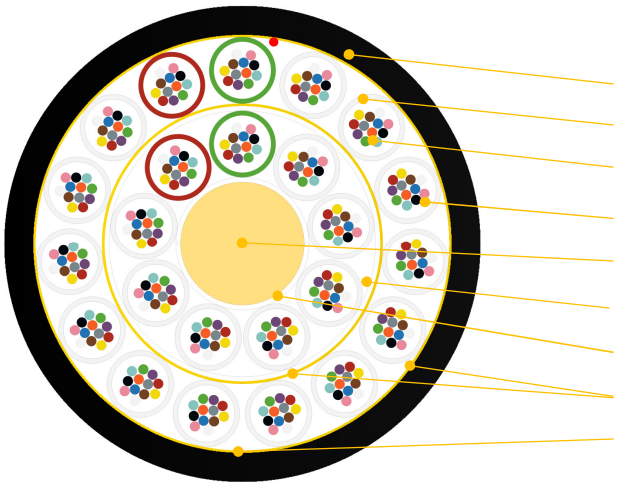
Type:	MKVM-0112-24-PE	REV: 0
Issued:	29/09/2021	KP
Project:	079-21	

288 Fibre Blown Cable



*schematic drawing, not to scale

DESIGN:

FRP strength and anti-buckling element
Dry yarns to prevent moisture ingress into the cable
SZ stranded cable core
Loose tubes (PBT Ø 1,4mm) with thixotropic filing compound and ITU-T G.652D or ITU-T G.657A1 optical fibres
Yellow PBT fillers (loose tubes with mechanical fibre - when applicable)
Water-swellable aramid binder
Red polyester ripcords (two pieces on opposite sides)
UV stabilized black HDPE sheath (nominal thickness 0,4mm)

Variant	Quantity [pcs]				Ø nominal (±0,2)	Nominal weight (±5%)	Max allowed tension
	Fibres	Fibres per tube	Total elements	Active tubes	[mm]	[kg/km]	[N] / ε=0,6%
24T x 12F	288	12	24	24	9,3	72	1000

FIBRES COLOUR CODE

Fibre number	1	2	3	4	5	6	7	8	9	10	11	12
Fibre colour	Blue	Orange	Green	Brown	Grey	Yellow	Red	Violet	White	Black	Aqua	Pink

TUBES COLOUR CODE

First tube: Green **Other tubes**: Natural
Last tube: Red
*Sequence repeated on a second layer.

OPTICAL FIBRES AND LOOSE TUBES COLOUR IDENTIFICATION

For optical fibres and tubes identification information please see **DSH_Colors_CODE_XXXX** document.

FIBRES PARAMETERS

For selected post-production optical fibres parameters please see DSH_OFP document.

MECHANICAL AND ENVIRONMENTAL CHARACTERISTICS

Temperature range:

Installation:	-5... +50 [℃]
Operation:	-10… +70 [℃]
Transport & Storage:	-40… +70 [℃]

Cable bending radius:

12 x cable diameter (during operation)
20 x cable diameter (during installation)

Test	Specification	Method	Requirements
Tensile strength	IEC60794-1-21 Method E1	**Mandrel diameter**: ≥ 30 x OD **Extended load**: 1000N or ε=0.6% / 15 min **Sample Length:** 250 m 1 fibre per tube to be spliced on inner and outer layer. Inner and outer layers are being monitored separately and at the same time	**Fibre strain:** < 0.6%(during test) ≤ 0.05%(after test) **Attenuation increment:** Δα≤0.05dB @ 1550nm (after test) No significant damage to fibre unit
Crush resistance	IEC60794-1-21 Method E3	**Load:** 500 N / 10 cm / 10 minutes **Plate size:** 100 mm x 100mm **Number of pts**: 3 (500mm apart) *All fibres to be monitored*	Δα ≤ 0.1dB @ 1550nm (after test) No jacket cracking and fibre breakage
Impact resistance	IEC60794-1-21 Method E4	**Impact energy**: 1J **Radius**: 300 mm **Distance**: 0.5m **No. of impacts**: 3 at different points 500mm apart *All fibres to be monitored*	Δα≤0.05dB @ 1550nm (after test) No jacket cracking and fibre breakage
Torsion	IEC60794-1-21 Method E7	**Cable length to be twisted:** 2m **No. of cycles:** 10 **Twist angle:** starting position to -180° to starting position to +180°, and back (±360° total) **Load:** 40N *All fibres to be monitored*	Δα≤0.05dB @ 1550nm (after test) No jacket cracking and fibre breakage
Bending	IEC60794-1-21 Method E11	**Mandrel radius**: 20 x OD / 4 turns (wrapped and unwrapped) / 3 flexing cycles *All fibres to be monitored*	Δα≤0.05dB @ 1550nm (after test) No jacket cracking and fibre breakage
Repeated bending	IEC60794-1-21 Method E6	**Sheave Radius:** 20 x OD **No. of cycles:** 35 **Flexing speed:** 15 cycles/minute **Load:** 40N *All fibres to be monitored*	Δα≤0.05dB @ 1550nm (after test) No jacket cracking and fibre breakage
Abrasion resistance	IEC60794-1-21 Method E2B (Method 2)	**No. of cycles**: 30 **Load:** 4N (PE sheath)	Legend shall remain legible
Water penetration	IEC 60794-1-22 Method F5A, F5B	**Water head**: 1m **Sample length**: 1m (3 samples of each cable) **Time**: 24 hrs	No water leakage
Tube kink	IEC 60794-1-21 Method G7	**Length(L1):** 350mm **Moving length**:100mm/60mm **Number of cycles:** 5 **Number of samples:** 5	No tube kink
Ripcord test	IEC 60794-1-21 Method E25	Keeping the test samples 12h @ -10℃ 400mm of the cable sample should be ripped through and the cable core revealed. **No. of samples:** 3	The rip cord shall rip through the cable sheath and not break for the entirety of the pull
Temperature cycling	IEC 60794-1-22 Method F1	Temperature steps: **1 cycle** +23℃→-10℃(T_{A1})→+60℃(T_{B1})→+23℃ **2 cycle** (last cycle) +23℃→-10℃(T_{A1})→-40℃(T_{A2})→ +60℃(T_{B1})→+70℃(T_{B2}) →+23℃ **Soak time**: 8h	For T_{A2} and T_{B2} ≤ 0,15dB/km For T_{A1} and T_{B1} ≤ 0,05dB/km Test wavelength: 1550nm

MARKING

The following print (laser printing or inkjet method) is applied at 1-meter intervals:

"MANUFACTURER's NAME" "NUMBER OF OPTICAL FIBRES" "FIBRE TYPE" "YEAR/MONTH" "CUSTOMER" "LASER SYMBOL" "LENGTH MARKING" "BATCH NUMBER"

Example: FIBRAIN MKVM-0112 288F SM G657A1 24T12F 2018/08 PROPERTY OF VIRGIN MEDIA "LASER SYMBOL" "LENGTH MARKING" "BATCH NUMBER"

The accuracy of marking is ±0,5%. Remarking is in accordance with Bellcore GR 20 and supersedes earlier markings. Occasional loss of marking is possible. Cables can be supplied with a range of single mode or multimode fibres and customized print.

PACKING

Cables will be shipped on disposable wooden or treated wooden drums. Both ends of the cable will be capped and accessible for testing. Rotation direction arrow will be marked on the drum together with identification information.

DELIVERY LENGTH

2000 – 8000 meters -0 / +2%, with possibility of supplying up to 5% of total contract quantity as short length cables which should be above 1000 meters long. Tolerance of 5 % of order quantity shall be allowed.