

ROUTINE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable

August 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Construction	9				
		9.1	There shall be no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer	Inspection	Passed	Annex A
		9.1a	The cross section of the ducts shall be circular, and the internal bore shall be smooth and substantially concentric with the external surfaces	Inspection	Passed	Annex A
		9.1b	Both ends of the duct shall be cleanly cut perpendicular to the central axis of the duct	Inspection	Passed	Annex A
		9.1c	The material shall be free from cracks, inclusions, delaminations or other defects	Inspection	Passed	Annex A
		9.1d	Any profiled surface of a cellular wall structure shall be complete, with no break in the cell wall	Inspection	Passed	Annex A
		9.1e	Non-coilable duct sections shall be substantially straight	Inspection	Passed	Annex A



Registered in England No 2566313



SAMPLE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable

August 2007 to October 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Dimensions	8				
1.1	Inside diameter	8.2	Nominal inside diameter 100mm	User Spec 8.2.3a	98.4mm	Annex B
1.2	Ovality	8.2	Maximum Ovality 1.8 mm	User Spec 8.2.3b	1.28mm	Annex B
1.3	Length	8.2	The minimum length shall be the length ordered	User Spec 8.2.3c	Passed	Annex B
2	Compression test: Resistance to deformation at 23°C	10.2	When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.	User Spec 10.2	1122N	Annex C
3	Impact test at -5°C	10.3	Using a 5kg weight with a fall distance of 570 mm, it shall be possible to pass a 95 mm ball through the conduit. There shall be no signs of disintegration nor shall there be any crack allowing the ingress of light or water between the inside and outside.	User Spec 10.3	Passed	Annex D
4	Heat Reversion	16.5	Maximum percentage change 3%, samples shall be free from blistering	User Spec 16.5.3b	0.03%	Annex E

TYPE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable

August 2007 to February 2008

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Marking and documentation	7.1	Ducts, couplings and bends shall be coloured black or red, throughout their length	Inspection	Passed	Annex F
		7.2	The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"	Inspection	Passed	Annex F
		7.2a	Class number shall be inserted after "C"	Inspection	Passed	Annex F
		7.2b	"MFR" shall be replaced by manufacturer's reference	Inspection	Passed	Annex F
		7.2d	Minimum print size of 8mm	Inspection	8.2mm	Annex F
		7.2e	The markings shall be repeated three times per metre	Inspection	Passed	Annex F
		7.2f	The markings shall be on two print lines, 180° apart	Inspection	Passed	Annex F
		7.4	Classification code marked every 1 metre	Inspection	Passed	Annex F
		7.5	The marking shall be durable and easily legible	EN 50086-1 7.5	Passed	Annex F
2	Duct Assembly, by other means than threads	9.6	Not designed to be disassembled	N/A	N/A	
3	Degree of protection	14	The protective properties of the joint between the duct and duct fitting shall not be less than IP4X	BS EN 60529 13.2	Passed	Annex G
4	Vicat softening test	16.2	The vicat softening temperature shall not be less than 75°C	EN 727	149.8°C (±0.2°C)	Annex H
5	Static friction coefficient test	16.3	The static friction coefficient shall not exceed 0.27	User Spec 16.3	0.20	Annex I
6	Resistance to deformation at 50°C (Class 2)	16.4	When reaching the deflection of 5%, the applied force shall be at least 450 N	User Spec 10.2	529.7N	Annex J

ROUTINE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable

August 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Construction	9				
		9.1	There shall be no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer	Inspection	Passed	Annex K
		9.1a	The cross section of the ducts shall be circular, and the internal bore shall be smooth and substantially concentric with the external surfaces	Inspection	Passed	Annex K
		9.1b	Both ends of the duct shall be cleanly cut perpendicular to the central axis of the duct	Inspection	Passed	Annex K
		9.1c	The material shall be free from cracks, inclusions, delaminations or other defects	Inspection	Passed	Annex K
		9.1d	Any profiled surface of a cellular wall structure shall be complete, with no break in the cell wall	Inspection	Passed	Annex K
		9.1e	Non-coilable duct sections shall be substantially straight	Inspection	Passed	Annex K

