MANUAL FUNCTIONAL INTEGRITY

2020

DÄTWYLER

Contents

Please note:
The optional installation techniques only apply to Datwyler cable types with Datwyler installation systems.
When multiple cables and/or functional integrity classes are combined in a single installation, the lowest values apply!

Assembly instructions

FAQ

SAFETY CONCEPTS FOR BUILDINGS

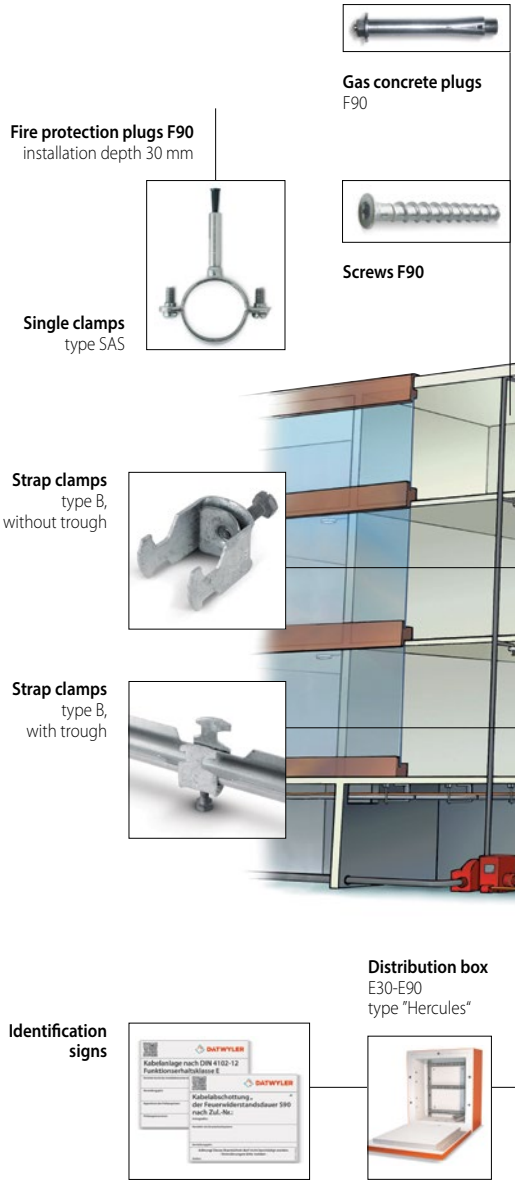
Proven quality

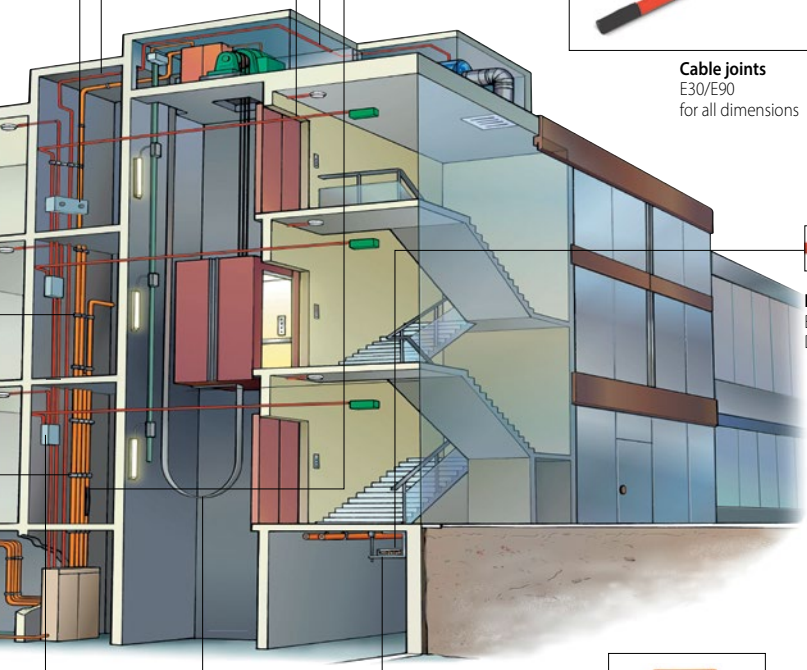
Datwyler IT Infra is the first European manufacturer to develop a complete system solution that meets the demands of today's industry for reliable power supply and data transmission in the event of fire. Datwyler cables and our approved cabling system components are the result of many years of intensive development in coordination with the relevant standardisation bodies.

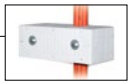
Selected raw materials and special compounds in combination with unique installation methods are what give a Datwyler system its high quality and maximum guaranty of safety in the event of fire.

Datwyler cables and safety system components are used wherever people, machinery and equipment are endangered by fire and smoke emission: in buildings with high density of occupants as well as in facilities containing large concentrations of valuable property.

Our safety cable systems have to be highly reliable when it comes to practical operations. This is why Datwyler measures each and every product against strict quality standards before it leaves the company. Specifically, this means that all processes are integrated into the comprehensive management system in accordance with ISO 9001 and ISO 14001. Beyond this, additional application-specific inspection and test methods ensure that Datwyler cables and safety cable systems exceed the requirements of our customers as well as the stringent standards specified by the various countries in which our products are used.







WUM
support measure

Safety cables
E90 Keram

Safety cables
E30-E60 Keram

Safety cables
E90 Keram

Cable joints
E30/E90
for all dimensions

Fibre optic safety cable
E30 with reference to
DIN 4102-12, 30 minutes

Multi cable support
"Hermann" clamp E30/E90
spacing ≤ 600/800 mm

Elevator
travelling cables

Cable trays
E30/E90
spacing ≤ 1500 mm

Connection/
terminal box
E30-E90

SAFETY CONCEPTS FOR TUNNELS

Fire protection plugs F90
installation depth 30 mm

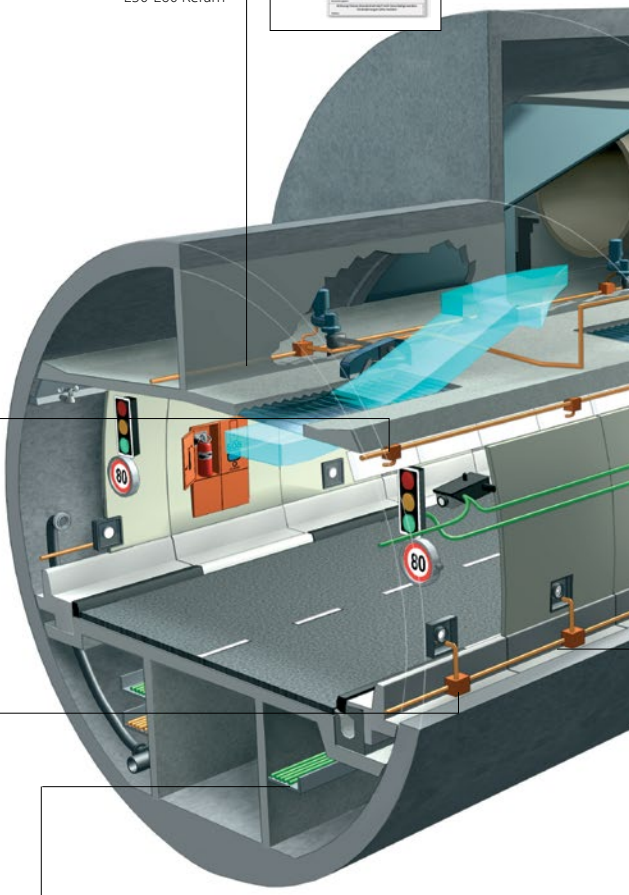
Single clamps
type SAS V4A

Gas concrete plugs F90

Screws F90

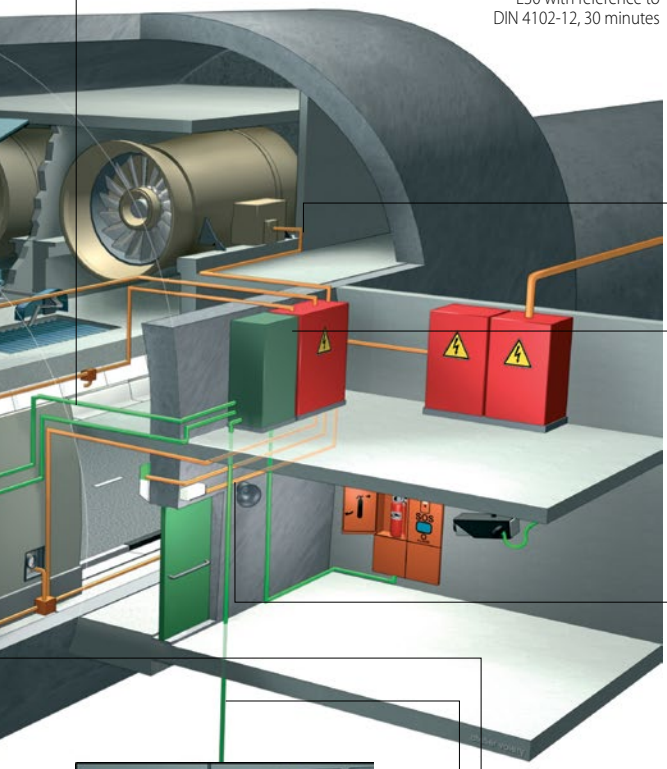
Safety cables
E30-E60 Keram

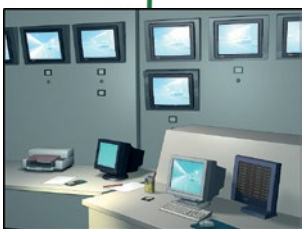
Identification signs



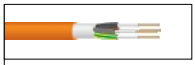
Distribution boxes
E30/E90

Multi cable support
"Hermann" clamp E30/E90





Fibre optic safety cable
E30 with reference to
DIN 4102-12, 30 minutes



Safety cables
E30/E90 Keram

Cable joints E30/E90
for all dimensions

Distribution box
E30-E90
type "Hercules"

Strap clamps
type B,
without trough

Strap clamps
type B,
with trough

Safety cables
E30-E90 Keram

Fibre optic safety cable
E30 with reference to
DIN 4102-12, 30 minutes

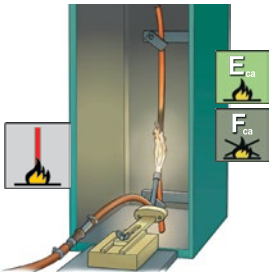
TESTING METHODS

Relevant fire behaviour / fire performance standards

German (VDE) / International	European Construction Products Regulation as per EN 13501-6 and EN 50575*

Flame propagation test for a single insulated cable

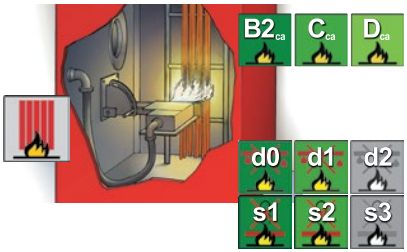
IEC 60332-1-2
EN 60332-1-2
DIN VDE 0482-332-1-2



EN 60332-1-2 serves to classify cables for Euroclasses E_{ca} and F_{ca}. Passing this test is prerequisite for tests for the Euroclasses D_{ca} up to B_{ca}.

Fire behaviour test for cable bundles with determination of flaming droplets/particles

IEC 60332-3-22 up to 26 Cat A-D
EN 60332-3-22 up to 26 Cat A-D
DIN VDE 0482-332-3-22 up to 26 Cat A-D



EN 50399
serves to classify cables for
- Euroclasses D_{ca} up to $B2_{ca}$
- Additional criteria:
  - flaming droplets/particles d2 up to d0
  - smoke generation s3 up to s1 (with EN 61034-2)

Smoke density test

IEC 61034-1 and IEC 61034-2
EN 61034-1 and EN 61034-2
DIN VDE 0482-1034 -1 and -2

EN 61034-2
serves to classify cables for the additional criterion smoke density (transmittance) s1a + s1b
(with EN 50399)

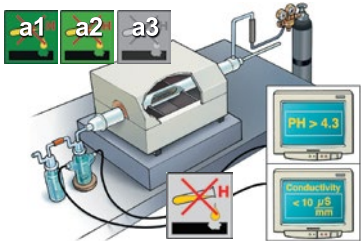
* EN 50575 does not apply to cables with fire resistance. Therefore, cables with fire resistance were excluded from the Construction Products Regulation at the time of printing this manual. To date, the European Union did not publish classification standards for cables with fire resistance according to EN 50577, EN 50200 or similar.

Relevant fire behaviour / fire performance standards

German (VDE) / International	European Construction Products Regulation as per EN 13501-6 and EN 50575

Acidity and corrosive flue gases test

IEC 60754-1 and IEC 60754-2
EN 60754-1 and EN 60754-2
DIN VDE 0482-754-1 and
DIN VDE 0482-754-2



EN 60754-2
serves to classify cables
for the additional criterion
acidity a3 up to a1

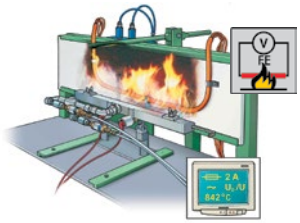
Relevant fire resistance standards

German (VDE) / International	EN Standard (up to now not part of the CPR)

Circuit integrity of an unprotected single cable (50 cm) during and after exposure to a fire

Cables < 20 mm:
IEC 60331-2
EN 50200
DIN VDE 0482-200
Cables > 20 mm:
IEC 60331-1
EN 50362
DIN VDE 0482-362

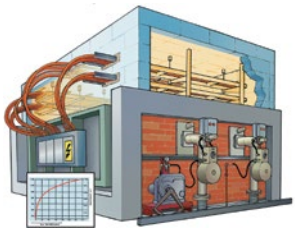
In metal:
IEC 60331-3
Copper data cables:
EN 50289-4-16
DIN VDE 0819-289-4-16
Fibre optic cables:
IEC 60331-25



EN 50200
PH 15 up to PH 120

System Circuit Integrity / Functional Integrity

DIN 4102 part 12 (E30-E90):
Better than standard!
Today, this test is the only reliable global standard for ensuring the functional integrity or system circuit integrity (E30-E90) of an entire electrical cable system together with fastening components under real-life conditions.



EN 50577
P15 up to P120
This is no full system test -
it serves to classify cables only.
Therefore EN 50577 cannot
replace the system circuit integrity
test in accordance with DIN 4102-12.

DATWYLER ICONS FOR FIRE PROPERTIES

Flame propagation

These Datwyler cables use a flame retardant material that is self-extinguishing.

IEC 60332-1-2
EN 60332-1-2
DIN VDE 0482-332-1-2

Euroclasses under the CPR according to EN 50575

Flame spread

These Datwyler cables are flame resistant and prevent the propagation of a fire from one location to another.

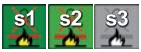
IIEC 60332-3-22 up to 26 Cat. A-D,
EN 60332-3-22 up to 26 Cat. A-D,
VDE 0482-332-3-22 up to 26 Cat. A-D
EN 50399
DIN VDE 0482-332-1-2

Euroclasses under the CPR according to EN 50575

Smoke density

These Datwyler cables emit minimum smoke in the event of fire. Exit routes and fire brigade access are not restricted.

IEC 61034-1 and IEC 61034-2,
EN 61034-1 and EN 61034-2,
EN 50399
DIN VDE 0482-1034 - 1 and -2

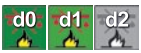


Euroclasses under the CPR according to EN 50575

Flaming droplets / particles

Exposed to fire these Datwyler cables have no or short-term flaming falling off particles.

EN 50399



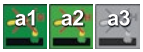
Euroclasses under the CPR according to EN 50575

DATWYLER ICONS FOR FIRE PROPERTIES

Zero halogen, no corrosive gases

These Datwyler cables are halogen-free and reduce possible damage to health or material to a minimum.

IEC 60754-1 and IEC 60754-2, EN 60754-1 and EN 60754-2, DIN VDE 0482-754-1 and IEC 60754-2

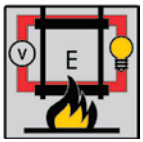


Euroclasses under the CPR according to EN 50575

Flame propagation (FE / PH)

These Datwyler cables with circuit integrity guarantee the function of a single cable for a defined duration. (FE = flame time and influence time)

IEC 60331-1 IEC 60331-2 and Part 21,23, 25
IEC 60331-3
EN 50200 (PH15 – PH120)
EN 50200 Annex E
EN 50362
EN 50289-4-16
DIN VDE 0819-289-4-16
DIN VDE 0472-814.
DIN VDE 0482-200.
DIN VDE 0482-362,
BS 8434-2, BS 6387



System circuit integrity [E30-E90]

These Datwyler cables together with certified Datwyler fixing systems guarantee enhanced circuit integrity of the complete electrical cable installation for a defined time. (E30=30 minutes, E60=60 minutes, E90=90 minutes)

DIN 4102-12 (E30-E90)
Similar standards, however, without reference to laying systems
NBN 713.020 (Rf1, Rf11/2)
EN 50577* (P15 – P120)

* EN 50575 does not apply to cables with fire resistance. Therefore, cables with fire resistance were excluded from the European Construction Products Regulation at the time of printing this manual. To date, the European Union did not publish classification standards for cables with fire resistance according to EN 50577, EN 50200 or similar.

General: Resistance to fire
(IEC 60364-4-42:2010/A1:2014)
Low voltage electrical installations - Part 4-42: Protection for safety - Protection against thermal effects
422.2 Conditions of evacuation in an emergency
Condition BD2: Low density occupation, difficult conditions of evacuation
BD3: High density occupation, easy conditions of evacuation
BD4: High density occupation, difficult conditions of evacuation
(according to Table 51A of IEC 60364-5-51:2005).
NOTE: Authorities responsible for building construction, public gatherings, fire prevention, etc. may specify which BD condition is applicable.
In conditions BD2, BD3 and BD4, wiring systems that are supplying safety circuits shall have a resistance to fire rating of either the time authorized by regulations for building elements or 1 h in the absence of such a regulation.

German Regulation on Fire Security of Conduit Installations – Directive on fire protection requirements for cabling systems (MLAR)

5.1 Basic requirements

5.1.1 In compliance with the stipulated building laws and construction standards, electrical cable systems used in safety systems and safety equipment must contain intrinsic protection or be protected by additional components in such a manner as to ensure that the safety systems and safety equipment remain operational for a sufficiently long period of time (functional integrity = system circuit integrity) in cases of fire. Functional integrity must also be given under of the effects of interaction with additional systems, equipment or their components.

5.1.2 Any additional safety systems and safety equipment which are required may be connected to electrical terminals used in safety systems and safety equipment operated in compliance with the stipulated building laws and construction standards.
Here, it must be ensured that the safety systems and safety equipment prescribed by law are not compromised.

5.2 Functional integrity

5.2.1 The functional integrity of a cable is ensured if

a) the test requirements of DIN 4102- 12:1998-11 (functional integrity classes E30 to E90) are fulfilled or classified as equivalent or
b) the cables are installed on floor slabs below a floor screed with a thickness of at least 30 mm or
c) the cables are installed in the earth

5.2.2 Distribution boards for electrical cable systems with functional integrity according to paragraph 5.3 have to

a) be installed in seperate rooms which are not used for other purposes and are seperated from other rooms by walls, ceilings and doors with fire resistance that corresponds to the necessary functional integrity duration and made of - except the doors - non-combustible materials
b) be seperated by housings which can guarantee the operation of the electrical equipment installed inside for the necessary functional integrity duration in case of fire by a certificate of usability from building authorities
c) be encased by components (including their terminations) which provide a fire resistance that corresponds to the necessary functional integrity duration and are made (except the terminations) of non-combustible materials. The operation of the electrical equipment installed inside must be ensured for the functional integrity duration in case of fire.

5.3 Duration of functional integrity

5.3.1 The functional integrity of a cable system must be ensured for at least 90 minutes for any of the following:

a) Water boosting equipment for firefighting water
b) Mechanical smoke exhaust systems and smoke control pressure systems for required stairwells in high-rise structures as well as for special structures where these systems are required. An exception here can be made for cable systems installed in stairwells, which require a functional integrity duration of 30 minutes.
c) Mechanical hospital beds and other equipment with special functionality and fire brigade elevators. The only exceptions are cable systems used in travel shafts or powerplant rooms.

5.3.2 The functional integrity of a cable system must be ensured for at least 30 minutes for any of the following:

a) Safety lighting systems; excepted are cable systems that provide power to safety lighting within a fire compartment on a floor or within a stairwell; the maximum floor space per fire compartment is 1,600 m^2.
b) Passenger elevators with fire control systems; excepted are cable systems located within travel shafts or powerplant rooms.
c) Fire detector systems including associated transmission systems; excepted are cable systems in rooms monitored by automatic fire detectors as well as cable systems in rooms without automatic fire detectors, where short or open circuits in the cable system caused by fires in these rooms will not compromise any of the fire detectors connected to this cable system.
d) Alarm and emergency information systems for working personnel and visitors inasmuch as these systems must remain operational in cases of fire; excepted are cable systems that provide power to safety lighting within a fire compartment on a floor or within a stairwell; the maximum floor space per fire compartment is 1600 m^2.
e) Natural smoke exhaust systems (smoke discharge via thermal lift); excepted are systems that automatically open when power is interrupted or lost as well as cable systems in rooms monitored by automatic fire detectors where the response of a fire detector causes the system to open automatically.
f) Mechanical smoke exhaust systems and smoke control pressure systems in applications differing from section 5.3.1.

CALCULATING THE REQUIRED CROSS-SECTION

Calculation of required cross-section for safety cables with E30 and E90 functional integrity

1. General

It is important to keep in mind that exposure to flames will increase the resistance of a given cable.
In Appendix A of test standard DIN 4102-12, this is described as follows:
"In cases where no extra evidence is available, the conductor temperature in cable systems with integrated functional integrity can be approximated as the fire compartment temperature at the point in time at which functional integrity was lost."
This means that after 30 minutes, the conductor temperature is approx. 830 °C and after 90 minutes even higher than 1000 °C. However, measurements have proven that the values differ considerably.
During two measurements, the increase in temperature was measured directly on the conductor in various cables using thermocouples. At the same time, the change in resistance ensuing from the temperature increase was measured in the conductor using a precision measuring bridge.
50% of the length of the cable was located in the testing room and thus exposed directly to the effects of the temperature increase along the uniform temperature time curve. The other half of the cable was located outside of the test room at an ambient temperature of approximately 17 °C. After 30 minutes, the conductor temperature was measured to be only approx. 420 °C and after 90 minutes it was approx. 870 °C.
On the basis of this data, tables have been created that allow electrical system planners and electricians to choose the actual cross-section that is required.
This ensures that the necessary safety equipment remains functional for the required duration.
It is even easier to calculate the required cross-section for fires using the line voltage drop calculation tool based on Excel spreadsheets. You can download this software from ITinfra.datwyler.com.

2. Table for calculating cross-section of cables

V	F (E30)	F (E90)	V	F (E30)	F (E90)
90:10	1.16	1.34	40:60	1.95	3.01
80:20	1.32	1.67	30:70	2.1	3.34
70:30	1.48	2.01	20:80	2.26	3.68
60:40	1.63	2.34	10:90	2.42	4.01
50:50	1.79	2.67	0:100	2.57	4.34

χ=58 (electrical conductivity of copper at 20°C)

Explanation of table:
V is the ratio of "cold" to "hot" cable lengths, with the first number representing the portion of cable not immersed in flames.
For this you choose the longest length of cable in a given fire compartment.
Since the building is subdivided into multiple "fire compartments", the cross-section of zero-halogen cable to be used depends on the ratio of "cold" to "hot" lengths, as shown in the table.

A fire compartment in this case is a room with a fire resistance duration of 30 or, accordingly, 90 minutes on all sides. An F90 fire compartment usually contains multiple F30 compartments. With longer lengths of cable, one should consider designs where the cable passes through multiple fire compartments. For example, it is preferable to install cable through neighbouring rooms than through a subterranean garage.

In the following example, we compare various aspects of the cross-section calculation:

A cable is to be installed with a length of 150 m and shall run through three equally large fire compartments, thus resulting in a ratio of "cold" to "hot" cable lengths of 60:40 (exactly 66:33).
The reason for this is that a fire can only break out in **one** fire compartment and it is assumed that the fire will not spread to the other fire compartments.
F is the required factor to be multiplied with the determined **theoretical** cross-section. After calculating the cross-section in this manner, choose the next higher available conductor cross-section.

