

**COMMUNICATIONS
ALLIANCE LTD**



AUSTRALIAN STANDARD

AS/CA S041.3:2015

**Requirements for DSL Customer Equipment for
connection to the Public Switched Telephone
Network — Part 3: Filters for use in connection
with all xDSL services**

Australian Standard — Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network — Part 3: Filters for use in connection with all xDSL services

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FOREWORD

General

This Standard was prepared by Communications Alliance and most recently revised by the WC58 : *VDSL2 and Vectoring* Working Committee. It is one of a series of Telecommunication Standards developed under the Memorandum of Understanding between the Australian Communications Authority (ACA) and the Australian Communications Industry Forum.

Note: On 1 July 2005 the ACA became the Australian Communications and Media Authority (ACMA) and the Memorandum of Understanding continues in effect as if the reference to the ACA were a reference to the ACMA.

Communications Alliance was formed in 2006 and continues the functions previously fulfilled by ACIF.

This Standard is a revision of AS/ACIF S041:2009 ***Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network.***

This Standard is the result of a consensus among representatives on the Communications Alliance Working Committee to produce it as an Australian Standard.

The requirements in this Standard are consistent with the aims of s376 of the *Telecommunications Act 1997*. Specifically these aims are—

- (a) protecting the integrity of a telecommunications network or facility;
- (b) protecting the health and safety of persons;
- (c) ensuring access to emergency services; and
- (d) ensuring interoperability with a standard telephone service.

It should be noted that some Customer Equipment (CE) may also need to comply with requirements in other Standards or other Parts of this Standard.

AS/CA S041 consists of the following parts under the general title ***Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network:***

- Part 1: General
- Part 2: Modems for use in connection with all DSL services
- Part 3: Filters for use in connection with all xDSL services

The Standard should be read in conjunction with AS/CA S041.1 [3].

Applicable electrical safety Standards and EMC Standards may apply under Commonwealth or State laws, or both.

Intellectual property rights

Equipment which is manufactured to comply with this Standard may require the use of technology which is protected by patent rights in Australia. Questions about the availability of such technology, under licence or otherwise, should be directed to the patent holder or Australian licensee (if known) or through enquiry

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Standards revision

Australian Standards (AS/ACIF and AS/CA Standards) developed by the Communications Alliance are updated according to the needs of the industry, by amendments or revision. Users of these Standards should make sure that they possess the latest amendments or editions. Representations concerning the need for a change to this AS/CA Standard should be addressed to—

The Project Manager
Customer Equipment and Cable Reference Panel
Communications Alliance
PO Box 444
Milsons Point NSW 1565

Regulatory notice

This document will be submitted to the ACMA, for making as a technical standard under s376 of the *Telecommunications Act 1997*. Until it is made by the ACMA compliance with this Standard is voluntary.

For the purposes of the ACMA Standard, defined as *Telecommunications Technical Standard (Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network – AS/CA S041) 2015* the transition period is 6 months.

The ACMA is a Commonwealth authority with statutory powers to impose requirements concerning telecommunications Customer Equipment and Customer Cabling.

The ACMA requires Australian manufacturers and importers, or their Australian agents, of specified items of Customer Equipment and Customer Cabling to establish compliance with Standards such as this. Items are required to be labelled in accordance with the applicable labelling notices.

Details on current compliance arrangements can be obtained from the ACMA website at <http://www.acma.gov.au> or by contacting the ACMA below at:

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Introduction

This introduction for the AS/CA S041.3 ***Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network — Part 3: Filters for use in connection with all xDSL services*** Standard is not an authoritative section of this Standard and is only provided as guidance for the user of the Standard to outline its objectives, the factors that have been taken into account in its development and to list the principal differences between the new and the previous edition.

The reader is directed to the clauses of this Standard for the specific requirements and to the ACMA for the applicable telecommunications labelling and compliance arrangements.

Note: Further information on the telecommunications labelling and compliance arrangements can be found in *The Telecommunications Labelling (Customer Equipment and Customer Cabling) Notice* (the TLN). The TLN can be obtained from the ACMA website at www.acma.gov.au.