SAMPLE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable

August 2007 to October 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Dimensions	8				
1.1	Inside diameter	8.2	Nominal inside diameter 125mm	User Spec 8.2.3a	123.1mm	Annex L
1.2	Ovality	8.2	Maximum Ovality 2.0 mm	User Spec 8.2.3b	0.61mm	Annex L
1.3	Length	8.2	The minimum length shall be the length ordered	User Spec 8.2.3c	Passed	Annex L
2	Compression test: Resistance to deformation at 23°C	10.2	When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.	User Spec 10.2	898.9N	Annex M
3	Impact test at -5°C	10.3	Using a 5kg weight with a fall distance of 570 mm, it shall be possible to pass a 118.75 mm ball through the conduit. There shall be no signs of disintegration nor shall there be any crack allowing the ingress of light or water between the inside and outside.	User Spec 10.3	Passed	Annex N
4	Heat Reversion	16.5	Maximum percentage change 3%, samples shall be free from blistering	User Spec 16.5.3b	0.12%	Annex O

TYPE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable

August 2007 to February 2008

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Marking and documentation	7.1	Ducts, couplings and bends shall be coloured black or red, throughout their length	Inspection	Passed	Annex P
		7.2	The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"	Inspection	Passed	Annex P
		7.2a	Class number shall be inserted after "C"	Inspection	Passed	Annex P
		7.2b	"MFR" shall be replaced by manufacturer's reference	Inspection	Passed	Annex P
		7.2d	Minimum print size of 8mm	Inspection	8.2mm	Annex P
		7.2e	The markings shall be repeated three times per metre	Inspection	Passed	Annex P
		7.2f	The markings shall be on two print lines, 180° apart	Inspection	Passed	Annex P
		7.4	Classification code marked every 1 metre	Inspection	Passed	Annex P
		7.5	The marking shall be durable and easily legible	EN 50086-1 7.5	Passed	Annex P
2	Duct Assembly, by other means than threads	9.6	Not designed to be disassembled	N/A	N/A	
3	Degree of protection	14	The protective properties of the joint between the duct and duct fitting shall not be less than IP4X	BS EN 60529 13.2	Passed	Annex Q
4	Vicat softening test	16.2	The vicat softening temperature shall not be less than 75°C	EN 727	149.8°C (±0.2°C)	Annex R
5	Static friction coefficient test	16.3	The static friction coefficient shall not exceed 0.27	User Spec 16.3	0.18	Annex S
6	Resistance to deformation at 50°C (Class 2)	16.4	When reaching the deflection of 5%, the applied force shall be at least 450 N	User Spec 10.2	475.6N	Annex T

ROUTINE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable

August 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Construction	9				
		9.1	There shall be no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer	Inspection	Passed	Annex U
		9.1a	The cross section of the ducts shall be circular, and the internal bore shall be smooth and substantially concentric with the external surfaces	Inspection	Passed	Annex U
		9.1b	Both ends of the duct shall be cleanly cut perpendicular to the central axis of the duct	Inspection	Passed	Annex U
		9.1c	The material shall be free from cracks, inclusions, delaminations or other defects	Inspection	Passed	Annex U
		9.1d	Any profiled surface of a cellular wall structure shall be complete, with no break in the cell wall	Inspection	Passed	Annex U
		9.1e	Non-coilable duct sections shall be substantially straight	Inspection	Passed	Annex U

SAMPLE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable

August 2007 to October 2007

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Dimensions	8				
1.1	Inside diameter	8.2	Nominal inside diameter 150mm	User Spec 8.2.3a	149.3mm	Annex V
1.2	Ovality	8.2	Maximum Ovality 2.0 mm	User Spec 8.2.3b	0.77mm	Annex V
1.3	Length	8.2	The minimum length shall be the length ordered	User Spec 8.2.3c	Passed	Annex V
2	Compression test: Resistance to deformation at 23°C	10.2	When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.	User Spec 10.2	1031.1N	Annex W
3	Impact test at -5°C	10.3	Using a 5kg weight with a fall distance of 800 mm, it shall be possible to pass a 142.5 mm ball through the conduit. There shall be no signs of disintegration nor shall there be any crack allowing the ingress of light or water between the inside and outside.	User Spec 10.3	Passed	Annex X
4	Heat Reversion	16.5	Maximum percentage change 3%, samples shall be free from blistering	User Spec 16.5.3b	0.20%	Annex Y