3. Procedure for calculating the cross-section

Example for SHE motor:

U = 400 V; cable length l = 150 m; P = 15 kW
ΔU = 12 V (corresponds to 3% line voltage drop)
cos φ = 0.87
χ = 58 (electrical conductivity of copper at20°C)
χ = 56 (electrical conductivity of copper at 30°C)

Normal operating conditions

When calculating the cross-section, first determine the cross-section relative to the nominal current of the fuse as shown in **3.1** and in **3.2** for the line voltage drop in accordance with DIN VDE 0100-520. Choose the highest cross-section of the two.

3.1 Calculating the cross-section in accordance with DIN VDE 0298-4

First determine the cross-section for normal operating conditions in accordance with DIN VDE 0298-4. "Normal" conditions are an ambient air temperature of 30 °C and a maximum conductor temperature of 90 °C.
Installation type "E" on perforated cable trays. Groups of 4 cables, "single layer" = reduction factor "0.79"
Since the load current is 25A, a fuse with IN 32A is normally used.
(**Note:** Pumps or fans should be fitted with suitably dimensioned fuses since long operating pauses or high degrees of contamination can result in increased load and starting currents. For this reason, VdS CEA Directive 4001 prescribes using the following fuses for sprinkler pumps: "9.8.2.1 The fuses in pump control cabinets must be surge-proof and designed to resist the current of a blocked motor for at least 75% of the time until the motor windings fail. They also have to be able to withstand normal current plus 100% for at least 5 h."
Modification 2007-07:
This can be achieved in the following manner:
High performance fuses can be installed in pump control cabinets designed to withstand the starting current for at least 20 s. The nominal current of the protective equipment must be larger than the operating current of the circuit."

In the author's opinion, safety systems should not contain a motor overload switch or fault-current circuit breaker.
To allow for comparisons with "normal" cable systems, calculations are made for a fuse with I_N **32A** as well as for the recommended fuse with I_N **50A**.

According to DIN VDE 0298-4, the cross-section can be calculated as follows:

$$I_Z = \frac{I_N\mathbf{32A} \cdot 1{,}45}{0{,}79\ \text{(reduction factor)}} = 58{,}74\ \text{A}$$

Chosen cross-section: 10 mm²

$$I_Z = \frac{I_N\mathbf{50A} \cdot 1{,}45}{0{,}79\ \text{(reduction factor)}} = 91{,}78\ \text{A}$$

or 16 mm²

According to DIN VDE 0298-4 Table 6, installation Type "E", for three conductors subjected to electrical load

3.2 Determining cross-section from line voltage drop calculation in accordance with DIN VDE 0100-520

$$I_b = \frac{P}{\sqrt{3} \cdot U \cdot \cos\varphi}$$

I_b = 25A

$$A = \frac{\sqrt{3} \cdot \ell \cdot I \cdot \cos\varphi}{\chi \cdot \Delta U}$$

$A_{theoret.}$ = 8.37 mm²

This results in a theoretical cross-section of 8.37 mm²
The reduction factor resulting from grouping the cables and the given installation type is 0.79.

$$A = \frac{A_{theoret.}\ 8{,}37\,\text{mm}^2}{0{,}79\ \text{(reduction factor)}}$$

A= 10.60 mm²
An available conductor cross-section of A = **16 mm²** can be used.

CALCULATING THE REQUIRED CROSS-SECTION

3.3 Fire conditions / functional integrity class E90

For equipment manufacturers, DIN VDE prescribes a line voltage drop of up to 10%. The voltage drop for fire conditions can be set to a higher value.
In cases of fire, it is only important that the connected electrical consumers still function. Doubling the voltage drop halves the cross-section!
In many cases, it can be helpful to calculate using a higher voltage drop.
Even with poor cable configurations, a voltage drop of 4.5% is often sufficient.
At the same time, the voltage drop calculation is based on a conductivity value of $\chi = 56$ at a temperature of 30 °C.

Reduction factors based on installation type, cable grouping or increased ambient temperatures are not determining factors under fire conditions.

Therefore, for fire conditions do not simply multiply the theoretically calculated value for 3% with the factor given in table 2! Instead, recalculate the voltage drop while taking into consideration the parameters for the fire conditions

If you use a larger line voltage drop (4.5%, for example) and allow for the conductivity of copper at 20°C ($\chi = 58$), the calculation is as follows:

$$A_{theoret.} = \frac{\sqrt{3} \cdot \ell \cdot I \cdot \cos\varphi}{\chi \cdot \Delta U}$$

$A_{theoret.} = 5.39\ mm^2$

For 3 equally large fire compartments, the factor is 2.34. This corresponds to a ratio of 60:40.

$A_{E90} = 5.39\ mm^2 \cdot 2.34 = 12.62\ mm^2$.
An available conductor cross-section of A = **16 mm²** could be used.

For normal operating conditions, it is thus apparent that the calculated cross-section is also sufficient for maintaining functionality integrity in cases of fire.

3.4 Examples for calculating cross-section using line voltage drop

Example:

Three-phase motor 15 kW, Ib = 25 A, cos φ = 0.87
U = 400 V
ΔU = 12 V (corresponds to 3% line voltage drop)
χ = 56 (electrical conductivity of copper at 30 °C)
Groups of 4 cables on cable tray, "single layer" = reduction factor "0.79" acc. to DIN VDE 0298-4
ΔU = 18 V (corresponds to 4.5% line voltage drop)
χ = 58 (electrical conductivity of copper at 20 °C), basis for fire case
The reduction factor is not required for the fire case.

CALCULATING THE REQUIRED CROSS-SECTION

Normal operating conditions (and an example with correct fuse dimensioning)

Cable length m	Theoretical cross-section (Uv=3%) mm²	Reduction factor 0.79	Available cross-section mm²	Acc. to DIN VDE 0298-4 Table 6, Installation Type "E" (Basis 32A) mm²	Acc. to DIN VDE 0298-4 Table 6, Installation Type "E" (Basis 50A) mm²	Selected cross-section mm²
150	8.37	10.6	16	10	16	16

safety cable, functional integrity E30, voltage drop 4.5% (3% for comparison)

Cable length m	Theoretical cross-section (Uv=4.5%) mm²	V 60:40 F =1.63 calculated mm²	Insert mm² (10mm² would be sufficient for 35A fuse)	Theoretical cross-section (Uv=3%) mm²	V 60:40 F =1,63 calculated mm²	Insert mm²
150	5.39	8.79	16	8.37	13.65	16

safety cable, functional integrity E90, voltage drop 4.5% (3% for comparison)

Cable length m	Theoretical cross-section (Uv=4.5%) mm²	V 60:40 F =2.34 calculated mm²	Insert mm²	Theoretical cross-section (Uv=3%) mm²	V 60:40 F =2,37 calculated mm²	Insert mm²
150	5.39	12.62	16	8.37	19.59	25

Note:
As apparent in these examples, the cross-section does not necessarily increase as a result of using functional integrity classes E30 or E90.

In all cases, it remains as E30 and E90 for a cross-section of 16 mm².

3.5 Calculating cross-section for a fire compartment

3.5.1 Functionality integrity class E30

Step 1: Resistance change as a result of temperature increase in conductor

First, the required cross-section is calculated for "normal opertion" as described in sections 3.1 and 3.2 (**16 mm²**).
R_W Resistance following temperature increase in Ω/km
R_K Resistance of conductor at 20 °C
ΔT Temperature change in K
α Temperature coefficient (0.00393 for copper)
The temperature change ΔT in the conductor is **400 K** during the 30th minute.

$$R_W = R_K \cdot (1+0.00393 \cdot \Delta T)$$

Example:

U = 400 V; I = 150 m; P = 15 kW; ΔU = 18 V (corresponds to 4.5% voltage drop)
cos φ = 0.87
χ = 58 (electrical conductivity of copper)
Ib = 25 A, $A_{theoret.} = 5.39\ mm^2$
The resistance for **6 mm² is given in table 5.3.6 as 3.08 Ω/km**

A cross-section must be found whose **R_W** for 30 minutes is closest to **R_K** from the previously calculated cross-section.

The **E30 factor** is **2.57**.

$$RW = \frac{3{,}08\ \Omega/km}{1 + 0{,}00393 \cdot 400} = \frac{3{,}08\ \Omega/km}{Faktor_{E30}\ 2{,}57} = 1{,}198\Omega / km$$

CALCULATING THE REQUIRED CROSS-SECTION

Step 2: Calculating the conductor cross-section to use
A cross-section must be found in table **3.6** where R_W for 30 minutes is closest to R_K from the previously calculated cross-section.

Example for calculated cross-section of 6 mm².
16 mm² = 1.15 Ω/km
25 mm² = 0.727 Ω/km

Since the theoretical cross-section was determined to be 5.39 mm² for cold conditions, a cross-section of **16 mm²** will be sufficient in our example.

3.5.2 Functionality integrity class E90

Step 1: Resistance change as a result of temperature increase in conductor
R_W Resistance following temperature increase in Ω/km
R_K Resistance of conductor at 20 °C
ΔT Temperature change in K
α Temperature coefficient (0.00393 for copper)
The temperature change ΔT in the conductor is **850 K** during the 90th minute.

$$R_W = R_K \cdot (1+0.00393 \cdot \Delta T)$$

Example:
U = 400 V; l = 150 m; P = 15 kW; ΔU = 18 V (corresponds to 4.5% voltage drop)
cos φ = 0.87
χ = 58 (electrical conductivity of copper)
Ib = 25 A, $A_{theor.}$ = 5.39 mm²
The resistance for **6 mm² is given in table 3.6 as 3.08 Ω/km**

A cross-section must be found whose R_W for 90 minutes is closest to R_K from the previously calculated cross-section.

$$RW = \frac{3{,}08\ \Omega/km}{1 + 0{,}00393 \cdot 850} = \frac{3{,}08\ \Omega/km}{Faktor_{E90}\ 4{,}34} = 0{,}709\ \Omega/km$$

The **E_{90} factor** is **4.34**.

Step 2: Calculating the conductor cross-section to use
A cross-section must be found in table **3.6** where R_W for 90 minutes is closest to R_K from the previously calculated cross-section.

Example for calculated cross-section of 6 mm².
25 mm² = 0.727 Ω/km
35 mm² = 0.524 Ω/km

Since the theoretical cross-section was determined to be 5.39 mm² for cold conditions,
a cross-section of **25 mm²** will be sufficient in our example.

In this (rather extreme) example, the required cross-section increases by an entire dimension. By cleverly planning the cable routes to pass through multiple fire compartments or possibly with a larger line voltage drop, it is possible to reduce the required cross-section.

3.6 Conductor resistances for safety cables

Single-core cable in accordance with VDE 0295	
Conductor cross-section mm²	Max. resistance for 20 °C in Ω/km
1.5	12.1
2.5	7.41
4	4.61
6	3.08
10	1.83

Multicore cable in accordance with VDE 0295			
Conductor cross-section mm²	Max. resistance for 20 °C in Ω/km	Conductor cross-section mm²	Max. resistance for 20 °C in Ω/km
16	1.5	120	0.53
25	0.727	150	0.124
35	0.524	185	0.0991
50	0.387	240	0.0754
70	0.268	300	0.0601
95	0.193		

Installation in E / I 90 channel

Example:

U = 400 V; cable length l = 150 m; P = 15 kW
ΔU = 12 V (corresponds to 3% line voltage drop)
cos φ = 0.87
χ = 58 (electrical conductivity of copper at 20°C)
χ = 56 (electrical conductivity of copper at 30°C)

Calculating the cross-section in accordance with DIN VDE 0298-4

First determine the cross-section for normal operating conditions in accordance with DIN VDE 0298-4. "Normal" conditions are an ambient air temperature of 30 °C and a maximum conductor temperature of 70 °C for PVC cables. Installation type "A2" on perforated cable trays. Groups of 4 three-phase current cables in installation duct = reduction factor "0.65"
Since the load current is 25A, a fuse with IN 32A is normally used.
(**Note:** Pumps or fans should be fitted with suitably dimensioned fuses since long operating pauses or high degrees of contamination can result in increased load and starting currents. For this reason, VdS CEA Directive 4001 prescribes using the following fuses for sprinkler pumps: "9.8.2.1 The fuses in pump control cabinets must be surge-proof and designed to resist the current of a blocked motor for at least 75% of the time until the motor windings fail. They also have to be able to withstand normal current plus 100% for at least 5 h."
Modification 2007-07:
This can be achieved in the following manner:
High performance fuses can be installed in pump control cabinets designed to withstand the starting current for at least 20 s. The nominal current of the protective equipment must be larger than the operating current of the circuit."

In the author's opinion, safety systems should not contain a motor overload switch or fault-current circuit breaker.
To allow for comparisons with "normal" cable systems, calculations are made for a fuse with I_N **32A** as well as for the recommended fuse with I_N **50A**.

According to DIN VDE 0298-4, the cross-section can be calculated as follows:

$$I_Z = \frac{I_N 32A \times 1{,}45}{0{,}65\ \text{(reduction factor)}} = 71{,}4A \qquad I_Z = \frac{I_N 50A \times 1{,}45}{0{,}65\ \text{(reduction factor)}} = 111{,}54A$$

Chosen cross-section 35 mm² or 70 mm²

According to DIN VDE 0298-4 Table 6, installation Type "E", for three conductors subjected to electrical load

The line voltage drop no longer needs to be calculated for an ambient temperature of 150 °C.

CORE COLOUR-CODING

Core colour-coding in accordance with CENELEC and SEV standards.

Core colour-coding in accordance with DIN VDE 0293 - 308 : 01/2003 (CENELEC HD 308 10/2001)

No. of cores	1(-0)		1(-J)	2(-0)	2(-J)	3(-0)	3(-J)	4(-0)	4(-J)	5(-0)	5(-J)
Conductor function	L	N	PE	LN	LPE	3L	LNPE	3LN	3LPE	4LN	3LNPE
Brown (L)	■			■	■	■	■	■	■	■	■
Blue (N)		■		■			■	■		■	■
Black (L)	■					■		■	■	■ ■	■
Grey (L)	■					■		■	■	■	■
Yellow-green (PE)			■		■		■		■		■

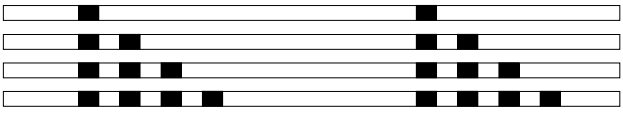
L = external conductor
N = neutral conductor
PE = protective conductor

Core markings for cables ≥ 6 conductors
External conductor = black with white printed digits
Protective conductor = yellow-green

Conductors marked in accordance with VDE 0815 for industrial electronics cable JE-H(ST)H…Bd (2 twin-wires: star quad; othwise: 4 pairs in bundles)

Pair	Conductor A	Conductor B
1	■	■
2	■	■
3	■	■
4	■	■

Each bundle is assigned to a ring group. All conductors in a bundle are marked with coloured rings and the order of the specific coloured rings in groups, or they are marked by a printed bundle number. When counting the groups, start with the innermost one.



Only applies for Datwyler safety cables

Bundle markings

Bundle number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ring colour																					
Ring group for bundle	4 conductors	I	I	II	II																
	8 conductors or 4 pairs	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Tape coil																					

Only applies for Datwyler safety cables

FUNCTIONAL INTEGRITY

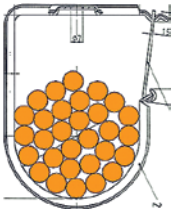
Vertical installation

In order to install cable systems vertically while maintaining functional integrity (system circuit integrity), DIN 4102-12 prescribes the following measures:

The placement and classification of functionally integral cables installed separately beneath a ceiling applies to both horizontal and vertical cable lines along walls and ceilings. When cables are installed horizontally on a wall using profile rails and clamps, the clamps used for seperately installed cables must be fastened in such a manner that a slippage of clamps will be prevented.
If the cable installation is entirely vertical (rising lines or separately installed cables, for example), you must install effective support mounts (spacing A^3 3500 mm), for example, a Datwyler WUM.
For vertical cable systems, the same placement and classification applies as with separately installed cables along a ceiling using single clamps. A certified bracket clamp can be used as alternative means of fastening the cables. The spacing of the bracket clamp is the same as the spacing used to install cables separately using single clamps.

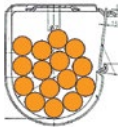
Multi-cable supports

Other comparable systems offer only a fraction of the capacity of a Hermann clamp!



30 pcs. Datwyler Keram (N)HXH FE180/E30-E60 3x1.5 mm^2 cable in a Hermann clamp

15 pcs. Datwyler Keram (N)HXH FE180/ E30-E60 3x1.5 mm^2 cable in a Hermann clamp "S"



Furthermore:
When installing a Hermann clamp in acc. with MLAR for "cables without functional integrity" above a fireproof ceiling, it is possible to install a linear cable weight of 15 kg/m with a clamp spacing of 600 mm.

E0 multi-cable support
For wall and ceiling installations in accordance with MLAR 2015

Article No.	Name	Interior dimensions mm x mm x mm	Exterior dimensions mm x mm x mm	Units / pcs.
3800086	E0 multi-cable supports	approx. 80 x 45 x 33	approx. 87 x 60 x 33	25
3800087	E0 S multi-cable supports	approx. 55 x 35 x 33	approx. 63 x 45 x 33	50

To speed up installation times for the E0 multi-cable support, we recommend using the Datwyler SWM-SM 50 setting tool.

System description:
For fire-safe installation of multiple cables or lines along ceilings or walls above fireproof ceilings in accordance with MLAR 2015 (not for functional integrity!).

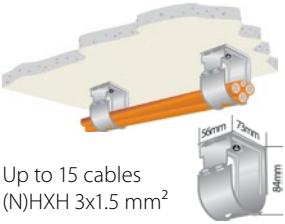
Excerpt from MLAR 2015 3.5.3.:
The special requirements pertaining to fireproof fasteners for lines installed in the area between floor slabs and suspended ceilings must be observed.

Installation spacing (cm)	30	40	50	60	70	80
Cable weight (kg/m)	6	4.5	3.6	3	2.6	2.3

Only applies for Datwyler safety cables

Multi-cable support, type E30-E90 for Hermann clamp S

for horizontal wall and ceiling installations



Up to 15 cables
(N)HXH 3x1.5 mm²

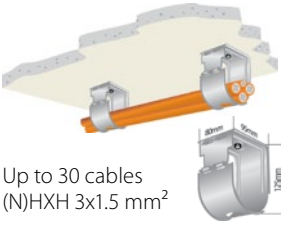
The cable with the highest weight must be placed in the multi-cable support beneath the cables with a lower weight.

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			maximum load: 3 kg/m
(N)HXH	800	E30-E60	
(N)HXCH	800	E30-E60	
FE180 / E90			maximum load: 3 kg/m
(N)HXH	800	E90	
(N)HXCH	800	E90	
FE180 / E30-E90			maximum load: 3 kg/m
JE-H(ST)H…Bd	800	E30-E60	*
JE-H(ST)H…Bd	600	E30-E90	
JE-H(ST)HRH…Bd	800	E30-E60	
JE-H(ST)HRH…Bd	600	E30-E90	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

Multi-cable support, type E30-E90 for Hermann clamp (large)

for horizontal wall and ceiling lines



Up to 30 cables
(N)HXH 3x1.5 mm²

The cable with the highest weight must be placed in the multi-cable support beneath the cables with a lower weight.

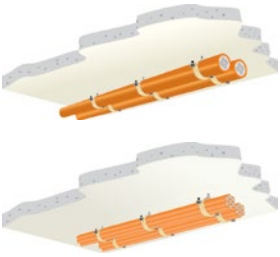
Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			maximum load: 6 kg/m
(N)HXH	800	E30-E60	
(N)HXCH	800	E30-E60	
FE180 / E90			maximum load: 6 kg/m
(N)HXH	800	E90	
(N)HXCH	800	E90	
FE180 / E30-E90			maximum load: 6 kg/m
JE-H(ST)H…Bd	800	E30-E60	*
JE-H(ST)H…Bd	600	E30-E90	
JE-H(ST)HRH…Bd	800	E30-E60	
JE-H(ST)HRH…Bd	600	E30-E90	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

SINGLE CLAMP

Separate and bundle installation using type SAS or TSD single clamps

(stainless steel tunnel clamp) for horizontal wall and ceiling lines

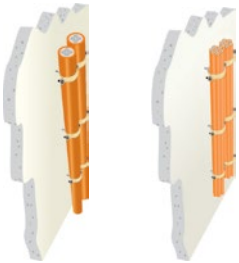


Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	600	E30-E60	
	1200	E30	
(N)HXCH	600	E30-E60	
	1200	E30	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	600	E90	
(N)HXCH	600	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	600	E90	
	1200	E30-E60	*
JE-H(ST)HRH…Bd	600	E90	
	1200	E30-E60	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

Separate and bundle installation using type SAS or TSD single clamps

(stainless steel tunnel clamp) for vertical installation



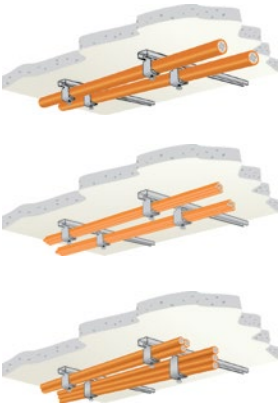
Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	600	E30-E60	
	1200	E30	
(N)HXCH	600	E30-E60	
	1200	E30	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	600	E90	
(N)HXCH	600	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	600	E90	
	1200	E30-E60	*
JE-H(ST)HRH…Bd	600	E90	
	1200	E30-E60	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

Note: For vertical installations >3.5 m between fire bulkheads on floor slabs, the cable system must be installed using an effective support measure (Datwyler WUM, for example).

Only permitted with Datwyler safety cables

Separate and bundle installation using type B...D strap clamps without troughs
for horizontal wall and ceiling installation



Strap clamps with troughs can also be used.

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	800	E30-E60	
	1200	E30	
(N)HXCH	800	E30-E60	
	1200	E30	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	800	E90	
(N)HXCH	800	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	800	E90	
	1200	E30-E60	*
JE-H(ST)HRH…Bd	800	E90	
	1200	E30-E60	
FO Universal Safety Cables			according to DIN 4102-12
ZGGFR	600	30 min.	2-12 fibres
wbGGFR	600	30 min.	24-60 fibres

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

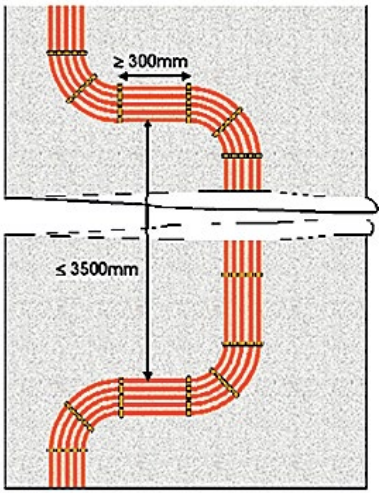
Separate and bundle installation using type B...D strap clamps without troughs
for vertical installation

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	800	E30-E60	
	1200	E30	
(N)HXCH	800	E30-E60	
	1200	E30	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	800	E90	
(N)HXCH	800	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	800	E90	
	1200	E30-E60	*
JE-H(ST)HRH…Bd	800	E90	
	1200	E30-E60	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

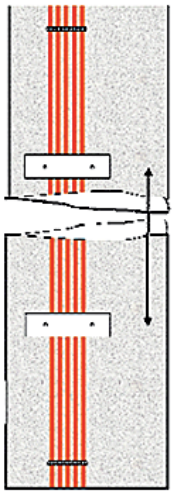
Note: For vertical installations >3.5 m between fire bulkheads on floor slabs, the cable system must be installed using an effective support measure (Datwyler WUM, for example).

WUM
Effective support measure in accordance with DIN 4102-12



"With riser lines, this classification only applies when effective support mounts (spacing ≤ 3,500 mm) are installed for the cables."