The objective of this Standard is to provide the technical requirements and test methods for Customer Equipment (CE), or the parts of CE that are designed or intended for connection to a DSL service that shares the metallic local loop with an analogue PSTN two-wire service in order to meet the regulatory arrangements for such equipment in Australia.

The objective of the previous revision was to include requirements specified in the Telstra RCIT.0004 ADSL Splitter Specification to bring the Standard in line with the xDSL services being offered by Australian broadband service providers and to restructure the Standard as a multi-part Standard to streamline the compliance testing separately of DSL modems and xDSL splitters/filters.

The principal differences between this edition of AS/CA S041.3 and the previous edition of AS/ACIF S041.3 are:

- (i) The extension of the standard to cover the use of filters with VDSL2 technology operating up to a maximum frequency of 30 MHz.
- (ii) For xDSL filter return loss in Table 1 the replacement of ‘Z_{sl}’ with ‘TN12 or Z_r’ for the measurement reference in Table 1.
- (iii) The removal in clauses 5.3.9 and 5.3.10 of reference to the test method in clause 6.5.4, as anticipated in the previous edition of AS/ACIF S041.3; plus a consequential deletion of clause 6.5.4 and deletion of what was the associated Figure 9.
- (iv) The addition of requirements for “Line Port Shunting loss in the Off Line State” in Table 9 and what is now clause 5.3.15 as an alternative to the existing requirements for “Line Port Impedance in the Off Line State” in Table 8 and what is now clause 5.3.15.
- (v) The addition of Figure 15 and Figure 16 in section 6 with the test configuration for measurement of Line Port impedance/shunt loss in the online state for distributed (i.e. Figure 15) and centralised (i.e. Figure 16) filters for the testing of shunt loss.

Informative Statements

Informative Statement for designers of filters on the POTS impact on xDSL services

Because of difficulties in specification, tests relating to the impact of POTS signalling events through the filter onto the xDSL service have not been included in this Standard. Designers of filters are advised to take into account the POTS interference mechanisms known to cause degradation of xDSL services, as described in Clause 5.3.18.

Therefore Carriers and Carriage Service Providers may need to protect their xDSL services by not listing as approved, and actively removing from service any filter type (that may have been tested and labelled as complying to this Standard) that causes degradation due to mechanisms like those above that have not been included in this Standard.

Informative Statement on the use of inline filters with VDSL services

(i) VDSL2 service impacts due to End User Premises cabling topology

Compared with ADSL2+ access technologies, VDSL2 utilises a substantially greater spectrum range, typically up to either 17.664 MHz or 30.000 MHz. At the highest VDSL2 frequencies, End User Premises cabling with either branch or star topology configuration is likely to present “bridged taps” which may severely degrade:

- VDSL2 data rates, and / or
- VDSL2 service stability, and / or
- Error performance during data transfer.

VDSL2 service impacts attributable to End User Premise cable bridged taps can be avoided by ensuring that the electrical cable path to the VDSL2 modem is free of cable stubs and branches, including removal of any cable branch beyond the VDSL2 modem or originating from the first Telecommunications Outlet.

(ii) Recommended application of Centralised and Distributed Filters

This standard covers two kinds of device: Centralised Filters (Master Splitters) and Distributed Filters (‘in-line’ filters or ‘micro-filters’). Regard to the End User Premises cable topology should be given when choosing between the alternative filtering and cabling options.

(a) VDSL2 Centralised Filters

VDSL2 service impacts attributable to End User Premises cable bridged taps can be avoided by the correct installation of a Centralised Filter (Master Splitter). A correctly installed Centralised Filter is the recommended alternative for supporting longer term co-existence of PSTN and VDSL2 broadband services.

(b) VDSL2 Distributed Filters

VDSL2 Distributed Filters may help simplify a transition between an ADSL2+ and PSTN Line Sharing Service and a long-term VDSL2 broadband service incorporating VOIP. Distributed Filters generally degrade VDSL2 due to End User Premises cable bridged taps. Where Distributed Filters are deployed temporarily

during some transition to VDSL2, subsequent upgrading of the Distributed Filters to a Central Splitter or removing some Distributed Filters and correcting the in-premises cable topology to a direct path without branches is recommended.