TYPE TEST:

Test period:

Standard Reference:

Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable

August 2007 to February 2008

Cable Duct User Spec ENATS 12/24 Issue 2007/08

No	Description	Standard Reference Clause	Requirement	Test Method	Results	Remarks
1	Marking and documentation	7.1	Ducts, couplings and bends shall be coloured black or red, throughout their length	Inspection	Passed	Annex Z
		7.2	The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"	Inspection	Passed	Annex Z
		7.2a	Class number shall be inserted after "C"	Inspection	Passed	Annex Z
		7.2b	"MFR" shall be replaced by manufacturer's reference	Inspection	Passed	Annex Z
		7.2d	Minimum print size of 8mm	Inspection	8.6mm	Annex Z
		7.2e	The markings shall be repeated three times per metre	Inspection	Passed	Annex Z
		7.2f	The markings shall be on two print lines, 180° apart	Inspection	Passed	Annex Z
		7.4	Classification code marked every 1 metre	Inspection	Passed	Annex Z
		7.5	The marking shall be durable and easily legible	EN 50086-1 7.5	Passed	Annex Z
2	Duct Assembly, by other means than threads	9.6	Not designed to be disassembled	N/A	N/A	
3	Degree of protection	14	The protective properties of the joint between the duct and duct fitting shall not be less than IP4X	BS EN 60529 13.2	Passed	Annex AA
4	Vicat softening test	16.2	The vicat softening temperature shall not be less than 75°C	EN 727	149.8°C (±0.2°C)	Annex AB
5	Static friction coefficient test	16.3	The static friction coefficient shall not exceed 0.27	User Spec 16.3	0.20	Annex AC
6	Resistance to deformation at 50°C (Class 2)	16.4	When reaching the deflection of 5%, the applied force shall be at least 450 N	User Spec 10.2	509.6N	Annex AD

ANNEX A:

SAMPLE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

CONSTRUCTION

- Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 clause 9.1c
- Test Requirements: The material shall be free from cracks, inclusions, delaminations or other defects.
- Test results: There were no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer were present.

The cross section of the ducts was substantially circular, and the internal bore smooth and concentric with the external surfaces. Both ends of the duct were perpendicular to the central axis of the duct. The material was free from cracks, inclusions, delaminations or other defects. It was noted that a transverse defect on the inside surface, approximately 80mm long occurred every 110mm (Figure 1). The defect is not considered to have a detrimental effect on the performance of the duct. Duct sections were substantially straight.



Figure 1 Defect on inside surface of 100mm duct

ANNEX B:

SAMPLE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DIMENSIONS- DIAMETER

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3a

Test Requirements: Nominal inside diameter 100mm

Test results:

Duct Length Identification	Duct Diameter (mm)			
	Measurement 1	Measurement 2	Measurement 3	Average
4	99.26	97.58	97.91	98.58
3	98.27	99.33	98.03	98.38
15	97.13	98.34	99.72	98.07
18	99.89	97.9	98.04	99.27
10	97.15	99.79	98.58	97.87
9	99.10	98.08	98.17	98.28

DIMENSIONS- OVALITY

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3b

Test Requirements: Maximum Ovality 1.8mm

Test results:

Duct Length Identification	Ovality (mm)						Maximum Ovality (mm)
	1	2	3	4	5	6	
19 end 1	97.89	97.82	98.20	97.63	97.75	98.52	0.89
19 end 2	97.57	97.31	98.82	97.75	97.15	98.72	1.67

DIMENSIONS- LENGTH

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3c

Test Requirements: The minimum length shall be the length ordered.