Datwyler WUM



Only permitted with Datwyler safety cables

In-wall installation
horizontally / vertically along wall or ceiling

(Mineral-based wall covering on cable ≥ 15 mm)

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			
(N)HXH		E30	
(N)HXCH		E30	
FE180 / E90			
(N)HXH		E90	
(N)HXCH		E90	
FE180 / E30-E90			
JE-H(ST)H…Bd		E30-E90	*
JE-H(ST)HRH…Bd		E30-E90	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

STEEL-ARMOURED CONDUITS

Separate and bundle installation in type Stapa DN to M steel armoured conduit
without troughs with type SAS / TSD single clamps or type B...D strap clamps
for horizontal wall and ceiling installations

(≤ M63, filling factor ≤ 60 %)

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	1200	E30	
(N)HXCH	1200	E30	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	1200	E30-E60	
JE-H(ST)HRH…Bd	1200	E30-E60	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

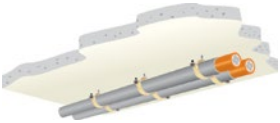
Maximum line length without fasteners between ends of conduit: ≤ 1.200 mm

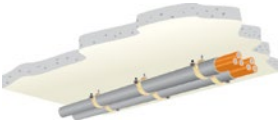
In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installations using strap clamps.

PROTECTIVE CONDUITS

Separate and bundle installation in zero-halogen protective conduit

with type SAS / TSD single clamps for horizontal wall and ceiling installation





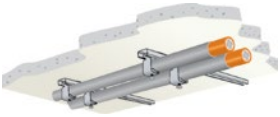
[1] also in aluminium protective conduit

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	600	E30-E60[1]	
	1200	E30[1]	
(N)HXCH	600	E30-E60[1]	
	1200	E30[1]	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	600	E90	
(N)HXCH	600	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	600	E90[1]	
	1200	E30-E60[1]	*
JE-H(ST)HRH…Bd	600	E90[1]	
	1200	E30-E60[1]	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

Separate and bundle installation in zero-halogen protective conduit

with strap clamps for horizontal wall and ceiling installations



Strap clamps with troughs can also be used.

[1] also in aluminium protective conduit

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			bundles without limits (number / weight)
(N)HXH	800	E30-E60[1]	
	1200	E30[1]	
(N)HXCH	800	E30-E60[1]	
	1200	E30[1]	
FE180 / E90			bundles without limits (number / weight)
(N)HXH	800	E90	
(N)HXCH	800	E90	
FE180 / E30-E90		bundle	maximum load: 2.5 kg/m
JE-H(ST)H…Bd	800	E90[1]	
	1200	E30-E60[1]	*
JE-H(ST)HRH…Bd	800	E90[1]	
	1200	E30-E60[1]	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installation using strap clamps.

Only permitted with Datwyler safety cables

Bundle installation in protective cable duct (LLK 60.100 + holding piece LHS 100)

for horizontal wall and ceiling lines

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			maximum load: 3.1 kg/m ceiling installation; 7.0 kg/m wall installation
(N)HXH	500	E30	from 1.5 mm² to 16 mm²
FE180 / E30-E90			maximum load: 3.1 kg/m ceiling installation; 7.0 kg/m wall installation
JE-H(ST)H…Bd	500	E30	*
JE-H(ST)HRH…Bd	500	E30	

Bundle installation in protective cable duct (LLK 26.030)

for horizontal wall and ceiling lines

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E90			maximum load: 0.3 kg/m
JE-H(ST)H…Bd	500	E30	*
JE-H(ST)HRH…Bd	500	E30-E60	

Bundle installation in wire mesh cable duct

Lanz Oensingen AG (CH), G-duct with G-post or hooked rail
for horizontal wall and ceiling lines

Datwyler Keram	Spacing (mm)	Functional integrity	Note
FE180 / E30-E60			G-… ≤ 50x75 mm ≤ 3 kg/m
(N)HXH	1250	E30	from 1.5 mm² to 16 mm²
(N)HXCH	1250	E30	from 1.5 mm² to 16 mm²
FE180 / E30-E90			G-… ≤ 50x75 mm ≤ 3 kg/m
JE-H(ST)H…Bd	1250	E30	*
JE-H(ST)HRH…Bd	1250	E30-E60	
FE180 / E30-E60			G-… ≤ 75x100 mm ≤ 7.5 kg/m
(N)HXH	1250	E30	no restrictions
(N)HXCH	1250	E30	no restrictions
FE180 / E30-E90			G-… ≤ 75x100 mm ≤ 7.5 kg/m
JE-H(ST)H…Bd	1250	E30	*
JE-H(ST)HRH…Bd	1250	E30-E60	

* JE-H(ST)H…Bd FE180/E30L classified in same manner as with E30.

UNLIMITED FUNCTIONAL INTEGRITY

Standard installation techniques are not practical and are more expensive

Datwyler "Keram" safety cables for high- and low-voltage applications with integrated functional integrity in accordance with DIN 4102-12 allow for installation techniques that fulfil nearly all requirements in contemporary building applications. They are also highly affordable.

Cables with integrated functional integrity are used in applications requiring special protection against fire and hazards to persons and property, and where building safety laws and provisions must be complied with.

The highly limited standard installation techniques are not able to comply with the demands in construction work and architecture. As a result, costly and time-intensive building site approvals are required on a case-by-case basis together with even more expensive correctional measures.

The installation itself is costly in terms of materials and time when performed in the "normal" manner.

Installation type	Standard installation techniques in accordance with DIN 4102-12 (Nov. 1998)	Installation techniques with Datwyler Keram cable in acc. with DIN 4102-12	Savings fastening system
Cable ladder	With threaded rod suspension	Without threaded rod suspension	Approx. 20%
	Support spacing: up to 1.200 mm	Support spacing: up to 1.500 mm	
	Width: up to 400 mm	Width: up to 400 mm	
	Load capacity: up to 20 kg/m	Load capacity: up to 20 kg/m	
Cable tray	With threaded rod suspension	Without threaded rod suspension	More than 50% for cable loads larger than 10 kg/m
	Support spacing: up to 1.200 mm	Support spacing: up to 1.500 mm	
	Width: up to 300 mm	Width: up to 400 mm	
	Load capacity: up to 10 kg/m	Load capacity: up to 30 kg/m	
Strap clamp	With trough Fastener spacing up to 600 mm	Without trough Fastener spacing up to 1.2 m (E30); 800 mm (E60 + E90) Bundling up to 2.5 kg/m	Approx. 60 % for separately installed cables, more than 90 % for cable bundles
Single clamp	Line spacing: up to 300 mm	Fastener spacing up to 1.2 m (E30); 600 mm (E60 + E90) only limited for JE-H(St)H / HRH cables Bundling up to 2.5 kg/m	Approx. 50 - 60 % for separately installed cables, more than 90 % for cable bundles
Multi-cable supports	(Bundled lines only on cable tray / cable ladder)	Bundle lines in multi-cable support Fastener spacing up to 800 mm (E30); 600 mm (E60 + E90) only limited for JE-H(St)H / HRH cables Up to 3 or 6 kg/m cable weight.	More than 90%
Conduit / duct	Not possible	Installation in zero-halogen plastic conduit / aluminium protective conduit / steel-armoured conduit / sheet steel ducts	

Wire mesh trays for horizontal wall and ceiling installation

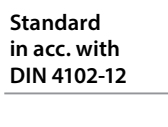
	Width ≤ mm	Load capacity ≤ kg/m	Fastener spacing ≤ m	OBO Menden (N)HXH E30 (N)HXH E90	OBO Menden (N)HXCH E30 (N)HXCH E90	OBO Menden JE-H(St)H	OBO Menden JE-H(St)HRH	PUK Berlin (N)HXH E30 (N)HXH E90	PUK Berlin (N)HXCH E30 (N)HXCH E90	PUK Berlin JE-H(St)H	PUK Berlin JE-H(St)HRH	Niedax Linz/Rhein FO Universal Safety ZGGFR 2-12 Fasern wbGGFR 24-60 Fasern
				Datwyler Keram				Datwyler Keram				Datwyler
	400	20	1.5					**E30** E90	**E30** E90			
	400	10	1.25					**E30** E90	**E30** E90			
	300	10	1.2					**E30** E90	**E30** E90			**30 min.**
Ceiling with threaded rod	300	30 stainless steel	1.5	**E30** E90	**E30** E90	**E30**	**E30**					
	400	20	1.5					**E30** E90	**E30** E90			
	400	10	1.25					**E30** E90	**E30** E90			
Wall with threaded rod	300	10	1.2					**E30** E90	**E30** E90			**30 min.**

	Width ≤ mm	Load capacity ≤ kg/m	Fastener spacing ≤ m	Legrand Cablofil (N)HXH E30 (N)HXH E90	Legrand Cablofil (N)HXCH E30 (N)HXCH E90	Legrand Cablofil JE-H(St)H	Legrand Cablofil JE-H(St)HRH
				Datwyler Keram			
	400	10	1.2	**E30** E90	**E30** E90	**E30** E60	
	200	10	1.25	**X** E90	**X** E90		
Ceiling with threaded rod	50	1 without threaded rod	1.5			**E30**	
	200	10	1.25	**X**	**X**		
Wall with threaded rod	300	10	1.2	E90	E90		

E&OE.
Please see the cable tray vendor´s General Appraisal Certificates (ABP) and approvals for assessing standard compliant cable trays (in accordance with DIN 4102-12).

CABLE TRAYS

Cable trays for horizontal ceiling installation



	Width ≤ mm	Load capacity ≤ kg/m	Fastener spacing ≤ m	PUK Berlin (N)HXH E30-E60 (N)HXH E90	PUK Berlin (N)HXCH E30-E60 (N)HXCH E90	PUK Berlin JE-H(ST)H E30-E90 *	PUK Berlin JE-H(ST)HRH E30-E90*	Vergokan B- Oudenaarde (N)HXH E30-E60 (N)HXH E90	Vergokan B- Oudenaarde (N)HXCH E30-E60 (N)HXCH E90	Vergokan B- Oudenaarde JE-H(ST)H E30-E90 *	Vergokan B- Oudenaarde JE-H(ST)HRH E30-E90*
				Datwyler Keram				Datwyler Keram			
Ceilings without threaded rod	**400**	**30**	**1.5**	**E30** E90	**E30** E90	**E30**					
	400	**25**	**1.5**	**E30** E90	**E30** E90	**E30**					
	400	**20**	**1.5**	**E30** E90	**E30** E90	**E30**	**E30**	**E30** E90	**E30** E90	**E30**	**E30**
				Datwyler Keram				Datwyler Keram			
Wall without threaded rod	**400**	**30**	**1.5**	**E30** E90	**E30** E90	**E30**					
	400	**25**	**1.5**	**E30** E90	**E30** E90	**E30**					
	400	**20**	**1.5**	**E30** E90	**E30** E90	**E30**	**E30**	**E30** E90	**E30** E90	**E30**	**E30**
				Datwyler Keram				Datwyler Keram			
Standard in acc. with DIN 4102-12	**300**	**10**	**1.2**	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90

E&OE.
Please see the cable tray vendor´s General Appraisal Certificates (ABP) and approvals for assessing standard-compliant cable trays (in accordance with DIN 4102-12).

*) More Appraisal Certificates coming soon.

Special fastening with clamps is permitted with standard-compliant cable trays if there is just a non-significant deviation from the General Appraisal Certificate (ABP).

Only permitted with Datwyler safety cables

	Niedax Linz/Rhein					**Rico** Kirchheim/Teck				**OBO** - Menden			
	(N)HXH E30-E60 (N)HXH E90	**(N)HXCH E30-E60 (N)HXCH E90**	**JE-H(ST)H E30-E90 ***	**JE-H(ST)HRH E30-E90***	**FO Universal Safety ZGGFR 2-12 Fasern wbGGFR 24-60 Fasern**	**(N)HXH E30-E60 (N)HXH E90**	**(N)HXCH E30-E60 (N)HXCH E90**	**JE-H(ST)H E30-E90 ***	**JE-H(ST)HRH E30-E90***	**(N)HXH E30-E60 (N)HXH E90**	**(N)HXCH E30-E60 (N)HXCH E90**	**JE-H(ST)H E30-E90 ***	**JE-H(ST)HRH E30-E90***
	Datwyler Keram					Datwyler Keram				Datwyler Keram			
	E30 E90	**E30** E90	**E30**			**E30** E90	**E30** E90	**E30**					
	E30 E90	**E30** E90	**E30**	**E30**	**E30**	**E30** E90	**E30** E90	**E30**	**E30**	**E30** E90	**E30** E90	**E30**	**E30**

	Datwyler Keram					Datwyler Keram				Datwyler Keram			
	E30 E90	**E30** E90	**E30**			**E30** E90	**E30** E90	**E30**					
	E30 E90	**E30** E90	**E30**	**E30**		**E30** E90	**E30** E90	**E30**	**E30**	**E30** E90	**E30** E90	**E30**	**E30**

	Datwyler Keram					Datwyler Keram				Datwyler Keram			
	E30 E90	**E30** E90	**E30** E90	**E30** E90	**30 Min.**	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90	**E30** E90

Only permitted with Datwyler safety cables

LOW-VOLTAGE CABLE E30-E60

Datwyler (N)HXH FE180 / E30-E60 Keram
all dimensions

Installation spacing

Datwyler fastener	horizontal and vertical		Note
Type SAS / TSD single clamp	E30: 1.2 m	E60: 60 cm	Bundles without limits
Type B…D strap clamp on profile rail	E30: 1.2 m	E60: 80 cm	Horizontal also possible with conduits
In-wall installation	E30 mineral-based wall covering on cable ≥ 15 mm		

Datwyler fastener	horizontal	Note
Hermann clamp S, small	E30-E60: 80 cm	Maximum load: 3 kg/m (e.g. up to 15 cables 3 x 1.5 mm^2)
Hermann clamp, large	E30-E60: 80 cm	Maximum load: 6 kg/m (e.g. up to 30 cables 3 x 1.5 mm^2)

Installation spacing

Datwyler fastener	horizontal	Note
Aluminium pipe with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m E60: 60 cm E60: 80 cm	Bundles without limits
Zero-halogen plastic armoured conduit with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m E60: 60 cm E60: 80 cm	Bundles without limits Separately installed cables 1.5 mm^2 to 16 mm^2
Steel-armoured conduit with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m	≤ M63, filling factor ≤ 60% Bundles without limits Maximum line length w/o fasteners between ends of conduit: ≤ 1.2 m
G-duct 50 x 75 mm with G-post or hooked rail	E30: 1.25 m	Maximum load: 3 kg/m up to 16 mm^2
G-duct ≤ 75 x 100 mm with G-post or with hooked rail	E30: 1.25 m	Maximum load: 7.5 kg/m
Protective cable duct 60 x 100 mm	E30: 50 cm	Maximum of 16 mm^2 Maximum load: 3.1 kg/m ceiling installation; 7 kg/m wall installation.
Cable tray 60 x ≤ 400 mm without threaded rod suspension	E30-E60: 1.5 m	Maximum load: 20 kg/m. Wall and ceiling installation

Cable support systems also without threaded rod	dependent on manufacturer		
Wire mesh cable tray	≤ 400 mm	1.5 m	maximum 20 kg/m
Tray	≤ 400 mm	1.5 m	maximum 30 kg/m
Ladder	≤ 400 mm	1.5 m	maximum 20 kg/m

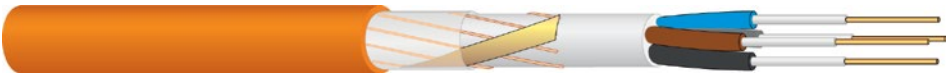
If a Hermann clamp is used to support multiple cables with varying cross-sections, the cable with the largest cross-section must be installed below the smaller ones. When installed horizontally, the installation is the same for walls and ceilings. However, riser lines (directly fastened, using only single or bracket clamps) require the installation of an appropriate fireproof bulkhead or WUM (see page 79) at a spacing of every 3.5 m. Any certified steel fastening bolts or certified fireproof plugs from other manufacturers can be used.

In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installation using strap clamps.

LOW-VOLTAGE CABLE E30-E60

Datwyler (N)HXCH FE180 / E30-E60 Keram

all dimensions



Installation spacing

Datwyler fastener	horizontal and vertical	Note
Type SAS / TSD single clamp	E30: 1.2 m E60: 60 cm	Bundles without limits
Type B…D strap clamp on profile rail	E30: 1.2 m E60: 80 cm	Horizontal also possible with conduits
In-wall installation	E30 mineral-based wall covering on cable ≥ 15 mm	

Datwyler fastener	horizontal	Note
Hermann clamp S, small	E30-E60: 80 cm	Maximum load: 3 kg/m (e.g. up to 15 cables 3 x 1.5 mm^2)
Hermann clamp, large	E30-E60: 80 cm	Maximum load: 6 kg/m (e.g. up to 30 cables 3 x 1.5 mm^2)

Installation spacing

Datwyler fastener	horizontal	Note
Aluminium pipe with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m E60: 60 cm E60: 80 cm	Bundles without limits
Zero-halogen plastic armoured conduit with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m E60: 60 cm E60: 80 cm	Bundles without limits
Steel-armoured conduit with type SAS / TSD single clamp with type B…D strap clamp on profile rail	E30: 1.2 m	≤ M63, filling factor ≤ 60% Bundles without limits Maximum line length w/o fasteners between ends of conduit: ≤ 1.2 m
G-duct 50 x 75 mm with G-post or hooked rail	E30: 1.25 m	Maximum load: 3 kg/m up to 16 mm^2
G-duct ≤ 75 x 100 mm with G-post or hooked rail	E30: 1.25 m	Maximum load: 7.5 kg/m
Protective cable duct 60 x 100 mm	E30: 50 cm	Maximum of 16 mm^2 Maximum load: 3.1 kg/m ceiling installations; 7 kg/m wall installations.
Cable tray 60 x ≤ 400 mm without threaded rod suspension	E30-E60: 1.5 m	Maximum load: 20 kg/m. Wall and ceiling installations

Cable support systems also without threaded rod	dependent on manufacturer		
Wire mesh cable tray	≤ 400 mm	1.5 m	maximum 20 kg/m
Tray	≤ 400 mm	1.5 m	maximum 30 kg/m
Ladder	≤ 400 mm	1.5 m	maximum 20 kg/m

If a Hermann clamp is used to support multiple cables with varying cross-sections, the cable with the largest cross-section must be installed below the smaller ones. When installed horizontally, the installation is the same for walls and ceilings. However, riser lines (directly fastened, using only single or bracket clamps) require the installation of an appropriate fireproof bulkhead or WUM (see page 79) at a spacing of every 3.5 m. Any certified steel fastening bolts or certified fireproof plugs from other manufacturers can be used.

In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installation using strap clamps.

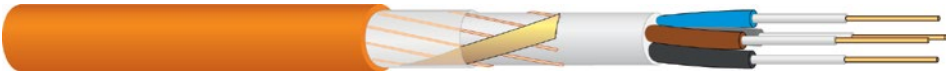
LOW-VOLTAGE CABLE E90

Datwyler (N)HXH FE180 / E90 Keram

all dimensions

Datwyler (N)HXCH FE180 / E90 Keram

all dimensions



Installation spacing

Datwyler fastener	horizontal and vertical	Note
Type SAS or TSD single clamp	60 cm	Bundles without limits
Type B…D strap clamp on profile rail	80 cm	Horizontal also possible with plastic armoured conduits
In-wall installation	E30 mineral-based wall covering on cable ≥ 15 mm	

Datwyler fastener	horizontal	Note
Hermann clamp S, small	80 cm	Maximum load: 3 kg/m (e.g. up to 15 cables 3 x 1.5 mm^2)
Hermann clamp, large	80 cm	Maximum load: 6 kg/m (e.g. up to 30 cables 3 x 1.5 mm^2)

Installation spacing

Datwyler fastener	horizontal	Note
Zero-halogen plastic armoured conduit with type SAS / TSD single clamp	60 cm	Bundles up to 2.5 kg/m without limits
Zero-halogen plastic armoured conduit with type B…D strap clamp on profile rail	80 cm	
Cable tray 60 x ≤ 400 mm without threaded rod suspension	1.5 m	Maximum load: 20 kg/m. Wall and ceiling installations

Cable support systems also without threaded rod	dependent on manufacturer		
Wire mesh cable tray	≤ 400 mm	1.5 m	maximum 20 kg/m
Tray	≤ 400 mm	1.5 m	maximum 30 kg/m
Ladder	≤ 400 mm	1.5 m	maximum 20 kg/m

If a Hermann clamp is used to support multiple cables with varying cross-sections, the cable with the largest cross-section must be installed below the smaller ones. When installed horizontally, the installation is the same for walls and ceilings. However, riser lines (directly fastened, using only single or bracket clamps) require the installation of an appropriate fireproof bulkhead or WUM (see page 79) at a spacing of every 3.5 m. Any certified steel fastening bolts or certified fireproof plugs from other manufacturers can be used.

In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installation using strap clamps.

JE-H(ST)H E30-E90

Datwyler Keram

Datwyler JE-H(ST)H...Bd FE180/E30-E90 Keram

Colour: red, with inscription for fire alarm cable

Datwyler JE-H(ST)H...Bd FE180/E30 L Keram

Colour: red, with inscription for fire alarm cable

Datwyler JE-H(ST)H...Bd FE180/E30-E90 Keram

Colour: orange

Datwyler JE-H(ST)H...Bd FE180/E30 L Keram

Colour: orange

Datwyler JE-H(ST)HRH...Bd FE180/E30-E90 Keram

Colour: red, with inscription for fire alarm cable

Installation spacing

Datwyler fastener	horizontal and vertical	Note
Type SAS / TSD single clamp	E30-E60: 1.2 m E90: 60 cm	Bundles up to 2.5 kg/m
Tyoe B…D strap clamp on profile rail	E30-E60: 1.2 m E90: 80 cm	Horizontal also possible with conduits
In-wall installation	Mineral-based wall covering on cable ≥ 15 mm	

Datwyler fastener	horizontal	Note
Hermann clamp S, small	E30-E60: 80 cm E90: 60 cm	Maximum load: 3 kg/m
Hermann clamp, large	E30-E60: 80 cm E90: 60 cm	Maximum load: 3 kg/m

Installation spacing

Datwyler fastener	horizontal	Note
Aluminium pipe **with type SAS / TSD single clamp** **with type B…D strap clamp** **on profile rail**	E30-E60: 1.2 m E90: 60 cm E90: 80 cm	Bundles up to 2.5 kg/m
Zero-halogen **plastic armoured conduit** **with type SAS / TSD single clamp** **with type B…D strap clamp** **on profile rail**	E30-E60: 1.2 m E90: 60 cm E90: 80 cm	Bundles up to 2.5 kg/m
Steel-armoured conduit **with type SAS / TSD single clamp** **with type B…D strap clamp** **on profile rail**	E30-E60: 1.2 m	≤ M63, filling factor ≤ 60% Maximum load: 2.5 kg/m Maximum line length w/o fasteners between ends of conduit: 1.2 m
G-duct 50 x 75 mm **with G-post or hooked rail**	E30: 1.25 m	Maximum load: 3 kg/m
G-duct ≤ 75 x 100 mm with G-post **or with hooked rail**	E30: 1.25 m	Maximum load: 7.5 kg/m
Protective cable duct 60 x 100 mm	E30: 50 cm	Maximum load: 3.1 kg/m ceiling installations, 7 kg/m wall installations
Protective cable duct 26 x 30 mm	E30: 50 cm	Maximum load: 0.3 kg/m Wall and ceiling installations

Cable support systems also without threaded rod	dependent on manufacturer		
Wire mesh cable tray	≤ 400 mm	1.25 m	maximum 10 kg/m
Tray	≤ 400 mm	1.5 m	maximum 30 kg/m
Ladder	≤ 400 mm	1.5 m	maximum 20 kg/m

When installed horizontally, the installation is the same for walls and ceilings. However, riser lines (directly fastened using only single or bracket clamps) require the installation of an appropriate fireproof bulkhead or WUM (see page 79) at a spacing of every 3.5 m. Any certified steel fastening bolts or certified fireproof plugs from other manufacturers can be used.
For cable constructions ... E30 L: classifiactions apply only up to E30.
In accordance with DIN 4102-12, a "slip-off protection" is necessary for horizontal wall installation using strap clamps.

