thereby achieving an E90 Fire Rating for all products.



Figure 13 – External view of the furnace at the 90 minute mark.

After the 90 minutes for DIN 4102 had elapsed, the test was continued for an additional 30 minutes in order to determine the resistance to fire for an extended period. None of the Cable Management Systems collapsed after a total time of 2 hours and a maximum temperature of 1049°C.

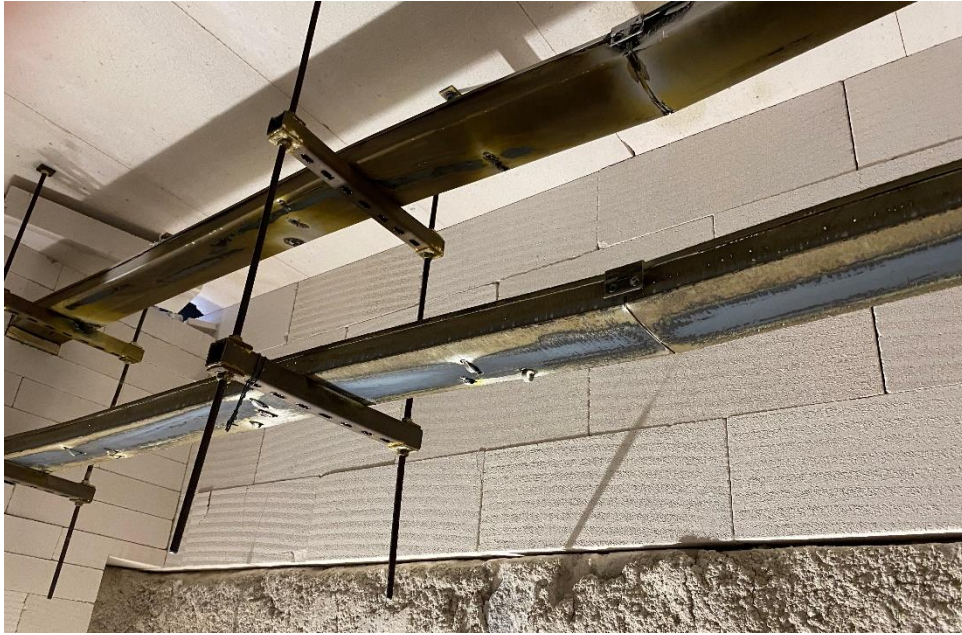


Figure 14 – Armorduct IP4x Cable Trunking after 120 minutes of testing.



Figure 15 – Armorduct IP4x Cable Trunking after 120 minutes of testing with the cover removed for inspection of the cables.