Test results: All duct length was in excess of 6 meters.

ANNEX C:

SAMPLE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	5 th September 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

COMPRESSION TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.2
 Test Requirements: Sample length 200±5 mm, temperature 23°C, nine test samples
 When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.
 Test Equipment Instron 1122, 10mm cross-head speed (Figure 1).



Figure 1 Resistance to deformation test rig

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
10	1090
9	1150
4	1130
3	1090
10	1200
18	1110
3	1110
15	1110
18	1110
Average	1122

ANNEX D:

SAMPLE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

TEST at -5°C

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.3
 Test Requirements: Sample length 200±5 mm, temperature -5°C conditioned for 2 hours, fourteen test samples, hammer weight 5kg, fall distance 570mm, 95mm diameter ball used for compliance test.
 Test Equipment As shown in Figure 1



Figure 1 Impact test rig

Test Results: 95mm ball passed through all test pieces freely, no signs of disintegration or cracks that allowed the ingress of light or water between the inside and outside were present.

ANNEX E:

SAMPLE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/4
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

HEAT REVERSION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.5
 Test Requirements: Sample length 300±5 mm, temperature 100°C conditioned for 1 hour, one test sample.

Maximum percentage change 3%, samples shall be free from blistering.

Test Equipment Air circulation oven Gallenkamp Oven 300 Plus series
 Test Results:

Initial length 99.90mm
 Final length 99.87mm
 Percentage Change 0.03%

ANNEX F:

TYPE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/20
Test period:	13 th February 2008
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

MARKING

Test Procedure:	Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 7.1, 7.2, 7.4 and 7.5
Test Requirements:	<p>Ducts, couplings and bends shall be coloured black or red, throughout their length</p> <p>The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"</p> <p>Class number shall be inserted after "C"</p> <p>"MFR" shall be replaced by manufacturer's reference</p> <p>Minimum print size of 8mm</p> <p>The markings shall be repeated three times per metre</p> <p>The markings shall be on two print lines, 180° apart</p> <p>Classification code marked every 1 metre</p> <p>The marking shall be durable and easily legible</p>
Test Equipment	None
Test Results:	<p>Coloured Black</p> <p>Duct marked 'ELECTRIC CABLE DUCT C2 NAYLOR'</p> <p>Print Size 8.2mm</p> <p>Markings repeated three times per metre</p> <p>The markings printed on two lines, 180° apart</p> <p>Classification code marked every 1 metre</p> <p>The marking were legible following rubbing by hand for 15 seconds with a piece of cloth soaked in water and again for 15 seconds with a piece of cloth soaked with petroleum spirits.</p> <p>Care should be taken in handling the samples to ensure excessive abrasion does not remove the lettering.</p>

ANNEX G:

TYPE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DEGREE OF PROTECTION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 14
 Test Requirements: Rigid steel rod 1.0^{+0.05} mm diameter using 1 N ± 10% test force
 Test Equipment Rigid steel rod 1.0^{+0.05} mm diameter

The full diameter of the probe shall not pass through opening.

Test Results: The full diameter of the probe did not pass through opening in accordance with IP4X.

It should be noted that compliance is only achieved if the duct is pushed fully to the sleeve stop.

ANNEX H:

TYPE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable
Test length identification:	Fitting 1 and 2
Test period:	23 rd November 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

VICAT SOFTENING TEMPERATURE

Test Procedure:	Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.2
Test Requirements:	The vicat softening temperature not be less than 75°C. Two measurements shall be taken and the difference shall not exceed 2°C.
Test Equipment	Load of 9.81N Indent size 1mm ² Sample thickness 3mm Heat transfer medium Glycerol
Test Results:	Vicat softening temperature 149.8°C (±0.2°C) No alterations in appearance

ANNEX I:

TYPE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/100/3 T5952/100/4, T5952/100/9
Test period:	21 st August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

STATIC FRICTION COEFFICIENT TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.3

Test Requirements: Sample length 1 metre, three test samples
The static friction coefficient shall not exceed 0.27

Test Equipment See Figure 1



Figure 1 Static friction coefficient test rig

Test Results:

Duct Length Identification	Test No	Static Friction Coefficient						Average
		1	2	3	4	5	6	
9	1	0.22	0.21	0.21	0.19	0.20	0.19	0.21
	2	0.19	0.20	0.18	0.19	0.19	0.19	0.19
	Average							0.20
3	1	0.20	0.21	0.22	0.22	0.20	0.21	0.21
	2	0.21	0.19	0.19	0.21	0.20	0.22	0.21
	Average							0.21
4	1	0.19	0.18	0.18	0.19	0.19	0.19	0.18
	2	0.19	0.19	0.19	0.19	0.19	0.19	0.19
	Average							0.19
Overall Average								0.20

ANNEX J:

TYPE TEST:	Polyethylene, nominal inside diameter 100mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/100/3 T5952/100/4, T5952/100/9
Test period:	17 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

RESISTANCE TO DEFORMATION AT 50°C (Class 2)

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.4
 Test Requirements: Sample length 200±5 mm, nine test samples
 When reaching the deflection of 5%, the applied force shall be at least 450 N.

Test Equipment Instron 1122, 10mm cross-head speed (Figure 1)



Figure 1 Resistance to deformation test rig

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
3	531
18	540
10	550
9	535
15	526
15	514
10	513
18	538
4	520
Average	529.7

ANNEX K:

SAMPLE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

CONSTRUCTION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 clause 9.1c

Test Requirements: The material shall be free from cracks, inclusions, delaminations or other defects.

Test results: There were no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer were present.

The cross section of the ducts was substantially circular, and the internal bore smooth and concentric with the external surfaces. Both ends of the duct were perpendicular to the central axis of the duct.

The material was free from cracks, inclusions, delaminations or other defects. Duct sections were substantially straight.

ANNEX L:

SAMPLE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/125/17, T5952/125/8, T5952/125/11, T5952/125/1, T5952/125/14, and T5952/125/5
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DIMENSIONS- DIAMETER

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3a

Test Requirements: Nominal inside diameter 125mm

Test results:

Duct Length Identification	Duct Diameter (mm)			
	Measurement 1	Measurement 2	Measurement 3	Average
17	123.18	123.42	123.17	123.20
8	123.02	123.51	123.39	123.21
11	123.20	123.54	123.00	123.25
1	123.40	123.09	123.37	123.29
14	122.63	123.50	122.93	123.02
5	123.32	122.52	122.79	122.88

DIMENSIONS- OVALITY

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3b

Test Requirements: Maximum Ovality 2.0mm

Test results:

Duct Length Identification	Ovality (mm)						Maximum Ovality (mm)
	1	2	3	4	5	6	
17	123.18	123.42	123.17	122.82	123.24	122.87	0.60
8	123.02	123.51	123.39	123.04	123.00	123.11	0.51
11	123.20	123.54	123.00	123.36	123.29	123.00	0.54
1	123.40	123.09	123.37	123.11	123.28	123.12	0.31
14	122.63	123.50	122.93	122.92	122.60	122.94	0.90
5	123.32	122.52	122.79	122.78	123.11	122.85	0.80

DIMENSIONS- LENGTH

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3c

Test Requirements: The minimum length shall be the length ordered.

Test results: All duct length were in excess of 6 meters.

ANNEX M:

SAMPLE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/125/17, T5952/125/8, T5952/125/11, T5952/125/1, T5952/125/14 and T5952/125/5.
Test period:	5 th September 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

COMPRESSION TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.2
 Test Requirements: Sample length 200±5 mm, temperature 23°C, nine test samples
 When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.

Test Equipment See Annex C

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
11	910
8	930
5	930
1	900
17	880
11	880
1	890
5	910
14	860
Average	898.9

ANNEX N:

SAMPLE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/125/17, T5952/125/8, T5952/125/11, T5952/125/1, T5952/125/14 and T5952/125/5.
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

IMPACT TEST at -5°C

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.3

Test Requirements: Sample length 200±5 mm, temperature -5°C conditioned for 2 hours, fourteen test samples, hammer weight 5kg, fall distance 570mm, 118.75mm diameter ball used for compliance test.