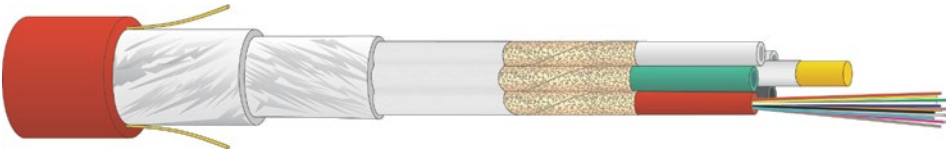
FIBRE OPTIC SAFETY CABLE

Functional integrity for 30 minutes according to DIN 4102-12 (E30)
"Functional integrity" in accordance with IEC 60331-25 FE 90 (90 minutes at 750 °C)

FO Universal ZGGFR Safety

U-DQ(ZN)BH 1 x m		Fibres	Article No.	Article No.	Article No.	Article No.
Description		number	E9/125 G.652.D	G50/125 OM2	G50/125 OM3	G50/125 OM4
ZGGFR Safety	1 x 4	4	187288	186363	190604	193447
ZGGFR Safety	1 x 6	6	191867	186639	191851	193448
ZGGFR Safety	1 x 8	8	on request	190621	on request	193449
ZGGFR Safety	1 x 12	12	190719	187293	191796	193450

FO Universal wbGGFR Safety



U-DQ(ZN)BH n x m		Fibres	Article No.	Article No.	Article No.	Article No.
Description		number	E9/125 G.652.D	G50/125 OM2	G50/125 OM3	G50/125 OM4
wbGGFR Safety	2 x 12	24	190223	187294	187360	193454
wbGGFR Safety	3 x 12	36	190224	on request	on request	193455
wbGGFR Safety	4 x 12	48	190225	192119	191191	193456
wbGGFR Safety	5 x 12	60	190226	on request	190605	193457

FIBRE OPTIC SAFETY CABLE

Functional integrity for 30 minutes according to DIN 4102-12 (E30)

Features

Metal-free fibre optic safety cable with up to 12 fibres or up to 60 fibres.
The optimal combination of flame retardant fibre coating and flame-inhibiting stabilizing elements ensures enhanced functional integrity (System Circuit Integrity) in case of fire for 30 minutes.

Application

Safety applications in tunnels, underground railways, banks, insurance companies, large-scale industry.
LAN backbones.
Indoor and outdoor cabling.
Can be installed in cable platforms, trays, ducts and vertical shafts.
Can be spliced in fibre optic distribution housings.

Installation spacing

Datwyler fastener	horizontal	vertical	
Strap clamp on profile rail	60 cm		

Cable support systems also without threaded rod	dependent on manufacturer		
Wire mesh cable tray	≤ 300 mm	1.2 m	maximum 10 kg/m
Tray	≤ 300 mm	1.2 m	maximum 10 kg/m

EXTENDED ARTICLE NUMBERS

The key to the 10-digit article number:

1 8 2 9 2 4 0 0 C K

Master Number (1 8 2 9 2 4)

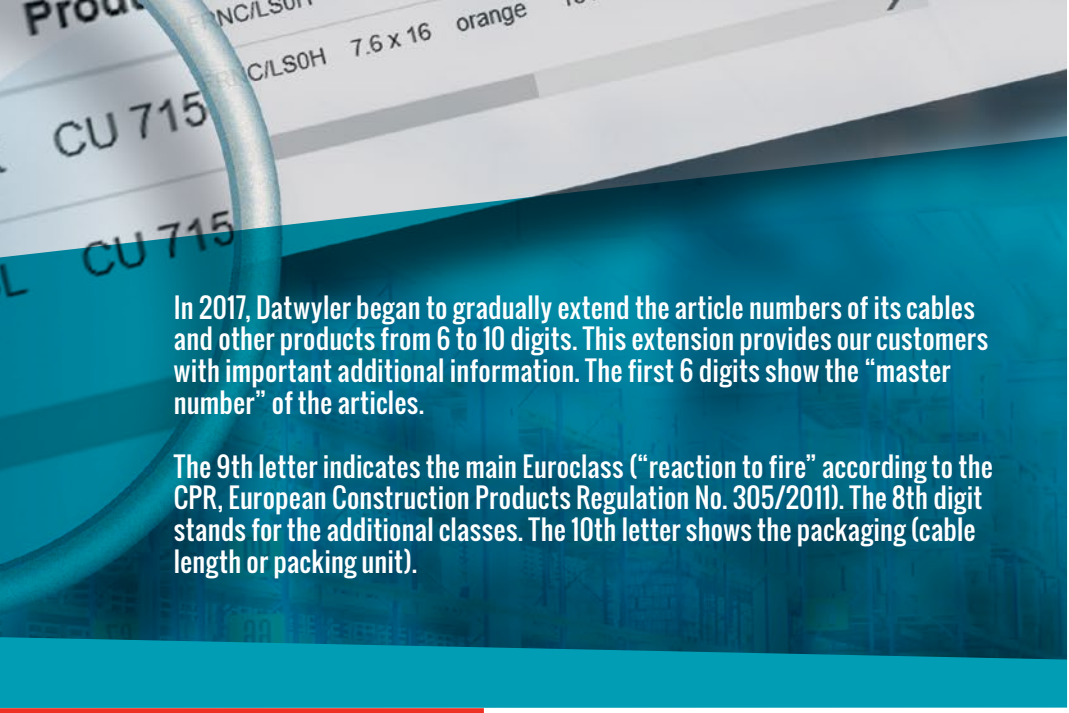
Placeholder (0 0)

CPR classification* (C K)

0 = Add'l. classes (Datwyler Standard)
1-9 = Add'l. classes (differing)
for the main Euroclasses $B2_{ca}$, C_{ca} , D_{ca}

B = Euroclass $B2_{ca}$
C = Euroclass C_{ca}
D = Euroclass D_{ca}
E = Euroclass E_{ca}
F = Euroclass F_{ca}
Z = not classified

* Testing in accordance with EN 50575



In 2017, Datwyler began to gradually extend the article numbers of its cables and other products from 6 to 10 digits. This extension provides our customers with important additional information. The first 6 digits show the "master number" of the articles.

The 9th letter indicates the main Euroclass ("reaction to fire" according to the CPR, European Construction Products Regulation No. 305/2011). The 8th digit stands for the additional classes. The 10th letter shows the packaging (cable length or packing unit).

Length/packing unit (PU)

Z	=	cut-to-length	reel/drum
K	=	1000 m	reel/drum
L	=	500 m	reel/drum
M	=	200 m	reel/drum
N	=	100 m	reel/drum
P	=	305 m Cu	PullQuick box
	=	250 m Fire Safety	PullQuick box
Q	=	300 m	reel/drum
S	=	305 m	reel in box
R	=	cut-to-length	coil
T	=	100 m	coil

As a result of this extension some article numbers have been integrated into the new ones and some totally replaced.

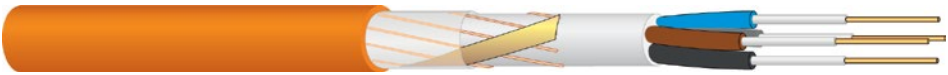
Note:
Our cables are not available in *any* CPR classification and *any* length or packing unit (PU) mentioned above. Please refer to our website for the different versions on offer. Here you can also find the Declarations of Performances (DoP) as PDF files for download.

LOW-VOLTAGE CABLES

(N)HXH FE180 / E30-E60 Keram

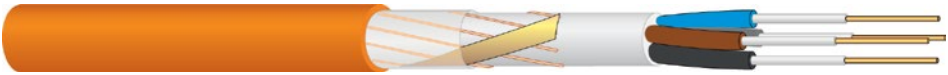
(N)HXH CL FE 180 / E30-E60 Keram

(N)HXCH FE180 / E30-E60 Keram



(N)HXH FE180 / E90 Keram

(N)HXCH FE180 / E90 Keram



Technical data

Nominal voltage	0.6/1 kV
Testing voltage	4000 V, 50 Hz / DC up to 8 kV max. 15 minutes
Operating temperature	-5 °C to +90 °C

Application

Datwyler safety cables with improved properties in case of fire and with integrated functional integrity can be installed indoors. When installed outdoors, they must be protected against direct sunlight (orange sheath). It is only permitted to install them directly into the earth or water when a protective conduit is used. These cables fulfil the requirements for functional integrity E30-E60 or E90 in accordance with DIN 4102-12. Functional integrity is guaranteed for operating voltages up to 400 V.

Application in accordance with DIN VDE 0266 (regardless of functional integrity)

Permissible application areas:

Cables compliant with this standard may only be installed indoors, in the air or in concrete. These cables are not intended for installations in the earth or water. However, it is permissible to install them in protective conduits as long as measures are implemented to prevent water from gathering in the conduits.

Application

Cable end seal:
The cable ends must be fitted with waterproof seals during shipping, storage and installation

Installation

In general:
Cables must be installed and operated in such a manner as to ensure that their properties are not compromised.
Amongst other aspects, observe the following points:

a) Operating conditions such as grouping of cables, effects from external heat sources and protection against direct sunlight must be taken into consideration when choosing the cable type.
b) Stray currents and corrosion
c) Vibrations (machine foundations, bridges), vibrations
d) To prevent mechanical damage, choose an installation procedure suitable for the type of external sheathing.
e) Protection against external agents, e.g., chemical solvents
f) Loads from short-circuit surge currents (dynamic)

Cables must be protected against mechanical damage after installation.
The interior diameter of cable conduits and ducts must be at least 1.5 times larger than the cable diameter.

Lowest permissible installation temperature
The lowest permissible installation temperature is -5 °C.
This temperature applies for the cable itself but not for the surroundings. If the temperature of the cables is too low, warm them up.
Make sure that the temperature does not drop below the lowest permissible temperature during the entire installation process.

Tensile load:
When pulling copper cables using a cable tensioning device, the maximum tension is 50 N/mm^2 per conductor.
(except for concentric conductors.)

Bending radius:
During the installation, the bending radius must not fall below the following values:
15-times cable diameter for single-core cables
12-times cable diameter for multicore cables
When bent only once in the proper manner using the bending template and by heating the cable to 30 °C, it is permissible to reduce the bending radius by 50%.

Assembly:
In horizontal installations, never exceed a spacing of 80 cm for fasteners or supports.
In vertical installations, never exceed a fastener spacing of 150 cm.
When installing single-core cables, use clips made of plastic or non-magnetic metals.
Steel clips may only be used if the magnetic circuit is not closed or when the cable is bundled triangularly.
To maintain functional integrity, only use system-certified fasteners compliant with DIN 4102-12.
Fasten cables and groups of cables so that they will not become damaged by pressure points resulting from thermal expansion.

(N)HXH FE180 / E30-E60

Datwyler Keram

Low-voltage cable 0.6/1kV

Based on DIN VDE 0266
Zero halogen content, improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E30-E60* i.a.w. DIN 4102-12

General Appraisal Certificate
P-MPA-E-03-043

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH FE180 / E30-E60 Keram						
171289	1 x 4	RE	38	90	7.1	0.21
171290	1 x 6	RE	58	113	7.6	0.23
171291	1 x 10	RE	96	158	8.4	0.27
171370	1 x 16	RM	154	227	9.8	0.34
171377	1 x 25	RM	240	329	11.3	0.43
171386	1 x 35	RM	336	428	12.4	0.48
171394	1 x 50	RM	480	565	13.9	0.58
171429	1 x 70	RM	672	783	15.7	0.68
170842	1 x 95	RM	912	1054	18.1	0.91
170845	1 x 120	RM	1152	1281	19.2	0.97
170850	1 x 150	RM	1440	1606	21.4	1.20
170855	1 x 185	RM	1776	1983	23.6	1.46
170858	1 x 240	RM	2304	2607	26.8	1.81
186280	2 x 1.5	RE	29	178	11.0	0.48
186921	2 x 2.5	RE	48	217	11.0	0.54
186922	2 x 4	RE	77	272	11.8	0.62
186923	2 x 6	RE	115	337	12.8	0.70
186924	2 x 10	RE	192	459	13.8	0.83
186952	2 x 16	RM	307	661	15.4	1.09
187221	2 x 25	RM	480	950	18.2	1.42
186925	3 x 1.5	RE	43	200	11.5	0.53
186926	3 x 2.5	RE	72	250	12.4	0.60
186927	3 x 4	RE	115	319	13.5	0.68
186928	3 x 6	RE	173	403	14.6	0.77
186929	3 x 10	RE	288	560	16.3	0.91
186953	3 x 16	RM	461	811	19.3	1.19
186955	3 x 25	RM	720	1184	22.6	1.56
186957	3 x 35	RM	1008	1529	24.9	1.80
186959	3 x 50	RM	1440	2026	28.2	2.24
186961	3 x 70	RM	2016	2844	32.7	2.88
186954	3 x 25 + 1 x 16	RM	874	1361	23.9	1.73
186956	3 x 35 + 1 x 16	RM	1162	1692	25.9	1.93
186958	3 x 50 + 1 x 25	RM	1680	2311	29.9	2.52
186960	3 x 70 + 1 x 35	RM	2352	3171	34.0	3.07

*) The functional integrity depends on the installation technique used.

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH FE180 / E30-E60 Keram						
186962	3 x 95 + 1 x 50	RM	3216	4276	39.3	4.18
186963	3 x 120 + 1 x 70	RM	4128	5303	42.6	4.74
186964	3 x 150 + 1 x 70	RM	4992	6417	46.6	5.63
186965	3 x 185 + 1 x 95	RM	6240	8040	52.0	6.99
186930	4 x 1.5	RE	58	234	12.4	0.61
186931	4 x 2.5	RE	96	296	13.4	0.69
186932	4 x 4	RE	154	381	14.6	0.78
186933	4 x 6	RE	230	490	15.8	0.90
186934	4 x 10	RE	384	695	17.8	1.07
186967	4 x 16	RM	614	1009	21.1	1.40
186968	4 x 25	RM	960	1485	24.8	1.86
186969	4 x 35	RM	1344	1929	27.4	2.15
186970	4 x 50	RM	1920	2600	31.5	2.79
186971	4 x 70	RM	2688	3618	36.2	3.38
186972	4 x 95	RM	3648	4860	41.7	4.68
186973	4 x 120	RM	4608	5890	44.6	5.19
186974	4 x 150	RM	5760	7417	50.0	6.52
186935	5 x 1.5	RE	72	278	13.4	0.71
186936	5 x 2.5	RE	120	353	14.5	0.81
186937	5 x 4	RE	192	456	15.8	0.93
186938	5 x 6	RE	288	589	17.2	1.05
186939	5 x 10	RE	480	832	19.3	1.25
186975	5 x 16	RM	768	1223	23.1	1.67
186976	5 x 25	RM	1200	1806	27.2	2.22
186977	5 x 35	RM	1680	2384	30.5	2.66
186978	5 x 50	RM	2400	3187	34.8	3.41
171272	7 x 1.5	RE	101	331	14.4	0.81
171273	7 x 2.5	RE	168	426	15.6	0.92
171279	12 x 1.5	RE	173	513	18.3	1.20
171280	12 x 2.5	RE	288	675	20.0	1.37
171283	19 x 1.5	RE	274	715	21.2	1.63
171284	19 x 2.5	RE	456	953	23.2	1.83
171285	24 x 1.5	RE	346	901	24.6	1.99
171286	24 x 2.5	RE	576	1205	27.0	2.27
171287	30 x 1.5	RE	432	1057	26.0	2.28
171288	30 x 2.5	RE	720	1446	28.8	2.68

(N)HXH CL FE 180 / E30-E60

Datwyler Keram

Low-voltage cable 0.6/1kV

Based on DIN VDE 0266
Zero halogen content, improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E30-E60* i.a.w. DIN 4102-12

General Appraisal Certificate
P-MPA-E-03-043

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH CL FE 180 / E30-E60 Keram						
192350	2 x 1.5	RE	29	336	15	0.94
187562	2 x 2.5	RE	48	385	16	1.02
191612	2 x 4	RE	77	453	17	1.13
187563	2 x 6	RE	115	531	18	1.25
	2x 10	RE	192	673	19	1.43
	2 x 16	RM	307	910	22	1.79
	2 x 25	RM	480	1239	25	2.22
	2 x 35	RM	672	1536	27	2.64
	2 x 50	RM	960	1956	30	3.04
	2 x 70	RM	1344	2640	35	3.79
	2 x 95	RM	1824	3475	39	4.89
	2 x 120	RM	2304	4118	42	5.47
	2 x 150	RM	2880	5086	46	6.62
	2 x 185	RM	3552	6268	51	8.13
191107	3 x 1.5	RE	43	363	15	1
186940	3 x 2.5	RE	72	425	16	1.1
192351	3 x 4	RE	115	509	17	1.22
188326	3 x 6	RE	173	607	19	1.35
191597	3 x 10	RE	288	785	20	1.54
188327	3 x 16	RM	461	1074	23	1.93
	3 x 25	RM	720	1491	27	2.41
	3 x 35	RM	1080	1865	29	2.73
	3 x 50	RM	1440	2404	32	3.29
	3 x 70	RM	2016	3314	37	4.22
	3 x 95	RM	2736	4369	42	5.42
	3 x 120	RM	3456	5221	45	6.04
	3 x 150	RM	4320	6460	50	7.3
	4 x 1.5	RE	58	410	16	1.11
190590	4 x 2.5	RE	96	484	17	1.22
191102	4 x 4	RE	154	585	19	1.36
	4 x 6	RE	230	709	20	1.51
	4 x 10	RE	384	940	22	1.76
186980	4 x 16	RM	614	1296	25	2.2
186981	4 x 25	RM	960	1820	29	2.78

*) This cable needs a permission for functional integrity installations in each individual case before being installed.

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH CL FE 180 / E30-E60 Keram						
186982	4 x 35	RM	1344	2296	31	3.16
190589	4 x 50	RM	1920	3037	36	4.02
	4 x 70	RM	2688	4157	41	5.05
	4 x 95	RM	3648	5498	46	6.52
	4 x 120	RM	4608	6595	50	7.26
192347	5 x 15	RE	72	466	17	1.25
188117	5 x 25	RE	120	556	18	1.38
188118	5 x 4	RE	192	675	20	1.54
186941	5 x 6	RE	288	825	21	1.72
186942	5 x 10	RE	480	1095	23	1.98
190525	5 x 16	RM	768	1536	27	2.53
186984	5 x 25	RM	1200	2171	31	3.23
190529	5 x 35	RM	1680	2808	35	3.85
191565	5 x 50	RM	2400	3686	39	4.83
	5 x 70	RM	3360	5053	45	6.05
	5 x 95	RM	4560	6792	52	8.14
	6 x 1.5	RE	86	521	18	1.39
	6 x 2.5	RE	144	624	20	1.54
188094	6 x 4	RE	230	769	21	1.74
	6 x 6	RE	346	943	23	1.94
	6 x 10	RE	576	1269	25	2.26
185232	7 x 1.5	RE	101	532	18	1.38
	7 x 2.5	RE	168	643	20	1.53
185245	7 x 4	RE	269	798	21	1.71
185247	7 x 6	RE	403	987	23	1.9
185248	7 x 10	RE	672	1343	25	2.2
	8 x 15	RE	115	604	20	1.53
	8 x 25	RE	192	732	21	1.69
188095	8 x 4	RE	307	916	23	1.91
	10 x 1.5	RE	144	701	22	1.78
	10 x 2.5	RE	240	857	23	1.98
	10 x 4	RE	384	1079	25	2.24
	12 x 1.5	RE	173	763	22	1.9
185239	12 x 2.5	RE	288	948	24	2.13
	12 x 4	RE	461	1205	26	2.42
	14 x 1.5	RE	202	847	23	2.07
	14 x 2.5	RE	336	1062	25	2.34
185233	16 x 1.5	RE	231	926	24	2.24
	16 x 2.5	RE	384	1154	26	2.52
	21 x 1.5	RE	303	1092	26	2.58
	21 x 2.5	RE	504	1381	28	2.89
	27x 1.5	RE	389	1311	29	3.06
	27x 2.5	RE	648	1681	32	3.45
185235	30 x 1.5	RE	432	1407	30	3.25
185241	30 x 2.5	RE	720	1847	33	3.81

(N)HXCH FE180 / E30-E60

Datwyler Keram

Low-voltage cable 0.6/1kV

Based on DIN VDE 0266
Zero halogen content, improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E30-E60* i.a.w. DIN 4102-12

General Appraisal Certificate
P-MPA-E-03-043

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXCH FE180 / E30-E60 Keram						
186943	2 x 1.5	RE/1.5	52	224	12.7	0.60
186944	2 x 2.5	RE/2.5	80	273	13.5	0.66
187232	2 x 4	RE/4	123	355	15.0	0.78
187234	2 x 6	RE/6	182	436	16.0	0.86
187236	2 x 10	RE/10	312	622	17.7	1.07
186945	3 x 1.5	RE/1.5	66	248	13.2	0.65
186946	3 x 2.5	RE/2.5	104	308	14.1	0.72
187233	3 x 4	RE/4	161	404	15.7	0.84
187235	3 x 6	RE/6	240	504	16.8	0.94
187237	3 x 10	RE/10	408	727	18.6	1.15
187238	3 x 16	RM/16	643	1148	23.9	1.63
187239	3 x 25	RM/16	902	1437	25.0	1.90
187240	3 x 35	RM/16	1190	1796	27.3	2.20
187241	3 x 50	RM/25	1723	2408	30.8	2.84
187242	3 x 70	RM/35	2410	3381	36.0	3.52
186985	3 x 95	RM/50	3296	4513	41.1	4.66
186986	3 x 120	RM/70	4236	5576	44.5	5.30
186987	3 x 150	RM/70	5100	7094	49.2	6.46
187243	3 x 185	RM/95	6383	8300	56.0	7.90
186988	3 x 240	RM/120	8242	11065	61.5	9.93
186947	4 x 1.5	RE/1.5	81	286	14.1	0.73
186948	4 x 2.5	RE/2.5	128	358	15.1	0.82
186949	4 x 4	RE/4	200	473	16.8	0.96
186950	4 x 6	RE/6	297	621	18.1	1.13
186951	4 x 10	RE/10	504	868	20.1	1.33
186989	4 x 16	RM/16	796	1254	23.4	1.70
186990	4 x 25	RM/16	1142	1752	27.2	2.20
186991	4 x 35	RM/16	1526	2218	29.8	2.56
186992	4 x 50	RM/25	2203	3049	34.8	3.41
186993	4 x 70	RM/35	3082	4198	39.5	4.18
186994	4 x 95	RM/50	4208	5610	45.2	5.58
186995	4 x 120	RM/70	5388	6954	49.1	6.37
186996	4 x 150	RM/70	6540	8512	54.3	7.83
186997	4 x 185	RM/95	8159	10619	59.8	9.55
186998	4 x 240	RM/120	10546	13852	67.9	12.00
187244	7 x 1.5	RE/2.5	133	393	16.1	0.94
187245	30 x 1.5	RE/6	499	1252	29.1	2.67

Low-voltage cable 0.6/1kV

Based on DIN VDE 0266
Zero halogen content, improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E90 i.a.w. DIN 4102-12

General Appraisal Certificate
P-MPA-E-04-019

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH FE180 / E90 Keram						
186141	1 x 16	RM	154	243	10.2	0.35
186142	1 x 25	RM	240	347	11.7	0.43
186143	1 x 35	RM	336	449	12.8	0.49
186144	1 x 50	RM	480	589	14.3	0.58
186145	1 x 70	RM	672	810	16.1	0.67
186146	1 x 95	RM	912	1090	18.5	0.85
186147	1 x 120	RM	1152	1318	19.6	0.91
186148	1 x 150	RM	1440	1648	21.8	1.11
186149	1 x 185	RM	1776	2029	24.0	1.32
186150	1 x 240	RM	2304	2658	27.2	1.63
186151	1 x 300	RM	2880	3166	29.6	1.91
187246	2 x 1.5	RE	29	178	11.0	0.48
187247	2 x 2.5	RE	48	217	11.8	0.54
187248	2 x 4	RE	77	272	12.8	0.62
187249	2 x 6	RE	115	337	13.8	0.70
187250	2 x 10	RE	192	459	15.4	0.83
187254	2 x 16	RM	307	714	19.0	1.19
187255	2 x 25	RM	480	1011	22.0	1.54
187256	2 x 35	RM	672	1287	24.2	1.79
187257	2 x 50	RM	960	1742	28.0	2.35
187258	2 x 70	RM	1344	2346	31.6	2.86
187259	2 x 95	RM	1824	3130	36.2	3.67
187260	2 x 120	RM	2304	3729	38.6	4.11
186174	3 x 1.5	RE	43	200	11.5	0.53
186177	3 x 2.5	RE	72	250	12.4	0.60
186182	3 x 4	RE	115	319	13.5	0.68
186186	3 x 6	RE	173	403	14.6	0.77
186189	3 x 10	RE	288	560	16.3	0.91
186152	3 x 16	RM	461	878	20.2	1.29
186153	3 x 25	RM	720	1299	24.0	1.75
186154	3 x 35	RM	1008	1664	26.4	2.02
186207	3 x 50	RM	1440	2189	29.8	2.51
187261	3 x 70	RM	2016	2997	33.9	3.09
187262	3 x 95	RM	2736	4007	38.9	3.95
187263	3 x 120	RM	3456	4812	41.5	4.39
187264	3 x 150	RM	4320	5988	46.0	5.32

*) The functional integrity depends on the installation technique used.