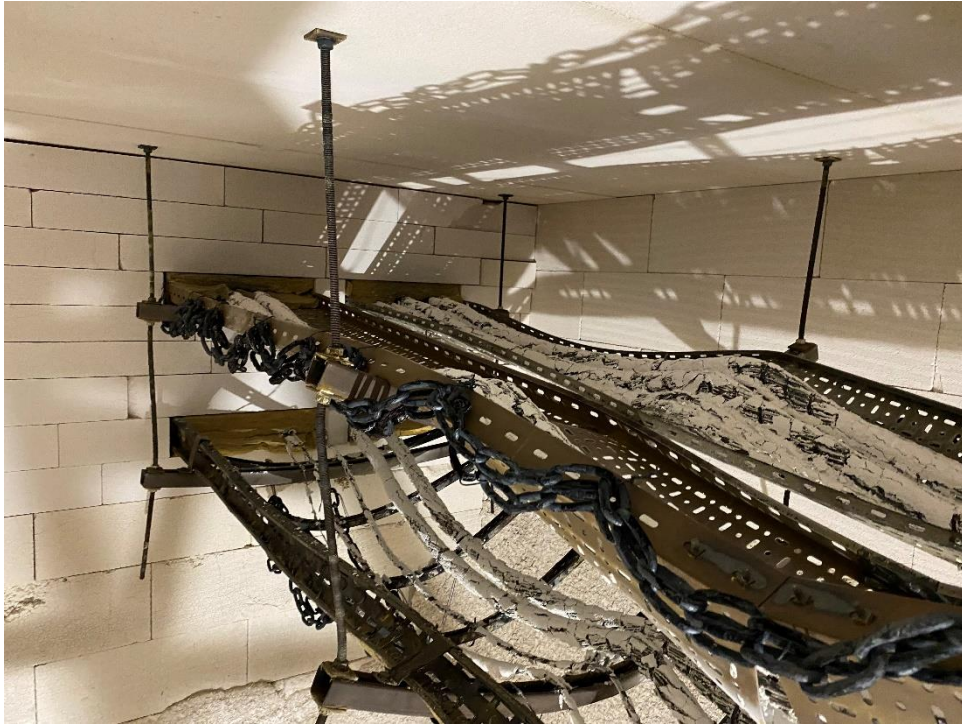


Figure 16 – Armorduct Cable Tray after 120 minutes of testing.

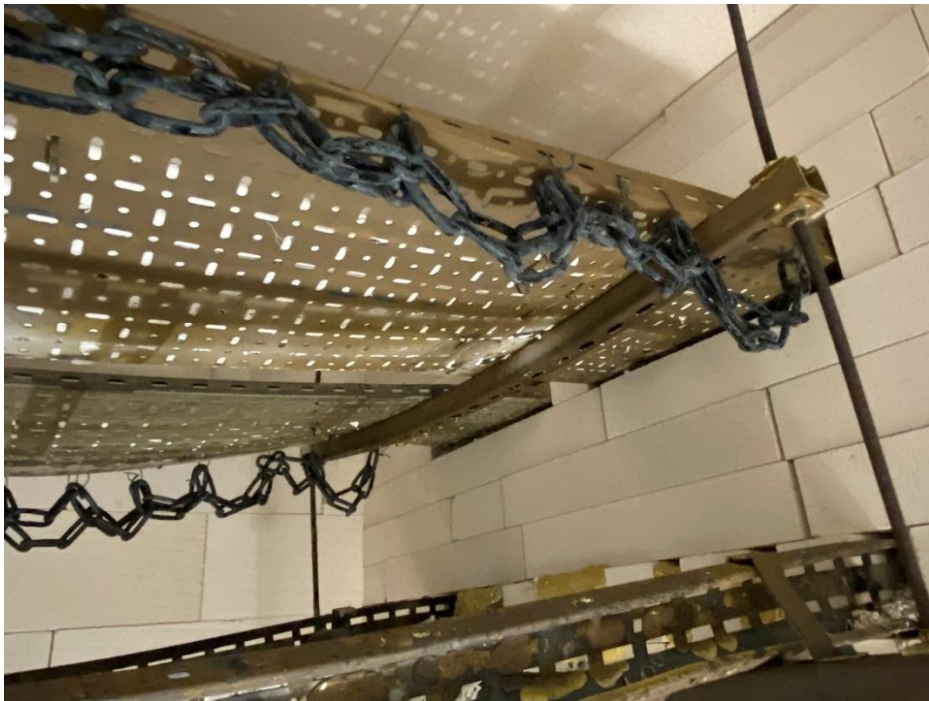


Figure 17 – Armorduct Cable Tray after 120 minutes of testing.

Armorduct Systems Ltd, trading as Armorduct, Building 9 Pensnett Estate Kingswinford, DY6 7TG. Co. Reg: 3551662 England & Wales.
Registered office: Milton Court, East Portway Business Park, Andover, Hampshire, SP10 3LU. VAT Reg: GB775396381.

BIBLIOGRAPHY

ISO 834-1 - Fire-resistance tests. Elements of building construction. Part 1: General requirements.

DIN 4102-1 - Fire behaviour of building materials and elements Part 1: Classification of building materials Requirements and testing.

DIN 4102-2 - Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests

DIN 4102-12 - Fire behaviour of building materials and elements - Fire resistance of electric cable systems required to maintain circuit integrity – Requirements and testing.

DIN VDE 0472-814 - Testing of cables. wires and flexible cords; continuance of insulation effect under fire conditions.