Test Equipment As shown in Annex D.

Test Results: 118.75mm ball passed through all test pieces freely, no signs of disintegration or any crack that allowed the ingress of light or water between the inside and outside were present.

ANNEX O:

SAMPLE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/125/5
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

HEAT REVERSION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.5

Test Requirements: Sample length 300±5 mm, temperature 100°C conditioned for 1 hour, one test sample.
Maximum percentage change 3%, samples shall be free from blistering.

Test Equipment Air circulation oven Gallenkamp Oven 300 Plus series

Test Results:

Initial length 100.56mm
Final length 100.44mm
Percentage Change 0.12%

ANNEX P:

TYPE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	T5952/125/21
Test period:	13 th February 2008
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

MARKING

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 7.1, 7.2, 7.4 and 7.5

Test Requirements: Ducts, couplings and bends shall be coloured black or red, throughout their length
The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"
Class number shall be inserted after "C"
"MFR" shall be replaced by manufacturer's reference
Minimum print size of 8mm
The markings shall be repeated three times per metre
The markings shall be on two print lines, 180° apart
Classification code marked every 1 metre
The marking shall be durable and easily legible

Test Equipment None

Test Results: Coloured Black
Duct marked 'ELECTRIC CABLE DUCT C2 NAYLOR'
Print Size 8.2mm
Markings repeated three times per metre
The markings printed on two lines, 180° apart
Classification code marked every 1 metre
The marking were legible following rubbing by hand for 15 seconds with a piece of cloth soaked in water and again for 15 seconds with a piece of cloth soaked with petroleum spirits

Care should be taken in handling the samples to ensure excessive abrasion does not remove the lettering.

ANNEX Q:

TYPE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/125/17, T5952/125/8, T5952/125/11, T5952/125/1, T5952/125/14 and T5952/125/5.
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DEGREE OF PROTECTION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 14
 Test Requirements: Rigid steel rod 1.0^{+0.05} mm diameter using 1 N ± 10% test force
 Test Equipment Rigid steel rod 1.0^{+0.05} mm diameter

Test Results: The full diameter of the probe did not pass through opening in accordance with IP4X.

It should be noted that compliance is only achieved if the duct is pushed fully to the sleeve stop.

ANNEX R:

TYPE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable
Test length identification:	Fitting 1 and 2
Test period:	23 rd November 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

VICAT SOFTENING TEMPERATURE

Test Procedure:	Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.2
Test Requirements:	The vicat softening temperature not be less than 75°C. Two measurements shall be taken and the difference shall not exceed 2°C.
Test Equipment	Load of 9.81N Indent size 1mm ² Sample thickness 3mm Heat transfer medium Glycerol
Test Results:	Vicat softening temperature 149.8°C (±0.2°C) No alterations in appearance

ANNEX S:

TYPE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/125/5 T5952/125/1, T5952/125/8
Test period:	21 st August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

STATIC FRICTION COEFFICIENT TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.3

Test Requirements: Sample length 1 metre, three test samples
The static friction coefficient shall not exceed 0.27

Test Equipment See Annex I

Test Results:

Duct Length Identification	Test No	Static Friction Coefficient						Average
		1	2	3	4	5	6	
5	1	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	2	0.18	0.19	0.18	0.18	0.18	0.18	0.18
	Average							0.18
1	1	0.19	0.19	0.19	0.18	0.18	0.19	0.18
	2	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	Average							0.18
8	1	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	2	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	Average							0.18
Overall Average								0.18

ANNEX T:

TYPE TEST:	Polyethylene, nominal inside diameter 125mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/125/17, T5952/125/8, T5952/125/11, T5952/125/1, T5952/125/14 and T5952/125/5.
Test period:	17 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

RESISTANCE TO DEFORMATION AT 50°C (Class 2)

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.4

Test Requirements: Sample length 200±5 mm, nine test samples
When reaching the deflection of 5%, the applied force shall be at least 450 N.