(N)HXH FE180 / E90

Datwyler Keram

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXH FE180 / E90 Keram						
187265	3 x 185	RM	5328	7363	50.7	6.44
187266	3 x 240	RM	6912	9632	57.6	8.10
187267	3 x 35 + 1 x 16	RM	1162	1833	27.4	2.13
187268	3 x 50 + 1 x 25	RM	1680	2457	31.3	2.69
187269	3 x 70 + 1 x 35	RM	2352	3362	35.6	3.34
187270	3 x 95 + 1 x 50	RM	3216	4488	40.7	4.24
187271	3 x 120 + 1 x 70	RM	4128	5532	44.0	4.82
187272	3 x 150 + 1 x 70	RM	4992	6666	48.0	5.70
187273	3 x 185 + 1 x 95	RM	6240	8315	53.4	7.00
186175	4 x 1.5	RE	58	234	12.4	0.61
186178	4 x 2.5	RE	96	296	13.4	0.69
186183	4 x 4	RE	154	381	14.6	0.78
186187	4 x 6	RE	230	490	15.8	0.90
186190	4 x 10	RE	384	695	17.8	1.07
186155	4 x 16	RM	614	1089	22.1	1.54
186156	4 x 25	RM	960	1618	26.3	2.05
186157	4 x 35	RM	1344	2083	29.0	2.36
186158	4 x 50	RM	1920	2752	32.8	2.97
186159	4 x 70	RM	2688	3804	37.6	3.55
186160	4 x 95	RM	3648	5092	43.1	4.75
187274	4 x 120	RM	4608	6133	46.0	5.27
186161	4 x 150	RM	5760	7662	51.2	6.49
187275	4 x 185	RM	7104	9425	56.5	7.85
187276	4 x 240	RM	9216	12334	64.1	9.85
186176	5 x 1.5	RE	72	278	13.4	0.71
186179	5 x 2.5	RE	120	353	14.5	0.81
186184	5 x 4	RE	192	456	15.8	0.93
186188	5 x 6	RE	288	589	17.2	1.05
186191	5 x 10	RE	480	832	19.3	1.25
186162	5 x 16	RM	768	1361	24.8	1.86
186163	5 x 25	RM	1200	1960	28.8	2.42
186164	5 x 35	RM	1680	2547	32.0	2.86
186165	5 x 50	RM	2400	3392	36.5	3.68
187277	5 x 70	RM	3360	4667	41.5	4.51
199847	5 x 95	RM	4560	6278	47.9	5.88
185271	7 x 1.5	RE	101	331	14.4	0.81
186180	7 x 2.5	RE	168	426	15.6	0.92
186185	7 x 4	RE	269	563	17.1	1.05
186999	7 x 6	RE	403	732	18.6	1.19
172260	10 x 1.5	RE	144	457	17.8	1.09
187253	10 x 2.5	RE	240	593	19.4	1.24
185272	12 x 1.5	RE	173	513	18.3	1.20
186181	12 x 2.5	RE	288	675	20.0	1.37
185273	24 x 1.5	RE	346	901	24.6	1.99

Low-voltage cable 0.6/1kV

Based on DIN VDE 0266
Zero halogen content, improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E90 i.a.w. DIN 4102-12

General Appraisal Certificate
P-MPA-E-04-019

Article No.	No. cores x cross-section n x mm²		Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
(N)HXCH FE180 / E90 Keram						
186071	3 x 1.5	RE/1.5	66	248	13.2	0.65
186195	3 x 2.5	RE/2.5	104	308	14.10	0.72
186197	3 x 4	RE/4	161	404	15.7	0.84
187278	3 x 6	RE/6	240	504	16.80	0.94
187279	3 x 10	RE/10	408	727	18.6	1.15
187251	3 x 16	RM/16	643	1166	24.4	1.64
187406	3 x 25	RM/16	902	1496	25.8	1.95
172417	3 x 35	RM/16	1190	1820	28.2	2.25
187408	3 x 50	RM/25	1723	2493	32.5	2.90
187409	3 x 70	RM/35	2410	3350	36.1	3.42
187410	3 x 95	RM/50	3296	4570	42.0	4.50
187411	3 x 120	RM/70	4236	5620	45.4	5.02
187412	3 x 150	RM/70	5100	6850	50.7	6.00
187413	3 x 185	RM/95	6383	8350	55.0	7.10
187414	3 x 240	RM/120	8242	11100	62.1	9.08
186072	4 x 1.5	RE/1.5	81	286	14.1	0.73
186196	4 x 2.5	RE/2.5	128	358	15.1	0.82
186198	4 x 4	RE/4	200	473	16.8	0.96
186199	4 x 6	RE/6	297	621	18.1	1.13
186200	4 x 10	RE/10	504	868	20.1	1.33
186131	4 x 16	RM/16	796	1400	24.5	1.81
186132	4 x 25	RM/16	1142	1895	28.1	2.28
186133	4 x 35	RM/16	1526	2376	30.8	2.60
186134	4 x 50	RM/25	2203	3249	35.9	3.49
186135	4 x 70	RM/35	3082	4426	40.5	4.25
186136	4 x 95	RM/50	4208	5809	46.4	5.53
186137	4 x 120	RM/70	5388	7134	50.1	6.25
186138	4 x 150	RM/70	6540	8703	55.3	7.58
186139	4 x 185	RM/95	8159	10827	60.8	9.18
186140	4 x 240	RM/120	10546	14139	69.2	11.60
186073	7 x 1.5	RE/2.5	133	393	16.1	0.94
191096	7 x 2.5	RE/2.5	200	491	17.3	1.05
187415	12 x 1.5	RE/2.5	205	595	20.2	1.38
172461	12 x 2.5	RE/4	334	798	22.6	1.63
187402	24 x 1.5	RE/6	413	901	27.4	2.32
187403	24 x 2.5	RE/10	696	1205	30.6	2.69
187404	30 x 1.5	RE/6	499	1252	29.1	2.67
187405	30 x 2.5	RE/10	840	1692	32.2	3.11

INSTALLATION CABLES

JE-H(ST)H...Bd FE180 / E30-E90 Keram

JE-H(ST)H...Bd FE180 / E30 L Keram

JE-H(ST)H...Bd FE180 / E30-E90 Keram

JE-H(ST)H...Bd FE180 / E30 L Keram

JE-H(ST)HRH...Bd FE 180 / E30-E90 Keram

General Appraisal Certificate
P-MPA-E-06-030

Technical data

Nominal voltage:	maximum = 225 V
Testing voltage:	500 V, 50 Hz conductor/conductor 2000 V, 50 Hz conductor/shield
Operating temperature:	-5 °C to +70 °C

Application

Datwyler safety cables are used whenever extra protection is required against fire, to reduce hazards for humans and property, and also when strict safety regulations must be complied with.
They may be installed indoors. These cables comply with functional integrity requirements E30-E90* in accordance with DIN 4102-12. Functional integrity is guaranteed for operating voltages up to 110 V, for signal and control applications, fire detection systems, electroacustic alarm systems and SHE, for example. When installed outdoors, the cables must be protected against direct sunlight (orange sheath; fire alarm cables BMK: red sheath).
Permissible operating temperature at conductor: +70 °C.

Installation cable, maximum 225 V

Compliant with DIN VDE 0815, zero halogen content,
improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 6033,
Functional integrity E30-E90* i.a.w. DIN 4102-12.

Article No.	No. cores x cross-section n x 2 x mm	Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
JE-H(ST)H...Bd FE180 / E30-E90 Keram					
188092	1 x 2 x 0.8	15	40	5.5	0.095
188097	2 x 2 x 0.8	25	56	6.0	0.123
188099	4 x 2 x 0.8	45	96	8.7	0.210
188102	8 x 2 x 0.8	85	218	13.7	0.520
188104	12 x 2 x 0.8	126	270	14.6	0.580
188106	16 x 2 x 0.8	166	337	16.0	0.690
188108	20 x 2 x 0.8	206	403	18.0	0.800
188111	32 x 2 x 0.8	326	570	21.8	1.020
188113	40 x 2 x 0.8	407	739	25.3	1.380
188115	52 x 2 x 0.8	529	906	27.6	1.590
JE-H(ST)H...Bd FE180 / E30 L Keram					
188376	1 x 2 x 0.8	15	40	5.5	0.095
188318	2 x 2 x 0.8	25	56	6.0	0.123
188325	4 x 2 x 0.8	45	96	8.7	0.210

Fire alarm cable, maximum 225 V

Compliant with DIN VDE 0815, zero halogen content,
improved fire properties
Insulation integrity FE180 i.a.w. DIN VDE 0472-814, IEC 60331
Functional integrity E30-E90* i.a.w. DIN 4102-12

Article No.	No. cores x cross-section n x 2 x mm	Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
JE-H(ST)H...Bd FE180 / E30-E90 BMK red Keram					
188093	1 x 2 x 0.8	15	40	5.5	0.095
188098	2 x 2 x 0.8	25	56	6.0	0.123
188101	4 x 2 x 0.8	45	96	8.7	0.210
188103	8 x 2 x 0.8	85	218	13.7	0.520
188105	12 x 2 x 0.8	126	270	14.6	0.580
188107	16 x 2 x 0.8	166	337	16.0	0.690
188109	20 x 2 x 0.8	206	403	18.0	0.800
188112	32 x 2 x 0.8	326	570	21.8	1.020
188114	40 x 2 x 0.8	407	739	25.3	1.380
188116	52 x 2 x 0.8	529	906	27.6	1.590
JE-H(ST)H...Bd FE180 / E30 L BMK red Keram					
188377	1 x 2 x 0.8	15	40	5.5	0.095
188374	2 x 2 x 0.8	25	56	6.0	0.123
188375	4 x 2 x 0.8	45	96	8.7	0.210

*) The functional integrity depends on the installation technique used.

JE-H(ST)H...BD FE180 / E30 L KERAM

Datwyler Keram

Fire alarm cable, maximum 225 V

Compliant with DIN VDE 0815
Zero halogen content, improved fire properties
Insulation integrity FE180 in accordance with DIN VDE 0472-814, IEC 60331
Functional integrity E30-E90* in accordance with DIN 4102-12

Article No.	No. cores x cross-section n x 2 x mm	Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
JE-H(ST)H...Bd FE180 / E30 L BMK red Keram 250 m in PullQuick box					
18837700ZP	1 x 2 x 0.8	15	40	5.5	0.095
18837400ZP	2 x 2 x 0.8	25	56	6.0	0.123

JE-H(ST)HRH...BD FE180 / E30-E90

Datwyler Keram

Fire alarm cable with steel-wire braiding

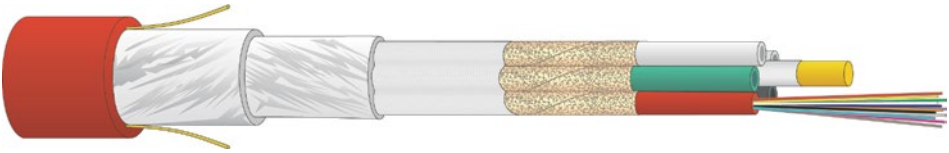
(maximum 225 V)
Compliant with DIN VDE 0815
Zero halogen content, improved fire properties
Insulation integrity FE180 in accordance with DIN VDE 0472-814, IEC 60331
Functional integrity E30-E90* in accordance with DIN 4102-12

Article No.	No. cores x cross-section n x 2 x mm	Cu number kg/km	Weight kg/km	Diameter approx. mm	Fire load kWh/m
JE-H(ST)HRH...Bd FE180 / E30-E90 Keram					
188119	2 x 2 x 0.8	15	117	9.0	0.26
188120	4 x 2 x 0.8	25	179	11.7	0.39
188127	8 x 2 x 0.8	85	404	18.0	0.93
188128	12 x 2 x 0.8	126	466	18.9	1.01
188129	20 x 2 x 0.8	206	640	22.3	1.32
188346	32 x 2 x 0.8	326	877	26.5	1.72
188347	40 x 2 x 0.8	407	1118	30.4	2.28
188348	52 x 2 x 0.8	529	1318	32.7	2.57

*) The functional integrity depends on the installation technique used.

FO Universal ZGGFR Safety

FO Universal wbGGFR Safety



Application

Fibre optic safety cables for indoor and outdoor applications, metal-free central core design with up to 12 fibres and 5 bundles. The optimised fibre coating and flame-retardant stabilisers enable functional integrity (System Circuit Integrity) for more than 30 minutes when using Datwyler installation systems.

FO Universal ZGGFR Safety

Safety cables for indoor and outdoor application
Metal-free, longitudinally watertight, anti-rodent, flame-retardant
Compliant with IEC 60332.1 and IEC 60332.3 C, functional integrity for 30 minutes according to DIN 4102-12 (E30), "Functional integrity" in accordance with IEC 60331-25 FE 90 (90 minutes at 750 °C)

U-DQ(ZN)BH 1 x m		Fibres	Article No.	Article No.	Article No.	Article No.
Name		Number	E9/125 G.652.D	G50/125 OM2	G50/125 OM3	G50/125 OM4
ZGGFR Safety	1 x 4	4	187288	186363	190604	193447
ZGGFR Safety	1 x 6	6	191867	186639	191851	193448
ZGGFR Safety	1 x 8	8	on request	190621	on request	193449
ZGGFR Safety	1 x 12	12	190719	187293	191796	193450

FO Universal wbGGFR Safety

Safety cables for indoor and outdoor applications
Metal-free, longitudinally watertight, anti-rodent, flame-retardant
Compliant with IEC 60332.1 and IEC 60332.3 C, functional integrity for 30 minutes according to DIN 4102-12 (E30), "Functional integrity" in accordance with IEC 60331-25 FE 90 (90 minutes at 750 °C)

U-DQ(ZN)BH n x m		Fibres	Article No.	Article No.	Article No.	Article No.
Name		Number	E9/125 G.652.D	G50/125 OM2	G50/125 OM3	G50/125 OM4
wbGGFR Safety	2 x 12	24	190223	187294	187360	193454
wbGGFR Safety	3 x 12	36	190224	on request	on request	193455
wbGGFR Safety	4 x 12	48	190225	192119	191191	193456
wbGGFR Safety	5 x 12	60	190226	on request	190605	193457

CLAMP ASSIGNMENT

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Datwyler Keram (N)HXH FE180 / E30-E60	Datwyler clamp for single cable and multiple cable installation					
	Type SAS single clamp					
No. of cores x cross-section n x mm²	single cable installation	maximum number of cables up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables	from 18 cables
1 x 4 RE* (round, solid)	SAS 8 D** 1300956	SAS 14 D 1300020	SAS 18 D 1300022	SAS 22 D 1300024	SAS 28 D 1300027	SAS 38 DN 1300251
1 x 95 RM* (round, stranded)	SAS 18 D 1300022					
1 x 120 RM*	SAS 20 D 1300023					
1 x 150 RM*	SAS 22 D 1300024					
1 x 185 RM*	SAS 24 D 1300025					
1 x 240 RM*	SAS 30 D 1300028					
3 x 1,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252	
3 x 2,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252	
4 x 1,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252	
4 x 2,5 RE	SAS 14 D** 1300958	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 38 DN 1300251		
5 x 1,5 RE	SAS 14 D** 1300958	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 38 DN 1300251		
5 x 2,5 RE	SAS 14 D** 1300958	SAS 28 D 1300027	SAS 38 DN 1300251	SAS 47 DN 1300252		
5 x 4 RE	SAS 16 D** 1300959	SAS 38 DN 1300251	SAS 38 DN 1300251	SAS 47 DN 1300252		
5 x 6 RE	SAS 18 D 1300022	SAS 38 DN 1300251	SAS 47 DN 1300252			
5 x 10 RE	SAS 20 D 1300023	SAS 47 DN 1300252				
5 x 16 RM	SAS 24 D 1300025					

*) Bundeling in three-phase current installation / Single cable installation not permitted for alternating current

**) pre-assembled with fire protection plug for concrete

Only applies for Datwyler safety cables

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Type B…D strap clamp					
single cable installation	maximum number of cables				
	up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables	from 18 cables
B 12 D 1300043	B 14 D 1300044	B 18 D 1300046	B 22 D 1300047	B 30 D 1300049	B 38 D 1300051
B 18 D 1300046	B 38 D 1300051	B 46 D 1300053			
B 22 D 1300047	B 38 D 1300051	B 50 D 1300054			
B 22 D 1300047	B 46 D 1300053	B 54 D 1300055			
B 26 D 1300048	B 50 D 1300054	B 64 D 1300057			
B 30 D 1300049	B 54 D 1300055	B 70 D 1300058			
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053	B 54 D 1300055
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 38 D 1300051	B 54 D 1300055
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 38 D 1300051	B 54 D 1300055
B 14 D 1300044	B 26 D 1300048	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053	B 54 D 1300055
B 14 D 1300044	B 26 D 1300048	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053	B 54 D 1300055
B 14 D 1300044	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053		
B 16 D 1300045	B 34 D 1300050	B 42 D 1300052	B 46 D 1300053		
B 18 D 1300046	B 34 D 1300050	B 46 D 1300053			
B 22 D 1300047	B 42 D 1300052				
B 26 D 1300048					

CLAMP ASSIGNMENT

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Datwyler Keram (N)HXCH FE180 / E30-E60	Datwyler clamp for single cable and multiple cable installation				
	Type SAS single clamp				
No. of cores x cross-section n x mm²	single cable installation	maximum number of cables up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
4 x 25 RM/16 (round, solid)	SAS 28 D 1300027				
4 x 35 RM/16 (round, stranded)	SAS 30 D 1300028				
4 x 50 RM/25	SAS 38 DN 1300251				
4 x 70 RM/35	SAS 47 DN 1300252				
4 x 95 RM/50					
4 x 120 RM/70					
4 x 150 RM/70					
4 x 185 RM/95					
4 x 240 RM/120					

Only applies for Datwyler safety cables

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

	Type B…D strap clamp				
	single cable installation	**maximum number of cables** up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
	B 30 D 1300049				
	B 30 D 1300049				
	B 38 D 1300051				
	B 46 D 1300053				
	B 50 D 1300054				
	B 54 D 1300055				
	B 58 D 1300056				
	B 64 D 1300057				
	B 70 D 1300058				

Only applies for Datwyler safety cables

CLAMP ASSIGNMENT

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Datwyler Keram (N)HXH FE180 / E90	Datwyler clamp for single cable and multiple cable installation				
	Type SAS single clamp				
No. cores x cross-section n x mm²	single cable installation	maximum number of cables up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
1 x 16 RM*	SAS 10 D 1300018	SAS 20 D 1300023	SAS 26 D 1300026	SAS 30 D 1300028	SAS 38 DN 1300251
1 x 25 RM*	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	
1 x 35 RM*	SAS 14 D** 1300958	SAS 26 D 1300026	SAS 38 DN 1300251		
1 x 50 RM*	SAS 14 D** 1300958	SAS 28 D 1300027	SAS 38 DN 1300251		
1 x 70 RM*	SAS 16 D** 1300959				
1 x 95 RM*	SAS 20 D 1300023				
1 x 120 RM*	SAS 20 D 1300023				
1 x 150 RM*	SAS 22 D 1300024				
1 x 185 RM*	SAS 24 D 1300025				
1 x 240 RM*	SAS 30 D 1300028				
1 x 300 RM*	SAS 30 D 1300028				
3 x 1,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252
3 x 2,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252
4 x 1,5 RE	SAS 12 D** 1300957	SAS 24 D 1300025	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252
4 x 2,5 RE	SAS 14 D** 1300958	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 38 DN 1300251	
5 x 1,5 RE	SAS 14 D** 1300958	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 38 DN 1300251	
5 x 2,5 RE	SAS 16 D** 1300959	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252	
5 x 4 RE	SAS 16 D** 1300959	SAS 38 DN 1300251	SAS 38 DN 1300251	SAS 47 DN 1300252	
5 x 6 RE	SAS 18 D 1300022	SAS 38 DN 1300251	SAS 47 DN 1300252		
5 x 10 RE	SAS 20 D 1300023	SAS 38 DN 1300251			
5 x 16 RM	SAS 26 D 1300026				

*) Bundeling in three-phase current installation / Single cable installation not permitted for alternating current
**) pre-assembled with fire protection plug for concrete

Only applies for Datwyler safety cables

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Type B…D strap clamp				
single cable installation	**maximum number of cables** up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
B 12 D 1300043	B 22 D 1300047	B 26 D 1300048	B 30 D 1300049	B 34 D 1300050
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	
B 14 D 1300044	B 26 D 1300048	B 34 D 1300050	B 38 D 1300051	
B 14 D 1300044	B 30 D 1300049	B 38 D 1300051		
B 16 D 1300045	B 34 D 1300050	B 38 D 1300051		
B 22 D 1300047	B 38 D 1300051	B 50 D 1300054		
B 22 D 1300047	B 42 D 1300052	B 50 D 1300054		
B 22 D 1300047	B 46 D 1300053	B 54 D 1300055		
B 26 D 1300048	B 50 D 1300054	B 64 D 1300057		
B 30 D 1300049	B 54 D 1300055	B 70 D 1300058		
B 30 D 1300049	B 64 D 1300057	B 76 D 1300059		
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053
B 12 D 1300043	B 26 D 1300048	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053
B 14 D 1300044	B 26 D 1300048	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053
B 14 D 1300044	B 26 D 1300048	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053
B 16 D 1300045	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053	B 54 D 1300055
B 16 D 1300045	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053	
B 18 D 1300046	B 34 D 1300050	B 42 D 1300052		
B 22 D 1300047	B 38 D 1300051			
B 26 D 1300048				

Only applies for Datwyler safety cables

CLAMP ASSIGNMENT

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Datwyler Keram (N)HXCH FE180 / E90	Datwyler clamp for single cable and multiple cable installation				
	Type SAS single clamp				
No. of cores x cross-section n x mm²	single cable installation	maximum number of cables up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
4 x 25 RM/16	SAS 28 D 1300027				
4 x 35 RM/16	SAS 38 DN 1300251				
4 x 50 RM/25	SAS 38 DN 1300251				
4 x 70 RM/35	SAS 47 DN 1300252				
4 x 95 RM/50					
4 x 120 RM/70					
4 x 150 RM/70					
4 x 185 RM/95					
4 x 240 RM/120					

Only applies for Datwyler safety cables

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Type B…D strap clamp					
single cable installation	**maximum number of cables** up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables
B 30 D 1300049				
B 34 D 1300050				
B 38 D 1300051				
B 46 D 1300053				
B 50 D 1300054				
B 54 D 1300055				
B 58 D 1300056				
B 64 D 1300057				
B 70 D 1300058				

Only applies for Datwyler safety cables

CLAMP ASSIGNMENT

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Datwyler Keram JE-H(St)H…Bd FE 180 / E30-E90		Datwyler clamp for single cable and multiple cable installation					
		Type SAS single clamp					
No. of cores x cross-section n x 2 x mm	max. number	single cable installation	maximum number of cables up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables	from 18 cables
2 x 2 x 0,8	**44**	SAS 6 D 1300016	SAS 12 D 1300019	SAS 14 D 1300020	SAS 20 D 1300023	SAS 26 D 1300026	SAS 38 DN 1300251
4 x 2 x 0,8	**26**	SAS 8 D* 1300956	SAS 16 D 1300021	SAS 22 D 1300024	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 47 DN 1300251
8 x 2 x 0,8	**11**	SAS 14 D* 1300958	SAS 26 D 1300026	SAS 38 DN 1300251	SAS 47 DN 1300252	SAS 47 DN 1300252	
12 x 2 x 0,8	**9**	SAS 14 D* 1300958	SAS 30 D 1300028	SAS 38 DN 1300251	SAS 47 DN 1300252	SAS 47 DN 1300252	
16 x 2 x 0,8	**7**	SAS 16 D* 1300959	SAS 38 DN 1300251	SAS 38 DN 1300251	SAS 47 DN 1300252		
20 x 2 x 0,8	**6**	SAS 18 D 1300022	SAS 38 DN 1300251	SAS 47 DN 1300252	SAS 47 DN 1300252		
32 x 2 x 0,8	**4**	SAS 22 D 1300024	SAS 47 DN 1300252	SAS 55 DN 1300234			
40 x 2 x 0,8	**3**	SAS 26 D 1300026	SAS 55 DN 1300234				
52 x 2 x 0,8	**1**	SAS 28 D 1300027					

*) pre-assembled with fire protection plug for concrete

Only applies for Datwyler safety cables

Clamp assignment for single cable and multiple cable installation

The clamps listed refer to mean values (no guarantee)

Type B…D strap clamp					
single cable installation	**maximum number of cables** up to 3 cables	up to 4 cables	up to 9 cables	up to 17 cables	from 18 cables
B 12 D 1300043	B 12 D 1300043	B 14 D 1300044	B 22 D 1300047	B 26 D 1300048	B 38 D 1300051
B 12 D 1300043	B 16 D 1300045	B 22 D 1300047	B 26 D 1300048	B 38 D 1300051	B 46 D 1300053
B 14 D 1300044	B 26 D 1300048	B 38 D 1300051	B 46 D 1300053	B 46 D 1300053	
B 14 D 1300044	B 30 D 1300049	B 38 D 1300051	B 46 D 1300053	B 46 D 1300053	
B 16 D 1300045	B 34 D 1300050	B 38 D 1300051	B 46 D 1300053		
B 18 D 1300046	B 38 D 1300051	B 46 D 1300053	B 46 D 1300053		
B 22 D 1300047	B 46 D 1300053	B 54 D 1300055			
B 26 D 1300048	B 54 D 1300055				
B 30 D 1300049					

Only applies for Datwyler safety cables

CLAMPS

Single clamp E30-E90 - type SAS

Fixing distance ≤ 1200 / 600 mm[1], also for cable bundles

[1] Depending on type of cable

Article No.	Name	Clamp type	Cable Ø [mm]	Information	PU
Type SAS single clamp					
1300016	Single clamp	SAS 6 D	5 - 6		100 pcs.
1300017	Single clamp	SAS 8 D	7 - 8		100 pcs.
1300018	Single clamp	SAS 10 D	9 - 10		100 pcs.
1300019	Single clamp	SAS 12 D	11 - 12		100 pcs.
1300020	Single clamp	SAS 14 D	13 - 14		100 pcs.
1300021	Single clamp	SAS 16 D	15 - 16		100 pcs.
1300022	Single clamp	SAS 18 D	17 - 18		100 pcs.
1300023	Single clamp	SAS 20 D	19 - 20		100 pcs.
1300024	Single clamp	SAS 22 D	21 - 22		100 pcs.
1300025	Single clamp	SAS 24 D	23 - 24		100 pcs.
1300026	Single clamp	SAS 26 D	25 - 26		100 pcs.
1300027	Single clamp	SAS 28 D	27 - 28		100 pcs.
1300028	Single clamp	SAS 30 D	29 - 30		100 pcs.
1300251	Single clamp	SAS 38 DN	29 - 38		25 pcs.
1300252	Single clamp	SAS 47 DN	38 - 47		20 pcs.
1300234	Single clamp	SAS 55 DN	47 - 55		20 pcs.
1300250	Single clamp	SAS 60 DN	55 - 60		20 pcs.
Type SAS V4A single clamp, material 1.4571 (fastened using K6x5 stainless steel plugs, available on request)					
	Single clamp	SAS 19 D V4A	15 - 19		50 pcs.
	Single clamp	SAS 24 D V4A	19 - 24		50 pcs.
	Single clamp	SAS 29 D V4A	24 - 29		50 pcs.
	Single clamp	SAS 38 D V4A	29 - 38		25 pcs.
	Single clamp	SAS 47 D V4A	38 - 47		20 pcs.
	Single clamp	SAS 55 D V4A	47 - 55		20 pcs.
	Single clamp	SAS 63 D V4A	55 - 63		20 pcs.