Test Equipment Instron 1122, 10mm cross-head speed (Figure 1).

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
17	495
14	472
8	475
17	475
1	473
5	495
11	460
11	468
14	467
Average	475.6

ANNEX U:

SAMPLE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/316 T5952/150/12, T5952/150/6, T5952/150/2, T5952/150/7, and T5952/150/13
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

CONSTRUCTION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 clause 9.1c

Test Requirements: The material shall be free from cracks, inclusions, delaminations or other defects.

Test results: There were no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer were present.

The cross section of the ducts was substantially circular, and the internal bore smooth and concentric with the external surfaces. Both ends of the duct were perpendicular to the central axis of the duct.

The material was free from cracks, inclusions, delaminations or other defects. Duct sections were substantially straight.

ANNEX V:

SAMPLE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/16 T5952/150/12, T5952/150/6, T5952/150/2, T5952/150/7, and T5952/150/13
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DIMENSIONS- DIAMETER

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3a

Test Requirements: Nominal inside diameter 150mm

Test results:

Duct Length Identification	Duct Diameter (mm)			
	Measurement 1	Measurement 2	Measurement 3	Average
16	149.82	149.23	149.16	149.40
12	149.35	149.54	149.07	149.32
6	149.64	149.05	148.97	149.22
2	149.31	150.00	149.61	149.64
7	149.77	149.44	149.34	149.52
13	149.17	148.97	149.36	149.17

DIMENSIONS- OVALITY

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3b

Test Requirements: Maximum Ovality 2.0mm

Test results:

Duct Length Identification	Ovality (mm)						Maximum Ovality (mm)
	1	2	3	4	5	6	
16	149.82	149.23	149.16	149.68	150.10	148.95	1.15
12	149.35	149.54	149.07	149.48	148.79	148.96	0.75
6	149.64	149.05	148.97	149.26	149.86	149.35	0.81
2	149.31	150.00	149.61	149.66	149.57	149.44	0.69
7	149.77	149.44	149.34	149.54	149.20	149.38	0.57
13	149.17	148.97	149.36	149.44	149.53	148.88	0.65
Average							0.77

DIMENSIONS- LENGTH

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 8.2.3c

Test Requirements: The minimum length shall be the length ordered.

Test results: All duct length was in excess of 6 meters.

ANNEX W:

SAMPLE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/12, T5952/150/6, T5952/150/2, T5952/150/7 and T5952/150/13
Test period:	5 th September 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

COMPRESSION TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.2
 Test Requirements: Sample length 200±5 mm, temperature 23°C, nine test samples
 When reaching the deflection of 5%, the applied force shall be at least 450 N or equivalent at 23°C. After test samples shall show no cracks visible to normal or corrected vision without additional magnification.

Test Equipment See Annex C

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
12	920
2	1010
7	1210
6	1010
7	990
13	980
6	970
12	980
2	1210
Average	1031.1

ANNEX X:

SAMPLE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/16 T5952/150/12, T5952/150/6, T5952/150/2, T5952/150/7, and T5952/150/13
Test period:	20 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

IMPACT TEST at -5°C

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 10.3

Test Requirements: Sample length 200±5 mm, temperature -5°C conditioned for 2 hours, fourteen test samples, hammer weight 5kg, fall distance 800mm, 142.5mm diameter ball used for compliance test

Test Equipment As shown Annex D

Test Results: 142.5mm ball passed through all test pieces freely, no signs of disintegration or any crack allowing the ingress of light or water between the inside and outside were present.

ANNEX Y:

SAMPLE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/16
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

HEAT REVERSION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.5

Test Requirements: Sample length 300±5 mm, temperature 100°C conditioned for 1 hour, one test sample.
Maximum percentage change 3%, samples shall be free from blistering.