Type SAS single clamp E30-E90, pre-assembled with type K6x5 fire protection plugs

Fixing distance ≤ 1200 / 600 mm[1], also for cable bundles

[1] Depending on type of cable

Article No.	Name	Clamp type	Cable Ø [mm]	Information	PU
Type SAS single clamp, pre-assembled with fire protection plugs (type K6x5, 30 mm)					
1300956	Single clamp	SAS 8 D - K6x5	7 - 8	pre-assembled with type K6x5, 30 mm	100 pcs.
1300957	Single clamp	SAS 12 D - K6x5	11 - 12	pre-assembled with type K6x5, 30 mm	100 pcs.
1300958	Single clamp	SAS 14 D - K6x5	13 - 14	pre-assembled with type K6x5, 30 mm	100 pcs.
1300959	Single clamp	SAS 16 D - K6x5	15 - 16	pre-assembled with type K6x5, 30 mm	100 pcs
Plug K6x5 – accessories					
1300962	SDS 1 drill bit			Required for type K6x5 plug and KDM	1 pc.
1300963	SMu 6 SM setting tool			Required for "pre-assembled clamp" (drill hammer)	1 pc.

Only in combination with Datwyler safety cables

Strap clamp E30-E90 - type B without trough

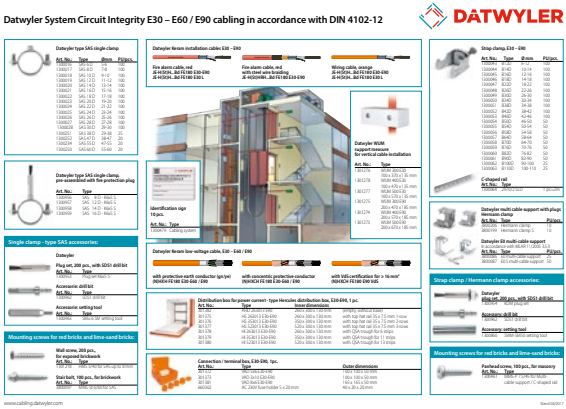
Fixing distance ≤ 1200 / 800 mm [1]
also for cable bundles

[1] Depending on type of cable

Article No.	Name	Clamp type	Cable Ø [mm]	Information	PU
1300064	C-shaped rail	2970 / 25LD / 2 m		Slit width 16 mm	1 pc. = 2 m
1300043	Strap clamp	B 12 D	6 - 12		100 pcs.
1300044	Strap clamp	B 14 D	10 - 14		100 pcs.
1300045	Strap clamp	B 16 D	12 - 16		100 pcs.
1300046	Strap clamp	B 18 D	14 - 18		100 pcs.
1300047	Strap clamp	B 22 D	18 - 22		100 pcs.
1300048	Strap clamp	B 26 D	22 - 26		100 pcs.
1300049	Strap clamp	B 30 D	26 - 30		100 pcs.
1300050	Strap clamp	B 34 D	30 - 34		100 pcs.
1300051	Strap clamp	B 38 D	34 - 38		100 pcs.
1300052	Strap clamp	B 42 D	38 - 42		100 pcs.
1300053	Strap clamp	B 46 D	42 - 46		100 pcs.
1300054	Strap clamp	B 50 D	46 - 50		50 pcs.
1300055	Strap clamp	B 54 D	50 - 54		50 pcs.
1300056	Strap clamp	B 58 D	54 - 58		50 pcs.
1300057	Strap clamp	B 64 D	58 - 64		50 pcs.
1300058	Strap clamp	B 70 D	64 - 70		50 pcs.
1300059	Strap clamp	B 76 D	70 - 76		50 pcs.
1300060	Strap clamp	B 82 D	76 - 82		50 pcs.
1300061	Strap clamp	B 90 D	82 - 90		50 pcs.
1300062	Strap clamp	B 100 D	90 - 100		25 pcs.
1300063	Strap clamp	B 110 D	100 - 110		25 pcs.

Plug KDM used for C-shaped rail – accessories

1300962	SDS 1 drill bit	Required for type K6x5 plug and KDM	1 pc.
1300961	SWM-SM setting tool	Required for KDM plug (drill hammer)	1 pc.
1300860	SWM-SM 50 setting tool	Required for Hermann clamp (drill hammer) and C-shaped rail	1 pc.



A short overview of products and installation / laying techniques

Only in combination with Datwyler safety cables

TROUGHS / MULTI-CABLE SUPPORTS

Trough E30-E90

Type B strap clamp with trough

For laying several cables independently or in bundles in parallel on ceilings and walls.
System Circuit Integrity is achieved for Datwyler Keram cable types (N)HXH/(N)HXH CL/(N)HXCH FE180/E30-E60, (N)HXH/(N)HXCH FE180/E90, JE-H(St)H FE180/E30-E90 and JE-H(St)HRH FE180/E30-E90.

Article No.	Name	Clamp type	Cable Ø [mm]	PU
1300065	Trough	LW 16 D	8 - 13	100 pcs.
1300066	Trough	LW 22 D	13 - 19	100 pcs.
1300067	Trough	LW 26 D	19 - 23	100 pcs.
1300068	Trough	LW 34 D	23 - 31	100 pcs.
1300069	Trough	LW 38 D	31 - 36	100 pcs.
1300070	Trough	LW 42 D	36 - 40	100 pcs.
1300071	Trough	LW 46 D	40 - 43	100 pcs.
1300072	Trough	LW 50 D	43 - 47	50 pcs.
1300073	Trough	LW 54 D	47 - 51	50 pcs.

Multi cable support E30-E90 - Type Hermann clamp

for wall and ceiling installation
Fixing distances ≤ 800 mm/≤ 600 mm[1]

[1)] Depending on type of cable

Multi cable support E30-E90
Type Hermann clamp

Multi cable support E30-E90
Type Hermann clamp S (small)

For laying multiple cables on ceilings or walls.
System circuit integrity is achieved for Datwyler Keram cable types (N)HXH/(N)HXH CL/(N)HXCH FE180/E30-E60, (N)HXH/(N)HXCH FE180/E90, JE-H(St)H FE180/E30-E90 and JE-H(St)HRH FE180/E30-E90.

Article No.	Name	Information		PU
38002060ZU	Hermann clamp	for wall and ceiling installation	incl. KDM plug	10 pcs.
38002060ZW	Hermann clamp	for wall and ceiling installation	incl. KDM plug	50 pcs.
38002060ZX	Hermann clamp	for wall and ceiling installation	incl. KDM plug	100 pcs.
38002060ZZ	Hermann clamp	for wall and ceiling installation	in wire-mesh box w/o plugs	750 pcs.
38002000ZU	Hermann clamp S	for wall and ceiling installation	incl. KDM plug	10 pcs.
38002000ZW	Hermann clamp S	for wall and ceiling installation	incl. KDM plug	50 pcs.
38002000ZX	Hermann clamp S	for wall and ceiling installation	incl. KDM plug	100 pcs.
38002000ZZ	Hermann clamp S	for wall and ceiling installations	in wire-mesh box w/o plugs	1750 pcs.

Plug KDM used for multi cable support – accessories

1300962	SDS 1 drill bit	Required for type K6x5 plug and KDM	1 pc.
1300860	SWM-SM 50 setting tool	Required for Hermann clamp (drill hammer) and G-shaped rail	1 pc.

Only in combination with Datwyler safety cables

E0 multi-cable support incl. KDM plug for wall and ceiling installation in accordance with MLAR 2/2015

Article No.	Name	Interior dimensions mm x mm x mm	Exterior dimensions mm x mm x mm	PU
3800086	E0 multi-cable support	approx. 80 x 45 x 33	~ 87 x 60 x 33	25 pcs.
3800087	E0 S multi-cable support	approx. 55 x 35 x 33	~ 63 x 45 x 33	50 pcs.

To speed up installation time for the E0 multi-cable support, we recommend using the Datwyler SWM-SM 50 setting tool.

System description:
For fire-safe installation of multiple cables or lines along ceilings or walls above fireproof ceilings in accordance with MLAR 2015 (not for functional integrity!)

Excerpt from MLAR 2015 3.5.3.:
The special requirements pertaining to fireproof fasteners for lines installed in the area between floor slabs and suspended ceilings must be observed.

Installation spacing (cm)	30	40	50	60	70	80
Cable weight (kg/m)	6	4,5	3,6	3	2,6	2,3

Plug KDM used for multi cable support – accessories

1300962	SDS 1 drill bit	Required for type K6x5 plug and KDM	1 pc.
1300860	SWM-SM 50 setting tool	Required for Hermann clamp (drill hammer) and G-shaped rail	1 pc.

Cable joint E30-E90

For connecting two Datwyler Keram cables, types (N)HXH/(N)HXH CL/(N)HXCH FE180/E30-E60 and (N)HXH/(N)HXCH FE180/E90.
The cable joint provides the relevant circuit integrity of the cables.


Cable joint

Article No.	Name	Dimensions [n x mm²]	PU
1300310	Cable joint SMH4	4 x 1.5 - 4 x 4	1 pc.
1300311	Cable joint SMH4	4 x 6 - 4 x 10	1 pc.
1300312	Cable joint SMH4	4 x 16 - 4 x25	1 pc.
1300313	Cable joint SMH4	4 x 35 - 4 x 50	1 pc.
1300314	Cable joint SMH4	4 x 70 - 4 x 95	1 pc.
1300315	Cable joint SMH4	4 x 120 - 4 x150	1 pc.
1300316	Cable joint SMH4	4 x 185 - 4 x 240	1 pc.
1300317	Cable joint SMHC4	4 x 1.5/1.5 - 4 x 4/4	1 pc.
1300318	Cable joint SMHC4	4 x 6/6 - 4 x10/10	1 pc.
1300319	Cable joint SMHC4	4 x 16/16 - 4 x 25/16	1 pc.
1300320	Cable joint SMHC4	4 x 35/16 - 4 x 50/25	1 pc.
1300321	Cable joint SMHC4	4 x 70/35 - 4 x 95/50	1 pc.
1300322	Cable joint SMHC4	4 x 120/70 - 4 x 150/70	1 pc.
1300323	Cable joint SMHC4	4 x 185/95 - 4 x 240/120	1 pc.

Only in combination with Datwyler safety cables

CONNECTION BOX / TERMINAL BOX

Connection box / Terminal box E30-E90

VAD 3 3x6 PE plus E30 - E90

VAD 3 6x6 PE plus E30 - E90

Fuse element M25/2A for VAD 3

Fuse element 2A for VAD 3

Article No.	Name	Dimensions [mm]	PU
301391	VAD 3 4x6 PE E30-E90	100 x 100 x 50	1 pc.
301392	VAD 3 3x6 PE plus E30-E90	100 x 100 x 50	1 pc.
301393	VAD 3 6x6 PE E30-E90	175 x 150 x 80	1 pc.
on request	Fuse element 2A for VAD 3	40 x 20 x 20	1 pc.
66030400ZY	Fuse element M25/2A for VAD 3	M25 x 50	1 pc.

Terminals assembly

Type	Terminals assembly	Terminal type	Dimensions
VAD 3 4x6 PE E30-E90	4 pc. KR6 and 2 pc. PE 16 mm²	KR6 	4 cores up to 2.5 mm² 2 cores 4 up to 6 mm²
VAD 3 6x6 PE E30-E90	6 pc. KR6 and 2 pc. PE 16 mm²		
VAD 3 3x6 PE plus E30-E90	4 pc. KR6.4 and 2 pc. PE 16 mm²	KR6.4 	8 cores up to 2.5 mm² 4 cores up to 6 mm²

Only in combination with Datwyler safety cables

High-current distribution box, type Hercules, E30-E90

Hercules distribution box
E30-E90

Hercules cover
AHD E30-E90

Article No.	Type	Interior dimensions [mm]	Information	PU
301382	AHD 263013 E90	260 x 300 x 130	(empty, without base)	1 set
301375	HS 263013 E30-E90	260 x 300 x 130	with top hat rail 35 x 7.5 mm 1-row	1 set
301376	HS 353013 E30-E90	350 x 300 x 130	with top hat rail 35 x 7.5 mm 2-rows	1 set
301377	HS 523013 E30-E90	520 x 300 x 130	with top hat rail 35 x 7.5 mm 3-rows	1 set
301378	HI 263013 E30-E90	260 x 300 x 130	with QSA trough for 6 strips	1 set
301379	HI 353013 E30-E90	350 x 300 x 130	with QSA trough for 11 strips	1 set
301380	HI 523013 E30-E90	520 x 300 x 130	with QSA trough for 13 strips	1 set
Replacement firestop mastic (if the provided firestop mastic is not sufficient)				
1300467	SP cartridge	Firestop mastic 310 ml		400 g cartridge

Only in combination with Datwyler safety cables

CONCRETE PLUGS

Fire protection plugs

K 6x5
30 mm embedment depth

K 6x265
K 6x110
K 6x80

KDM
30 mm embedment depth

Article No.	Name	Information / fastening of	PU
1300953	Plug set K6x5	SAS single clamps	200 plugs & drill bit
1300954	Plug set KDM	Single/distance clamps and Hermann clamp	200 plugs & drill bit
1300954	Plug set KDM	C-shaped rail	200 plugs & drill bit
38554650ZX	Plugs K6x80	On insulated ceilings and walls up to 75 mm	100 pcs.
38554640ZX	Plugs K6x110	On insulated ceilings and walls up to 105 mm	100 pcs.
38001360ZX	Plugs K6x265	On insulated ceilings and walls up to 260 mm	100 pcs.

Only in combination with Datwyler safety cables

Fire protection plugs - accessories

EWA 6x5-SM

SWM-SM

SWM-SM 50

SMu 6 SM

SDS 1 32 mm

Article No.	Name	Information / fastening of	PU
1300962	SDS 1 drill bit	Required for type K6x5 plug and KDM	1 pc.
1300961	SWM-SM setting tool	Required for KDM plug (drill hammer)	1 pc.
1300963	SMu 6 SM setting tool	Required for "pre-assembled clamp" (drill hammer)	1 pc.
1300860	SWM-SM 50 setting tool	Required for Hermann clamp (drill hammer) and C-shaped rail	1 pc.
1300462	EWA 6x5-SM setting tool	For direct mounting of type K6x5 plug	1 pc.
1300560	EWA 6x80-SM setting tool	For direct mounting of type K6x80 plug	1 pc.
1300851	EWA 6x110-SM setting tool	For direct mounting of type K6x110 plug	1 pc.

Only in combination with Datwyler safety cables

SPECIAL PLUGS / IDENTIFICATION SIGNS

Special plugs and accessories

MMS+ MS 7,5/45
35 mm embedment depth

MMS+ St 6/55
35 mm embedment depth

MMS KS 5/40
30 mm embedment depth

Gas concrete plugs
PBD M 6x10

Identification sign

Article No.	Name	Information / fastening of	PU
Gas concrete plugs			
1301301	PBD M6x10 plug	Gas concrete plugs for spacer clamps, profile rail, Hermann clamp, light cable support	25 pcs.
1301306	PBD M10x10 plug	Gas concrete plugs for heavy cable support	25 pcs.
Accessories			
1301302	EWP 6x10 SDS setting tool	Required for PBD 6x10 plug (drill hammer)	
1301314	EWP 10x10 SDS setting tool	Required for PBD 10x10 plug (drill hammer)	
Mounting screws			
1301218	Mounting screws MMS KS 5/40	For SAS single clamps	200 pcs.
3800097	Mounting screws MMS+ St 6/55	For SAS single clamps	100 pcs.
1300461	Mounting screws MMS+ MS 7,5/45	For C-shaped rail 2970/2 SLD, Hermann clamps	100 pcs.
Identification sign			
1300479	Identification sign	For cable system	10 pcs.

Insulation bridging set (Ü-Set)

Mounting screw

Joint

Threaded rod

Nuts

Article No.	Name	Information	PU
4000738	Ü-Set 400 mm Bridging set up to 400 mm insulation	100 sets = 100 proved mounting screws, 100 joints, 300 nuts, 50 threaded rods, type M6 1m (100 x 0.5 m)	100 sets

WUM - support measure for vertical cable installation

Effective support measure for vertical installation of
safety cables with intrinsic fire resistance using the C-shaped rail 2970 SLD.
Meandering cable laying is not necessary if the WUM is used (intervals: up to 3.5 m).

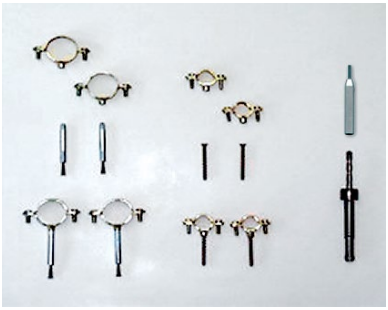
Article No.	Name	Exterior dimensions	for C-shaped rail 2970 SLD (width)
1301276	WUM 300 E30	100 x 370 x 135 mm	300 mm
1301278	WUM 400 E30	100 x 470 x 135 mm	400 mm
1301277	WUM 500 E30	100 x 570 x 135 mm	500 mm
1301275	WUM 300 E90	200 x 470 x 185 mm	300 mm
1301274	WUM 400 E90	200 x 570 x 185 mm	400 mm
1301273	WUM 500 E90	200 x 670 x 185 mm	500 mm

Replacement firestop mastic (if the provided firestop mastic is not sufficient)

1300467	SP cartridge	Firestop mastic 310 ml	400 g cartridge

SAS
Assembly instructions

SAS single clamp



The **K6x5** plugs can be used to fasten Datwyler SAS clamps to concrete.
Tools: drill hammer, SDS 1 drill bit, SMu 6 SM setting tool.

The **MMS KS mounting screws** can be used to fasten the Datwyler SAS clamps to concrete, sand-lime bricks and solid bricks.
Tools: Drill with 4 mm concrete / masonry drill bit and power screwdriver with T-Drive "T20"

Using MMS KS mounting screws

Insert the mounting screw into the clip.
The shape of the bolt head prevents it from pressing against the cable in the clamp.
(for clamp sizes SAS 12 and larger)

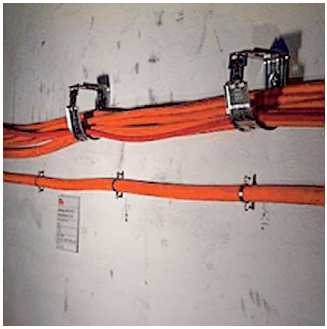
Using K6x5 plugs
By using drill bit SDS1, the hole for K6x5 plugs is drilled to an exact depth of 32 mm. To achieve this depth, drill the hole as far as it will go.
(also refer to assembly instructions for K6x5 plug on page 94)

Using MMS KS mounting screws
Hole diameter is 4.0 mm. The hole depth is at least 30 mm.
(also refer to assembly instructions for mounting screws on page 96)

Blow out the drilled holes with compressed air to clean them.

Using K6x5 plugs
The SMu 6 SM setting tool is required for the installation.
The K6x5 plug is screwed into the SAS clamp prior to the installation.
Make sure that the plug bolts do not protrude into the cable area.
Insert the clamp with the bolted plug into the drilled hole.
Place the setting tool onto the SDS 1 drill bit.
Use the drill hammer to drive the plug deeper into the drilled hole and splay it apart.
(also refer to assembly instructions for K6x5 plug on page 94)

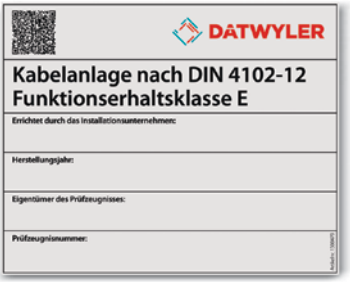
Using MMS KS mounting screws
Insert using T-drive "T20".
(also refer to assembly instructions for mounting screws on page 96)



Depending on the cable type, a fastener spacing of up to 1200 mm is required to maintain the functional integrity of the SAS clamps.

DIN VDE 0100-520 522.6.:
Cable and line systems must be chosen and installed in such a manner to minimise any physical damage (such as impact, penetration or pressure) that occurs during installation, operation and maintenance.

DIN VDE 0276 - 604 5.5 Cable fasteners:
Reference value for clamp spacing with non-armoured cables: 20 times the cable diameter. The spacing should not exceed 80 cm horizontally and 1.5 m vertically.

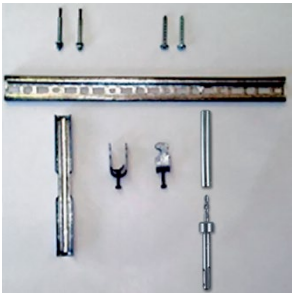


The cable system must be fitted with a permanent identification sign.

STRAP CLAMP

Assembly instructions

C-rail for strap clamp



The **KDM plugs** can be used to fasten Datwyler 2870/2 SLD C-rails to concrete.
Tools: drill hammer, SDS 1 drill bit, SWM-SM or SWM-SM 50 setting tool

The **MMS+ MS mounting screws** can be used to fasten Datwyler 2870/2 SLD C-rails to concrete, sand-lime bricks and solid bricks.
Tools: Drill with 6 mm concrete / masonry drill bit and power screwdriver with T-Drive "T30"

Fastening points for SL2870/2 SLD C-rail.
The required number of fastening points also depends on the load to be fastened and the extraction force of the plug type. A hole spacing of maximum 300 mm is required to maintain functional integrity.
No functional integrity cables may be fastened outside of the plug groups!

Depending on the cable type, a fastener spacing of up to 1200 mm is required to maintain the functional integrity of the strap clamps.

Using KDM plugs
By using drill bit SDS1, the hole for KDM plugs is drilled to an exact embedment depth of 32 mm.
To achieve this depth, drill the hole as far as it will go.
(also refer to assembly instructions for KDM plug on page 95)

Using MMS+ MS mounting screws
Hole diameter is 6.0 mm. The minimum hole depth is 45 mm.
(also refer to assembly instructions for mounting screws on page 97)

Blow out the drilled holes with compressed air to clean them.

Using KDM plugs
The SWM-SM or SWM-SM 50* setting tool is required for the installation. Insert the KDM plug through the rail into the drilled hole. Do not remove the pre-assembled nut and washer!
Place the setting tool onto the SDS 1 drill bit.
Use the drill hammer to drive the plug deeper into the drilled hole and splay it apart.
(also refer to assembly instructions for KDM plug on page 95)

* also suitable for fastening Datwyler Hermann clamp

Using MMS+ MS mounting screws
Screw in using T-drive "30".
(also refer to assembly instructions for mounting screws on page 97)

The cable system must be fitted with a permanent identification sign.

For horizontally fastened cables, the clamps must be secured against slippage in case of fire (using a sliding nut, for example).

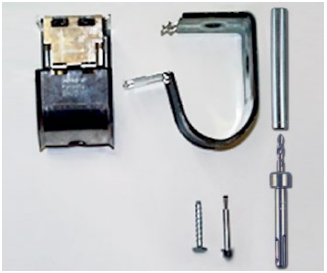
DIN VDE 0100-520 522.6.:
Cable and line systems must be chosen and installed in such a manner to minimise any physical damage (such as impact, penetration or pressure) that occurs during installation, operation and maintenance.

DIN VDE 0276 - 604 5.5 - Cable fasteners:
Reference value for clamp spacing with non-armoured cables: 20 times the cable diameter. The spacing should not exceed 80 cm horizontally and 1.5 m vertically.

MULTI-CABLE SUPPORT

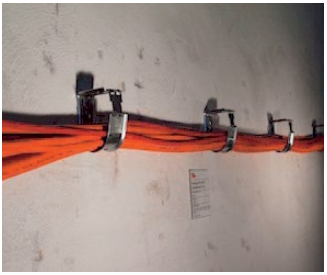
Assembly instructions

Type Hermann clamp / Hermann clamp S



The **KDM plug** can be used to fasten "Hermann" clamps to concrete.
Tools: drill hammer, SDS 1 drill bit, SWM-SM 50 setting tool

The **MMS+ MS mounting screws** can be used to fasten "Hermann" clamps to concrete, sand-lime bricks and solid bricks.
Tools: Drill with 6 mm concrete / masonry drill bit, power screwdriver with T-Drive "T30" and drill bit extension of at least 110 mm for ceiling installations

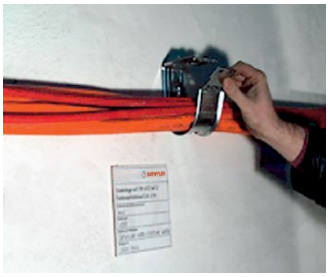


The universal "Hermann" clamp can be installed on walls or ceilings.
The cover is always situated on the side and the rounded cable support surface always faces downwards.
An assembly opening is provided on the clip to allow for ceiling installations.

Using KDM plugs
By using drill bit SDS1, the hole for KDM plugs is drilled to an exact embedment depth of 32 mm. To achieve this depth, drill the hole as far as it will go.
(also refer to assembly instructions for KDM plug on page 94)

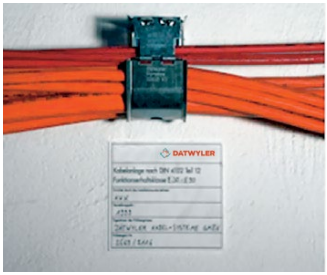
Using MMS+ MS mounting screws
Hole diameter is 6.0 mm. The minimum hole depth is 45 mm.
(also refer to assembly instructions for mounting screws on page 97)
Blow out the holes with compressed air to clean them.

Using KDM plugs
The SWM 50 SM setting tool is required for the installation.
Insert the KDM plug through the fastening hole into the drilled hole.
Do **not** remove the pre-assembled nut and washer!
Place the setting tool onto the SDS 1 drill bit.
Use the drill hammer to drive the plug deeper into the hole and splay it apart.
(also refer to assembly instructions for KDM plugs on page 94)
Using MMS+ MS mounting screws
Screw in using T-drive "30" (also refer to assembly instructions for mounting screws on page 97)



Cables can be easily inserted into the Hermann clamp through the large opening.
Make sure to install cables with higher weight below those of lower weight.

After installing the cable, close the Hermann clamp using the integrated folding mechanism.
Cables can be easily re-inserted into the clip at any time.
Depending on the cable type, a fastener spacing of up to up to 800 mm is required to maintain the functional integrity of the strap clamps.



The cable system must be fitted with a permanent identification sign.

The "Hermann" clamp:

- Unsurpassed performance
- Enormous savings: minimum of material and time expenditure
- Does not require anti-slipping elements

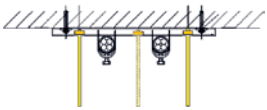
Furthermore:
When installing a Hermann clamp in accordance with MLAR 2015 for "cables without functional integrity" above a fireproof ceiling, it is possible to install a linear cable weight of 15 kg/m with a clip spacing of 600 mm.

WUM
Assembly instructions

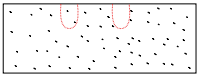
WUM - support measure

Application
Effective support measure in accordance with DIN 4102-12 for vertical installation of safety cables with integrated functional integrity onto 2970 SLD profile rails.
A meander-shaped cable line can be avoided when installing WUM at a spacing of up to 3.5 m.

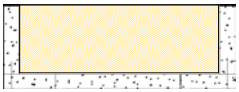
Riser lines consisting of Datwyler 2970/2 SLD C-rails must be fastened to walls using Datwyler fireproof plugs in accordance with the General Appraisal Certificates (ABPs) from building authorities.
Datwyler safety cables with integrated functional integrity are fastened onto walls using Datwyler type B…D strap clamps onto Datwyler 2970/2 SLD C-rails.



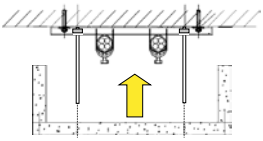
The threaded bolts are fastened using sliding nuts onto Datwyler 2970/2 SLD C-rails. Use the same spacing as the holes provided on the WUM. **(There is only one fastening point for WUM 300 located in the centre)**



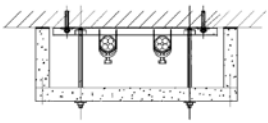
Cut cable feedthroughs into the WUM…



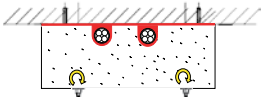
… and fill the inside with mineral wool.



Push the WUM onto the threaded bolts…



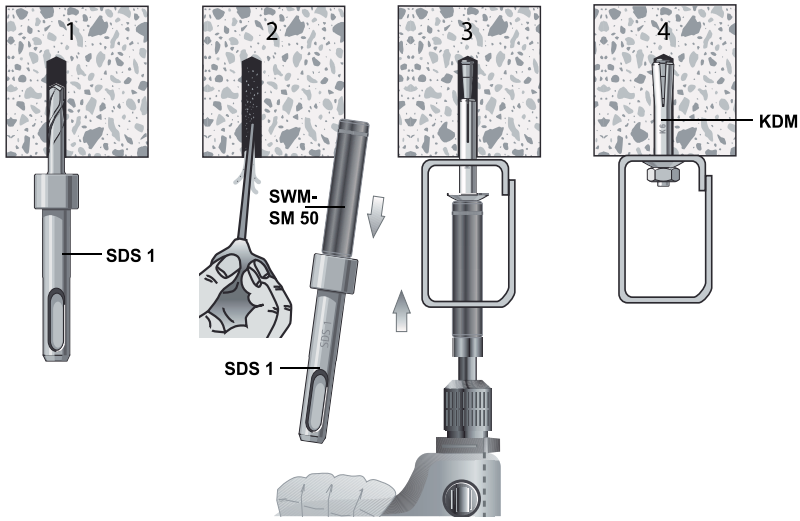
… and fasten it there using a nut and washer tightened by about 2 turns.



The cable inlets are sealed using mineral wool and Datwyler S100 SM-K firestop mastic. The gap between the WUM and the wall is also filled with S100 SM-K firestop mastic.

Assembly instructions for E0 multi-cable supports

The KDM plug can be used to fasten Datwyler E0 multi-cable supports to concrete.
Tools: Drill hammer, SDS 1 drill bit, SWM-SM 50 setting tool.
The MMS+MS 7.5/45 mounting screws can be used to fasten the Datwyler E0 multi-cable supports to concrete, sand-lime bricks and solid bricks.
Tools: Drill with 6 mm concrete / masonry drill bit, power screwdriver with T-Drive "T40" and drill bit extension of at least 110 mm for ceiling installations.
The universal E0 multi-cable support can be installed on walls or ceilings. The cover is always situated on the side at the top. For ceiling installation, an assembly opening is situated on the bottom to provide access for the assembly tools.



Using KDM plugs
By using drill bit SDS1, the hole for KDM plugs is drilled to an exact seat depth of 32 mm.
To achieve this depth, drill the hole as far as it will go (also refer to assembly instructions for KDM plug).
Blow out the drilled holes with compressed air to clean them.
The SWM 50 SM setting tool is required for the installation.
The KDM plugs are inserted through the fastening hole into the drilled hole.
Do not remove the pre-assembled nut and washer!
Place the setting tool onto the SDS 1 drill bit.
Use the drill hammer to drive the plug deeper into the drilled hole and splay it apart.

E0 MULTI-CABLE SUPPORT

Assembly instructions

Assembly instructions for multi-cable supports

Using MMS+MS mounting screws

Drill bit diameter is 6 mm, drill hole depth is > 55 mm, tighten bolts using T-Drive "30" (also refer to assembly instructions for mounting screw).
Blow out the drilled holes with compressed air to clean them.
Cables can be easily inserted through the large opening into the E0 multi-cable support.
E0 multi-cable supports can hold, for example, 30 NYM 3 x 1.5 mm^2 cables.
E0 multi-cable support of type "S" can hold, for example, 15 NYM 3 x 1.5 mm^2 cables.
This clip is only intended for compliance with the special requirements with respect to fireproof fasteners above suspended ceilings in accordance with MLAR 2015 section 3.5.3 and does not fulfil the functional integrity requirements given in section 5.2.1.
Close the E0 multi-cable support after the cables were installed.
Cables can be easily re-inserted into the clip at any time.
The load on E0 clips in cases of fire depends on the fastener spacing.

Installation spacing (cm)	30	40	50	60	70	80
Cable weight (kg/m)	6	4.5	3.6	3	2.6	2.3

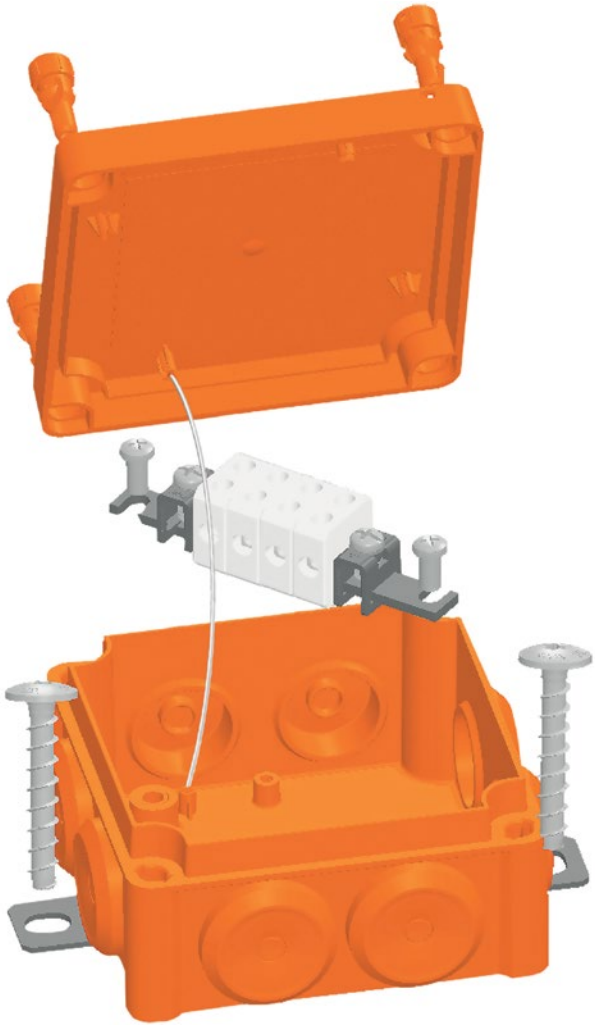
(Not for functional integrity!)

For higher load requirements, the Datwyler Hermann clamp can be used.
(for assembly instructions, see page 84)

Installation spacing (cm)	60	80
Cable weight (kg/m)	15	11.25

(Not for functional integrity!)

Assembly instructions for VAD 3 boxes E30-E90



Drill the holes:
Drill bit diameter is 6 mm.
Embedment depth is > 45 mm.
Blow out the drilled holes
with compressed air to clean them.

Fix the Box:
With the standard mounting screws
and T-Drive „30".
The VAD 3 box is mounted on the
approved mounting surface.
Unscrew the lid and secure it against
falling with the lid loop.
The cable entries are made by piercing
the existing dowels.
Make cable connections according to
test certificate.
Close cover and provide cable system
with identification plate.

The mounting screws are certified
for concrete, full bricks, masonry,
perforated sand lime bricks and
solid sand lime bricks.

MMS+ MS 7,5/45
Mounting screws assembly instructions:
Page 97

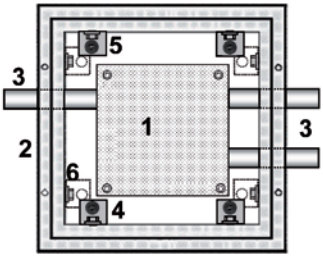
Basic information on plugs:
Page 92

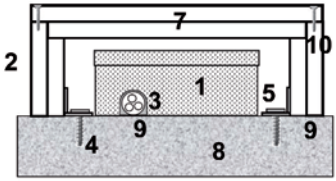
General Appraisal Certificate
P-MPA-06-030

HERCULES COVER

Assembly instructions

Cable connections using AHD E30-E90 Hercules cover



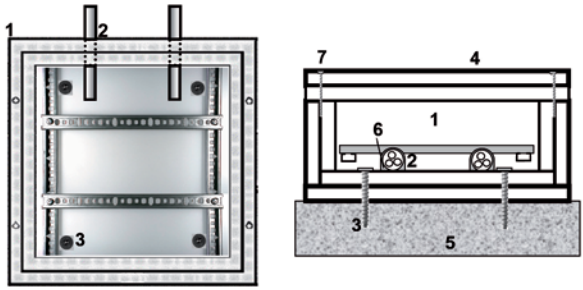


1	Junction box
2	AHD E30-E90 Hercules cover
3	Cable inlet
4	Anchor screws
5	Fastening bracket
6	Anchor bolt
7	Lid
8	Wall
9	Firestop mastic
10	Lid bolt

1. Cable connections or junctions can be installed using a conventional junction box (1) made of poly-carbonate and terminals made of polyamide 6.6.
2. Cut openings into the bottom of the AHD E30-E90 Hercules cover (2) for the cable inlets (3).
3. Drill the plug holes for the fasteners (4).
4. Fasten the 4 brackets (5) to the intended anchor bolts (6), depending on your space requirements
5. Clean the assembly surface, remove the lid from the AHD E30-E90 Hercules cover (7) and fasten the enclosure using the correct anchor screws (4) until there is a gap of approx. 5 mm between the enclosure (2) and wall (8). Fill this gap and the cable inlets using S 100 SM-K firestop mastic (9). Next, tighten the enclosure into place using the anchor screws (4). Scrape away or smoothen any protruding fire-stop mastic (can be washed away or thinned using water during the workability period).
6. Close the lid on the AHD E30-E90 Hercules cover (7) using the correct lid bolts (10). (Do not seal the cover using firestop mastic!))

Note: The spacing between the side walls of the AHD E30-E90 Hercules cover and the junction boxes must be at least 35 mm and 10 mm between the lids.

Cable connections using AHD E30-E90 Hercules terminal box



1	AHD E30-E90 Hercules teminal box	5	Wall
2	Cable inlet	6	Firestop mastic
3	Anchor screws	7	Lid screw
4	Lid		

1. Drill the plug holes for the anchor screws (3).
2. Clean the mounting surface, remove the lid from the AHD E30-E90 Hercules terminal box (4) and fasten the enclosure using the corresponding anchor screws (4).
3. Drill cable inlets into the enclosure large enough for the diameters of the cables.
4. After inserting the cables, generously fill the gap using S 100 SM-K fire-stop mastic (6) with enough material to cover the entire thickness of the enclosure walls. Scrape away or smoothen any protruding firestop mastic (can be washed away or thinned using water during the workability period).
5. Fit conventional terminals or LSA+ onto the standard support rail and connect the wires.
6. Check that the cable inlets (2) are sufficiently sealed using fire-stop mastic (6) and add more if necessary.
7. Close the lid on the AHD E30-E90 Hercules terminal box (4) using the correct lid bolts (7). (Do not seal the cover using firestop mastic!)

ASSORTED PLUGS

Basic information on plugs

Fastening surface: concrete ≥ B25

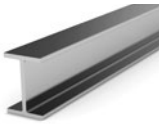
Application area	Plug type	Drill bit	Setting tool	Load (kN) F90	
				Central tension	Tranverse load
Single clamp SAS	K6x5	SDS 1	EWA6x5 SM	0.3	0.3
Single clamp SAS pre-assembled	SAS…D-K6x5	SDS 1	SMu 6 SM	0.3	0.3
Tunnel clamp TSD	KDM	SDS 1	SWM-SM	0.3	0.3
C-rail	KDM	SDS 1	SWM-SM	0.3	0.3
Protective cable duct	KDM	SDS 1	SWM-SM	0.3	0.3
G-duct	KDM	SDS 1	SWM-SM	0.3	0.3
Cable rails, light	KDM	SDS 1	SWM-SM	0.3	0.3
Hermann clamp	KDM	SDS 1	SWM-SM 50	0.3	0.3
Note: Clean the drilled hole with compressed air before inserting the plug.					

Fastening surface:
Concrete ≥ B25 or porous sand-lime bricks (KSL), solid sand-lime bricks (KSV) and solid brickwork with strength class ≥ 1.2

Einsatzgebiet	Plug type	Drill bit ø / min. seat depth (mm)	Setting tool	Load (kN) F90
Single clamp SAS <12mm	MMS+ St 6/55	5 / 35	M 10	0.16
Single clamp SAS ≥12mm	MMS-KS 5/40	4 / 30	Torx "20"	0.07
Tunnel clamp TSD	MMS+ St 6/55	5 / 35	M 10	0.16
Tunnel clamp TSD	MMS-KS 5/40	4 / 30	Torx "20"	0.07
C-rail	MMS+ MS 7.5/45	6 / 35	Torx "30"	0.26
Protective cable duct	MMS+ MS 7.5/45	6 / 35	Torx "30"	0.26
G-duct	MMS+ MS 7.5/45	6 / 35	Torx "30"	0.26
Cable rails	MMS+ MS 7.5/45	6 / 35	Torx "30"	0.26
Hermann clamp	MMS+ MS 7.5/45	6 / 35	Torx "30"	0.26
Note: Clean the drilled hole with compressed air before inserting the plug.				

Fastening surface:
Gas concrete with strength class ≥ P3.3

Application area	Plug type		Setting tool	Load (kN) F90 Central tension	Load (kN) F90 Tranverse load
Single clamp SAS	PBD M6x10		EWP 6x10 SDS	0.35	0.35
Tunnel clamp TSD	PBD M6x10		EWP 6x10 SDS	0.35	0.35
C-rail	PBD M6x10	Do not drill!	EWP 6x10 SDS	0.35	0.35
Protective cable duct	PBD M6x10	Use the	EWP 6x10 SDS	0.35	0.35
G-duct	PBD M6x10	setting tool for	EWP 6x10 SDS	0.35	0.35
Cable rails, light	PBD M6x10	the installation.	EWP 6x10 SDS	0.35	0.35
Hermann clamp	PBD M6x10		EWP 6x10 SDS	0.35	0.35
Cable rails, heavy (M10)	PBD M10x10		EWP 10x10 SDS	0.80	0.80



Fastening to steel supports*
As an alternative to using plug fasteners, the profile rails, single clamps, multi-cable supports or protective cable ducts can also be fastened using spring steel clips.
Spring steel clips may only be loaded to a maximum of 25 N.
With respect to functional integrity duration, the steel support must be protected by at least the same degree as the cables.

Fastening to wooden beams*
As an alternative to using plug fasteners, the profile rails, single clamps, multi-cable supports or protective cable ducts can also be fastened to wooden beams using steel woodscrews. With respect to fire requirements, the minimum cross-section dimensions of the wooden beams must be properly dimensioned according to the functional integrity duration of the cable. The screw-in depths and edge spacings must be increased for E30 by 30 mm and by 90 mm for E90.

Fastening to post-and-beam/drywall constructions
Unfortunately, this is not possible since drywalls can break and fall down on the side facing the fire.

* The latest General Appraisal Certificates (ABPs) must no longer include expert's opinion on fastening to steal supports or wooden beams. Please see the previous MPA Appraisal Certificates which can still be found on our website for your evaluation.

K6X5 / KDM PLUG

Assembly instructions

Assembly instructions for K6x5 plugs with type SAS ... D single clamp

Drilling
Embedment depth: 32 mm
Drill bit: SDS1
Purge the drilled hole.
Insert the pre-assembled clamp and plug into the drilled hole.

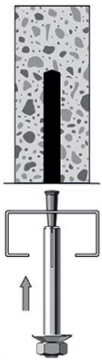
Driving in
Place the setting tool “SMu 6-SM” or “SDS1” onto the “SDS1” drill bit.
Drive the plug into the drilled hole using the drill hammer.

Assembly instructions for KDM plug with Hermann clamp

Drilling
Embedment depth: 32 mm
Drill bit: SDS1. Purge the drilled hole.
Insert the plug with a nut and washer through the Hermann clamp and into the drilled hole.

Driving in
Place the setting tool “SWM-SM 50” onto the “SDS1” drill bit.
Drive the plug into the drilled hole using the drill hammer.

Assembly instructions for KDM plug with 2970/2 SLD profile rail

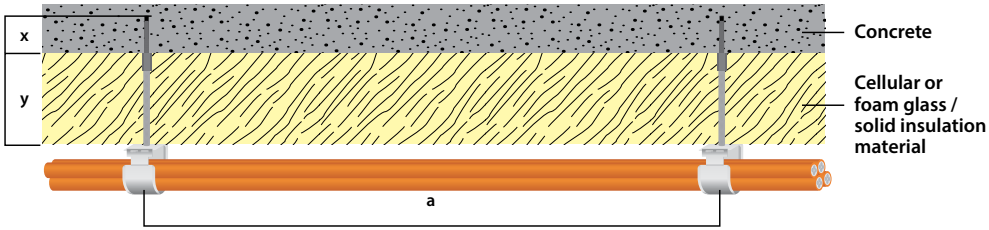


Drilling
Embedment depth: 32 mm
Drill bit: SDS1
Purge the drilled hole.
Insert the plug with a nut and washer through the profile rail and into the drilled hole.

Driving in
Place the setting tool "SWM-SM" or "SWM-SM 50" onto the "SDS1" drill bit.
Drive the plug into the drilled hole using the drill hammer.