Test Equipment Air circulation oven Gallenkamp Oven 300 Plus series

Test Results:

Initial length 100.50mm
Final length 100.23mm
Percentage Change 0.27%

ANNEX Z:

TYPE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	T5952/150/22
Test period:	13 th February 2008
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

MARKING

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 7.1, 7.2, 7.4 and 7.5

Test Requirements: Ducts, couplings and bends shall be coloured black or red, throughout their length
The duct shall be marked "ELECTRIC CABLE DUCT C_MFR"
Class number shall be inserted after "C"
"MFR" shall be replaced by manufacturer's reference
Minimum print size of 8mm
The markings shall be repeated three times per metre
The markings shall be on two print lines, 180° apart
Classification code marked every 1 metre
The marking shall be durable and easily legible

Test Equipment None

Test Results: Coloured Black
Duct marked 'ELECTRIC CABLE DUCT C2 NAYLOR'
Print Size 8.6mm
Markings repeated three times per metre
The markings printed on two lines, 180° apart
Classification code marked every 1 metre
The marking were legible following rubbing by hand for 15 seconds with a piece of cloth soaked in water and again for 15 seconds with a piece of cloth soaked with petroleum spirits.

Care should be taken in handling the samples to ensure excessive abrasion does not remove the lettering.

ANNEX AA:

TYPE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/100/3, T5952/100/10, T5952/100/4, T5952/100/15, T5952/100/9, and T5952/100/18
Test period:	23 rd August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

DEGREE OF PROTECTION

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 14
 Test Requirements: Rigid steel rod 1.0^{+0.05} mm diameter using 1 N ± 10% test force
 Test Equipment Rigid steel rod 1.0^{+0.05} mm diameter

Test Results: The full diameter of the probe did not pass through opening in accordance with IP4X.

Meet the requirements; it should be noted that compliancy is only achieved if the duct is pushed fully to the sleeve stop.

ANNEX AB:

TYPE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable
Test length identification:	Fitting 1 and 2
Test period:	23 rd November 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

VICAT SOFTENING TEMPERATURE

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.2

Test Requirements: The vicat softening temperature not be less than 75°C.
Two measurements shall be taken and the difference shall not exceed 2°C.

Test Equipment Load of 9.81N
Indent size 1mm²
Sample thickness 3mm
Heat transfer medium Glycerol

Test Results: Vicat softening temperature 149.8°C (±0.2°C)
No alterations in appearance

ANNEX AC:

TYPE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/150/7 T5952/150/6, T5952/150/12
Test period:	21 st August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

STATIC FRICTION COEFFICIENT TEST

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.3

Test Requirements: Sample length 1 metre, three test samples
The static friction coefficient shall not exceed 0.27

Test Equipment See Annex I

Test Results:

Duct Length Identification	Test No	Static Friction Coefficient						Average
		1	2	3	4	5	6	
5	1	0.19	0.19	0.19	0.20	0.20	0.20	0.20
	2	0.20	0.19	0.19	0.20	0.19	0.19	0.20
	Average							0.20
1	1	0.20	0.20	0.21	0.21	0.21	0.21	0.21
	2	0.21	0.20	0.20	0.20	0.20	0.20	0.20
	Average							0.20
8	1	0.21	0.21	0.20	0.20	0.20	0.20	0.21
	2	0.21	0.20	0.20	0.20	0.20	0.19	0.20
	Average							0.20
Overall Average								0.20

Meet the requirements

ANNEX AD:

TYPE TEST:	Polyethylene, nominal inside diameter 150mm, Class 2, rigid and non-coilable, sealed and non sealed fittings
Test length identification:	T5952/100/3 T5952/100/4, T5952/100/9
Test period:	17 th August 2007
Standard Reference:	Cable Duct User Spec ENATS 12/24 Issue 2007/08

RESISTANCE TO DEFORMATION AT 50°C (Class 2)

Test Procedure: Cable Duct User Spec ENATS 12/24 Issue 2007/08 Clause 16.4
 Test Requirements: Sample length 200±5 mm, nine test samples
 When reaching the deflection of 5%, the applied force shall be at least 450 N.

Test Equipment Instron 1122, 10mm cross-head speed.

Test Results:

Duct Length Identification	Load at 5% Deformation (N)
13	510
2	540
7	518
6	510
12	505
16	495
13	515
12	497
6	496
Average	509.6