Assembly instructions for insulation bridging set for insulated ceilings, thickness > 100 mm

Embedment depth in concrete (x): minimum of 70 mm,
plus thickness of non-flammable insulation (y). Borehole depth = x+y.
Drill diameter: 5 mm for MMS+ ST.



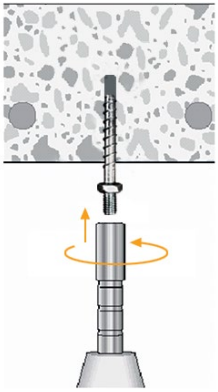
x = Embedment depth in concrete
y = Thickness of insulation
a = Distance between "Hermann" clamps or SAS clamps. Other: see pages 34 to 43.
The distances are the same as for direct mounting on ceilings (or walls).

MMS+ST / MMS-KS MOUNTING SCREW

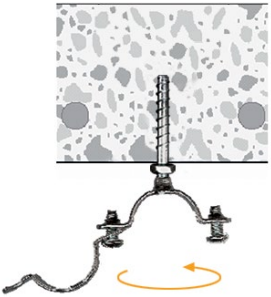
Assembly instructions

Assembly instructions for MMS+St mounting screw and type SAS … D single clamps

Drilling
Embedment depth: > 35 mm
Drill diameter: 5 mm
Drill hole depth: > 55 mm
Purge the drilled hole!



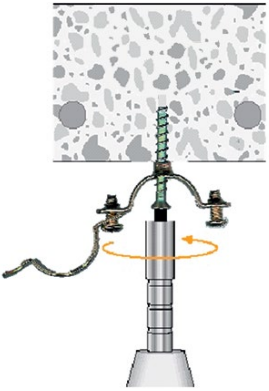
Driving in
with M10 socket wrench



Screw on
the clamp

Assembly instructions for MMS-KS mounting screw and type SAS … D single clamps

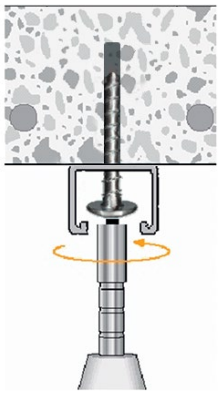
Drilling
Embedment depth: > 30 mm
Drill diameter: 4 mm
Drill hole depth: > 40 mm
Purge the drilled hole!
Insert MMS-KS bolt through SAS clamp up to the drilled hole.



Driving in
with T-Drive „20“

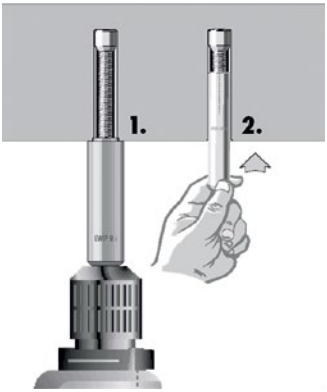
Assembly instructions for MMS+MS mounting screw and Hermann clamp / profile rail

Drilling
Embedment depth: > 35 mm
Drill diameter: 6 mm
Drill hole depth: > 45 mm
Purge the drilled hole!
Insert MMS+MS bolt through Hermann clamp / profile rail up to the drilled hole.

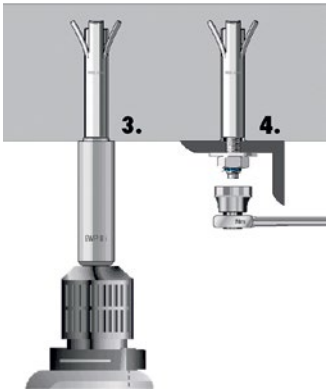


Driving in
with T-Drive „30"

Assembly instructions for PBD gas concrete plugs (wall thickness min. 175 mm)



1. Use the setting tool and hammering action of the drill hammer to drive the tapered bolts into the gas concrete.
   Do not pre-drill.
2. Insert the splaying sleeve.



3. Use the setting tool and hammer action of the drill hammer to drive the splaying sleeve into place.
4. Tighten the component into place until the blue marking becomes visible.

FAQ

Can cables with functional integrity be installed directly in the earth?

The standards pertaining to the installation of cables of these types is given in DIN VDE 0276-604 and DIN VDE 0266.
Neither DIN VDE 0276-604 nor DIN VDE 0266 contains provisions for installing these cables directly in the earth or in water. However, it is permitted to install them in cable conduits as long as no water can collect in the conduits.

Are cables with functional integrity also resistant to UV light?

The UV light resistance of a cable chiefly depends on the colour of the external sheathing.
Cables that are conceived for outdoors applications and exposure to sunlight are generally fitted with a black sheathing. Datwyler cables with red or orange sheathing are UV-stabilised but not protected against excessive exposure to sunlight. They should be protected using a duct, conduit (with consideration of the general test certificate) or coated externally using water-soluble dispersion paint.

Is it possible to repair the external sheathing of any of the following halogen-free cables or lines, or cables with functional integrity?

Just as with PVC-insulated cables and lines, zero-halogen cables and lines can be repaired using blow-out patches. Datwyler Keram cables with integrated functional integrity did not exhibit premature failure in tests using connecting joints.
Since the cable sheathing, filling material and parts of the conductor insulators are destroyed by fire and only the ceramic coating directly on the copper wire insulates it against fire, the external sheathing of Datwyler Keram cables can be repaired using blow-out patches.
Any metallic components of the blow-out patch must be removed after the tubing has shrunk into place.
However, it makes sense to use a zero-halogen blow-out patch.

Do zero-halogen cables or lines, or cables with integrated functional integrity have better fire load properties than PCV-insulated cables?

No.
Depending on the manufacturer, cable type and standard, there may be fluctuations.
When comparing similar types of cables, the fire-load values of zero-halogen cables is even usually quite a bit lower.
The largest differences can be observed when comparing various cables with functional integrity. Since ceramics are used in the Datwyler cables, their fire load characteristics are up to 50% lower than those of comparable cables.

The confusion pertaining to the supposed higher fire load properties of zero-halogen cables originated in a VdS data sheet (VdS 2134:1999-01 and its predecessor). Since the zero-halogen sheathing cable NHXMH was not included with this data sheet, readers mistakenly compared the PVC-sheathed cable of type NYM with the zero-halogen cable of type NHXHX with 0.6/1 kV (intended for containment applications in nuclear power plants).
The correct comparison here would have been between cables such as NYM 3x1.5 mm^2 (fire load: 0.44 kWH/m) and Datwyler NHXMH 3x1.5 mm^2 (fire load: 0.33 kWH/m).

What is the maximum tensile loading capacity for zero-halogen cables/lines or for cables with functional integrity?

NHXMH	acc. to DIN VDE 0298 - 3:	50 N / mm² core cross-section
N2XH/CH, (N)HXH/CH E30-E60, (N)HXH/CH E90	acc. to DIN VDE 0276-604:	50 N / mm² core cross-section
J-H(St)H...BD, JE-H(St)H…BD FE180 E30-90	acc. to DIN VDE 0891 - 5:	depending on number of cores, span length and temperature

What is the maximum permissible operating temperature at the cable for zero-halogen cables/lines or cables with functional integrity?

(N)HXSLHXÖ-J	acc. to Datwyler specifications:	- 25 °C to + 90 °C moving air
	acc. to Datwyler specifications:	- 40 °C to + 90 °C stationary air
NHXMH, H07Z-U/R, H05 / H07Z-K	acc. to DIN VDE 0298 - 3:	+ 5 °C to + 70 °C moving air
	acc. to DIN VDE 0298 - 3:	- 40 °C to + 70 °C stationary air
N2XH/CH, (N)HXH/CH E30-E60, (N)HXH/CH E90	acc. to DIN VDE 0276-604:	- 5 °C to + 90 °C moving air
	acc. to Datwyler specifications:	- 25 °C to + 90 °C stationary air
Dätwyler FE 180/E30-CL Keram	acc. to Datwyler specifications:	- 5 °C to + 90 °C moving air
	acc. to Datwyler specifications:	- 25 °C to + 90 °C stationary air
J-H(St)H..., JE-H(St)H… E30-E90	acc. to DIN VDE 0891 - 5:	- 5 °C to + 50 °C moving air
	acc. to DIN VDE 0891 - 5:	- 30 °C to + 70 °C stationary air

The installation temperatures are the same as the temperatures for moving air. These temperatures apply for the cable itself but not for the surroundings. If the temperature of the cables is low, warm them up. Make sure that the temperature never drops below the lowest permissible temperature during the entire installation.

How does safety cable behave in tunnels or subterranean garages?

Given that the following auxiliary conditions are met, the functionality of our zero-halogen cables and lines will not be compromised or negatively affected by the effects of water or water-salt solutions (road salt) nor from acids resulting from automotive exhaust gases:

- There is no damage to the cable sheath.
- No water can penetrate into the cable in the longitudinal direction.
- The cables have been installed in a protected state (e.g., in a closed concrete duct with a sand bed so that the cables are not permanently surrounded by water or situated in pipe systems where water can flow).

Datwyler can guarantee the full range of functions for its cables if the cables are stored in the following media or under the following conditions:

- Storage at almost 100% air humidity
- Storage in stagnant water, temperature range: + 5 °C up to a maximum of +50 °C.

FAQ

How is it possible that a terminal lug / crimped connector with the same cross-section as a given conductor is actually too large for the conductor?

For multicore copper cables with diameters larger than 16 mm^2, the round copper wires are deformed (compressed) and fill out the intermediary spaces between the cores. Thus, the cable diameter decreases effectively. However, the cable cross-section is not changed and remains equivalent to the sum of the cross-sections of the various copper cores.
For this reason, the terminal lugs or crimped connectors should be dimensioned according to the diameter of compressed copper cable or suitable reducers should be used.

Is it possible to install high-current cables together with low-current cables?

According to DIN 4102-12, the functional integrity is not affected by combining high-current and low-current cables in an installation. However, the regulations given in the DIN VDE provisions apply.

Is it permissible to apply coatings to Datwyler safety cables?

Datwyler safety cables can be coated with water-thinnable dispersion paint. For cables with functional integrity or fire detector cables, it is recommended to confer first with the responsible authorities since the orange or red signal colour may be concealed.

Is it permissible to install safety cables directly in concrete?

According to DIN VDE 0276 Part 604 Appendix A Section 3.1 (contains regulations pertaining to the application areas for low voltage cables with improved fire properties), safety cables may installed indoors, in the air or embedded in concrete. According to HD 604 Part 5 Section 5.1.2, the cables also have to be protected against mechanical damage.
Functional integrity can only be achieved as part of a "non-essential deviation" if the cable has a functional integrity approval for the installation under plaster.

Is the C-conductor of a concentric cable [(N)HXCH] a shield?

The concentric conductor in cables is not a shield in the electrical sense and thus not comparable with telecommunications or IT applications. It only provides a mild shielding effect. This concentric conductor is defined in DIN VDE 0276 Part 604 Section 5 Item 3.3.5.

Functional integrity under plaster or in concrete?

NHXH E30/NHXCH E30 and NHXH E90/NHXCH E90 may be installed indoors, in the air or in concrete (DIN VDE 0276 Part 604 Annex A Section 3.1). However, the cables must be protected against mechanical damage.
The laying in concrete can only be deduced within the scope of a "non-significant deviation" if the cable has a functional integrity approval for the installation under plaster.
The installation under plaster or in concrete does not per se constitute a measure of the functional integrity.

Can zero-halogen cables and lines be fitted with joints?

Zero-halogen cables and lines can be fitted with joints just as with PVC-insulated cables and lines. However, it makes sense to use a zero-halogen joint. Certified Datwyler joints are available for Datwyler Keram cables with functional integrity.

Can zero-halogen cables and lines be connected to PVC-insulated cables and lines?

Seen from a purely electrical viewpoint, yes. However, the resultant cable will not fulfil the requirements in DIN VDE 0482-267 for zero-halogen cabling. It will no longer be possible to guarantee minimal fire propagation in accordance with DIN VDE 0482-266 and minimal smoke density inaccordance with DIN VDE 0482-1034.

What does “NHMH or zero-halogen cable without improved behaviour in case of fire” mean? (Datwyler: NHXMH)

In contrast to NHXMH, NHMH cables do not fulfil the test criteria for minimal fire propagation in accordance with DIN VDE 0482-266-2-4, nor do they comply with the requirements for low smoke density as stipulated by DIN VDE 0482 Part 1034. The danger with this cable type is that it can exhibit a fuse effect and produce dense smoke.
NHMH is therefore not suitable for applications requiring compliance with DIN VDE 0100-482 in rooms or locations containing irreplaceable goods of high value nor in areas where people congregate as stipulated in the pertinent VdS loss prevention provision (VdS 2025 – Cable and Line Systems).

What is the difference between flame-retardant and minimal flame propagation) or, in other words, what does “improved behaviour in cases of fire” mean? Datwyler: J-H(St)H, NHXMH, N2XH/CH Datwyler Keram: JE-H(St)H/HRH...BD FE180 E30-E90, (N)HXH/CH E30-E60 / E90

When one speaks of a “flame-retardant cable”, this means that this cable can, depending on its diameter, self-extinguish any flames within one minute after the fire source moves or is moved away (DIN VDE 0482-332-1). DIN VDE defines this as “flame resistant”.
However, since “flame-resistant” cables may still have very high fire propagation properties, this laboratory test on its own is not particularly relevant for real-world applications and says nothing of the actual fire properties of the given cable.
On the other hand, minimal fire propagation indicates that the fire source will not propagate even after 20 or more minutes of exposure to the fire (DIN VDE 0482-266-2-4). Furthermore, groups of cables containing a specific volume of non-metallic materials (in VDE 0482-266-2-4 = 1.5 l) with a length of 360 cm are tested under real-world conditions.

What is the meaning of functional integrity E30 or E90?

This refers to functional integrity as stipulated in DIN 4102 -12. Since functional integrity is only maintained when the functionality of both the cable and installation system remains integral, this test always applies to the entire system.
On their own, neither the cable or installation system offer functional integrity.
Furthermore, it is essential to use certified plugs and bolts.

FAQ

Is it permitted to re-use cables with functional integrity following a fire? Datwyler JE-H(St)H/HRH...BD FE180 E30-E90 Keram, (N)HXH/CH E30-E60 / E90 Keram

All safety cables must be replaced following any type of exposure to a fire.
Cable systems with functional integrity must be re-certified from a qualified appraiser.
Cables with functional integrity are by no means absolutely fireproof.

What happens when cables with functional integrity are exposed to high-pressure water in sprinkler systems during fire? Datwyler (N)HXCH E90 Keram

Datwyler safety cables (N)HXCH E90 Keram of size 16 mm^2 and above have been tested in accordance with VdS provision 2344 (1999-02) for this application and have been certified by VdS.

Are cables with functional integrity suitable for applications where the surrounding temperatures are permanently > 100 °C?

No. Cables offering functional integrity are not silicon lines and cannot be compared with them.
The permissible temperature range with stationary air for conductors is
-25 °C to + 90 °C for (N)HXH FE180/E30-E60 and
-30 °C to + 70 °C for JE-H(ST)H…Bd FE180/E30-E90

What is the proper method of installing vertical lines of cables with functional integrity that extend across multiple storeys?

According to DIN 4102 Part 12, this type of installation requires that cables are supported at a spacing of up to 3500 mm. This can be done by installing "meandering" lines, using S90 ceiling fire bulkheads or encasing the lines in WUM clips.

What does the "G" number indicate with respect to functional integrity?

For supply lines to sprinkler pump motors, the VdS provision for spinkler systems (VdS CEA 4001 9.8.2.2 f) stipulates an additional test of the functionality of the cable when exposed to water during a fire (VdS provision 2344).
If a cable passes this test, it is assigned an approval code that begins with G.
Datwyler (N)HXCH E90 Keram 16 mm^2 and larger: Approval code G-4980024.

How should cable systems be assessed following flood damage?

With the exception of buried cables with longitudinal waterproofing, we suggest the following recommendations for our cable types:

Transverse watertightness:
If the cable is submerged in water for approx. 1 month, this is considered to be a short-term exposure. According to DIN VDE, this is not equivalent to being installed under water. With respect to the transverse watertightness, as long as the cable sheath is not damaged, there is no need to suspect that the cable has been compromised. Important: exposure to chemical substances (e.g., oil) from neighbouring rooms must be considered separately.
Longitudinal watertightness:
As with NYY, our cables are not watertight in the longitudinal direction! As a result of the capillary effect, water can penetrate the cable to a point that is even above the effective water level.
It is not possible to fully remove this water from the cable.
However, the positive results of an insulation measurement that was performed indicate that the cable can still be used.
It is not possible to reach any further conclusions with respect to the product life.

E30-E90 systems with functional integrity:
With respect to transverse watertightness, the same applies as for the cable types given above.

With respect to longitudinal watertightness, the functional integrity (JE-H(St)H E30-E90, NHXH/CH E30, NHXH/CH E90) may be heavily compromised. In areas where water collects in cables, the cable may burst open as a result of boiling/vapourising water and thus cause a short circuit.
To continue to ensure safety in these functional integrity classes, we recommend replacing the cable. (Furthermore: This hazard also exists in electrical ducts containing conventional cables since fire temperatures of above 100 °C are permitted here.)

What does ABP mean?

ABP is a German abbreviation for a "General Appraisal Certificate" from building authorities. According to building laws and regulations, cable systems with integrated functional integrity must be supplied with a "General Appraisal Certificate". Otherwise, approval is required on a case-by-case basis from the highest building authority.

FAQ

What is the bending radius for zero-halogen cables/lines or for cables with functional integrity?

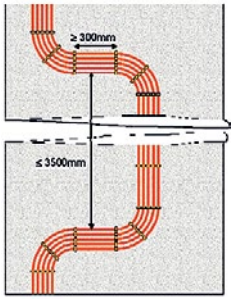
NHXMH	acc. to DIN VDE 0298 - 3	4 x external diameter
N2XH/CH, (N)HXH/CH E30-E60 / E90	acc. to DIN VDE 0276-604	15 x external diameter (single core) 12 x external diameter (multicore)
J-H(St)H…, JE-H(St)H… E30-E90	acc. to DIN VDE 0891 5:	7.5 x external diameter
(N)HXSLHXÖ ≤ 12 mm	permanently installed	3 x external diameter
(N)HXSLHXÖ > 12 mm	permanently installed when bent once	4 x external diameter
(N)HXSLHXÖ ≤ 8 mm	permanently installed	2 x external diameter
(N)HXSLHXÖ > 8 -12 mm	permanently installed	3 x external diameter
(N)HXSLHXÖ > 12 mm	permanently installed	4 x external diameter

The prerequisite here is that the cable is bent evenly without any kinks.

What is the proper method of installing vertical lines of cables with functional integrity that extend across multiple storeys? Meander-shaped installation or effective support mount WUM

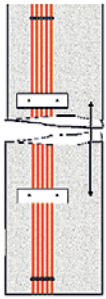
According to DIN 4102-12 Section 8.3, the classification of functional integrity only applies when effective support mounts (spacing ≤ 3,500 mm) are installed for the cables. An example of an effective support mount is shown in the figure below (right side). Another method is to use an appropriately classified ceiling fire bulkhead or a tested and certified clip construction. Only authorised test institutes are permitted to evaluate mount designs that differ from the one shown in the figure below (left side).

The figure below (left) displays a meander-shaped cable installation, with the cable system leading horizontally every 3,500 mm and fastened by two clips at a spacing of max. 300 mm. The cable must run for at least 300 mm in the horizontal direction. The bending radii must be included in the calculation.
When using Datwyler WUM (effective support mounts), it is possible to eliminate the need for the horizontal cable routing since this has been certified by a recognised test institute.



"With riser lines, this classification only applies when effective support mounts (spacing ≤ 3500 mm) are installed for the cables."

Datwyler WUM



Installation using only single or strap clamps:
According to DIN 4102-12 Section 8.3, the only test results that apply to vertical cable systems are those for separately installed cables on ceilings using single clips. A certified strap clamp can be used as alternative means of fastening the cables. The spacing of the strap clamps is the same as the spacing used to install cables separately using single clips. (Using standard installation techniques, this corresponds to a fastener spacing of 300 mm).
Using Datwyler, SAS single clips or strap clamps of type B…D, it is possible to achieve fastener spacings of up to 1.2 m with bundled cable weights of up to 2.5 kg/m. For more information, refer to our "Optional Installation Techniques".

How does DIN 4102-12 stipulate fastening single-core high-current cables with integrated functional integrity?

The cable is subject to DIN VDE 0266 and this standard refers to DIN VDE 0276-604 for applications. According to section 5.5.3, single-core cables may only be installed separately or in bundled systems (L1,L2,L3). A system of bundled cables can be treated in the same manner as multicore cables. When installing single-core cables, only use clips made of plastic or non-magnetic metals. Steel clips may only be used if the magenetic circuit is not closed.
According to DIN 4102-12, only the systems listed in the "General Test Certificate" may be used.

Due to their low melting points, clips made of plastic or aluminium are not approved for applications requiring functional integrity.
Our Datwyler (N)HXH/CH E30-E60 / E90 Keram safety cable has been approved for three-phase cable group installations and is expressly listed in the general test certificate.

Along escape routes, LAR (German code of practice) stipulates that fire-safe fasteners must be fitted for lines installed between floor slabs and suspended ceilings. Which products are suitable for this application?

Datwyler Hermann clips and E0 multi-cable supports combine the simple yet flexible assembly of multi-cable supports with the high requirements of fire-safe installations. For these applications, Hermann clips can be subjected to cable weights of up to 10 kg/m with a fastener spacing of 600 mm. In contrast to functional integrity applications, if the distance is shortened, the cable weight can be increased accordingly. On the other hand, fastener spacings of up to 800 mm are possible with reduced loads. The fireproof plugs are used as the fasteners in these applications.

DIN 4102-12 provides information on the thermal effects that cause the electrical resistance to increase in copper lines. How should this be taken into account when dimensioning cables?

For cable systems with integrated functional integrity, DIN 4102-12 stipulates that, if no special measurements are performed, the conductor temperature can be approximated as the fire room temperature for the purpose of choosing an appropriate cable size. (E30: 860 °C and E90: 1,000 °C)
In measurements of the copper conductors in cables, Datwyler has determined that the actual temperatures in the copper conductors are significantly lower. For Datwyler cables we have therefore developed a simple calculation program for the line voltage drop that also takes the fire compartments into consideration. The max. permissible line voltage drop also has a large effect, since during fires it depends only on the electrical consumers and can amount to 5% or more. (Doubling the voltage drop halves the cross-section!)

Please download our cross-section calculation tool.

FAQ

Table with material stabilities at room temperature

Materials	Stability at room temperature of 23 °C
5% + 30% formaldehyde	Good to very good over short term
5% + 30% acetic acid	Good to very good over short term
Methanol	Good to very good over short term
20% soda brine	Good to very good over short term
NaCl 10% common salt solution	Good
Chlorine water 3%	Conditional to good
Ammonia (gaseous/aqueous)	Average to good/The material is not destroyed
Hydrocarbon	Conditional to average over short term
Water resistance	
(water bath storage at 70 °C)	Average
Water resistance	
(water bath storage at 23 °C)	Good to very good
Storage with air humidity close to 100%	Very good

Fore more extensive information and aids such as calculating tools, manuals, forums, MLAR, approvals and more, visit us at ITinfra.datwyler.com!

Typos:

Dear reader,
after making extensive changes to this manual, very likely a few typos will have crept into this document. We would be very glad to receive any feedback from you on typos or other mistakes that you may have found!

Subject to change without prior notice.

Your Datwyler team.

Preventive fire protection and system circuit integrity

The co-ordinated and licensed Datwyler products enable optimal system approaches and guarantee quality, cost-efficiency, saving of time and security.

300 mm

Standard laying technics with single clamp (of different manufacturers)

600 mm

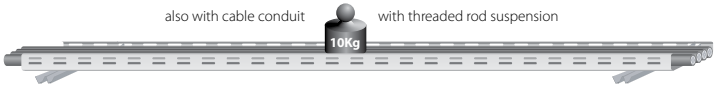
Standard laying technics with strap clamp with trough (of different manufacturers)

600 / 800 mm

Hermann clamp: **bundling, e.g. 30 cables 3x1.5mm²**

600 / 800 / 1200 mm

Single clamp
Strap clamp



1200 mm

Standard cable tray (of different manufacturers)

1500 mm

Datwyler cable tray without threaded rod suspension for wall and ceiling installation.
Optional laying technique with different cable tray manufacturers.

Datwyler E30-E90 support systems

ITinfra.datwyler.com

DATWYLER