Apart from situations where the End User premises has a single Telecommunications Outlet, VDSL2 Distributed Filters that comply with the requirements of this standard are **not recommended** for long term use in conjunction with a VDSL2 service.

TABLE OF CONTENTS

1	INTERPRETATIVE GUIDELINES	1
	1.1 Categories of requirements	1
	1.2 Compliance statements	1
	1.3 Definitions, expressions and terms	1
	1.4 Notes	1
	1.5 References	1
	1.6 Units and symbols	1
2	SCOPE	2
3	REFERENCES	3
4	ABBREVIATIONS AND DEFINITIONS	6
	4.1 Abbreviations	6
	4.2 Definitions	6
	4.2.1 Carrier	6
	4.2.2 Carriage Service Provider	6
	4.2.3 Centralised Filter (Master Splitters)	6
	4.2.4 Customer Equipment	7
	4.2.5 Distributed Filters ('in-line' filters or 'micro-filters')	7
	4.2.6 Facility	7
	4.2.7 Line Port	7
	4.2.8 Line Terminating Equipment	7
	4.2.9 Local Port	7
	4.2.10 Metallic local loop	8
	4.2.11 Off-line	8
	4.2.12 Off-hook	8
	4.2.13 On-line	8
	4.2.14 On-hook	8
	4.2.15 Plain Old Telephony Service (POTS)	8
	4.2.16 Public Switched Telephone Network (PSTN)	8
	4.2.17 Ring in/Loop out PSTN line	8
	4.2.18 Standard Telephone Service	9
	4.2.19 Telecommunications Network	9
	4.2.20 Telecommunications Reference Conductor (TRC)	9
	4.2.21 Voice Frequency (VF)	9
	4.2.22 Voiceband	9
	4.2.23 xDSL	9
5	REQUIREMENTS	10
	5.1 General	10
	5.1.1 Filters used in conjunction with all xDSL services	10

	5.1.2	<i>Provision of advice on the suitability of the device</i>	10
5.2	Filter types		10
	5.2.1	<i>General</i>	10
	5.2.2	<i>Distributed Filters ('in-line' filters or 'micro-filters')</i>	11
	5.2.3	<i>Centralised Filter (Master Splitters)</i>	11
	5.2.4	<i>Distributed and centralised filter labelling</i>	11
5.3	Technical Requirements		12
	5.3.1	<i>DC current range</i>	12
	5.3.2	<i>Reference Impedance</i>	12
	5.3.3	<i>Test Impedances</i>	12
	5.3.4	<i>DC series resistance</i>	12
	5.3.5	<i>Ringing voltage drop</i>	13
	5.3.6	<i>Return loss</i>	13
	5.3.7	<i>Unbalance about Earth</i>	13
	5.3.8	<i>Group Delay Distortion</i>	14
	5.3.9	<i>Voiceband Filter Loss 'On-Line'</i>	15
	5.3.10	<i>Voice Band Filter Loss distortion 'On-Line'</i>	15
	5.3.11	<i>Voiceband Filter Loss 'Off-line'</i>	16
	5.3.12	<i>Intermodulation distortion</i>	16
	5.3.13	<i>xDSL band filter loss On-line state</i>	16
	5.3.14	<i>xDSL band filter loss Off-line state</i>	17
	5.3.15	<i>xDSL band shunt loss Online state</i>	17
	5.3.16	<i>Noise in Voiceband</i>	19
	5.3.17	<i>Noise in xDSL band</i>	20
	5.3.18	<i>PSTN transient effects</i>	20
	5.3.19	<i>Parallel operation</i>	21
6	TESTING		22
6.1	Verification of compliance with requirements		22
6.2	Standard test conditions		22
6.3	Levels		23
6.4	Test frequencies		23
6.5	Parameters to be tested		23
	6.5.1	<i>Ringing characteristics</i>	23
	6.5.2	<i>Return Loss</i>	23
	6.5.3	<i>Impedance balance</i>	23
	6.5.4	<i>Noise performance</i>	24
	6.5.5	<i>Signal levels and frequencies</i>	24
	6.5.6	<i>Test for POTS Transient effects</i>	24
	6.5.7	<i>Parallel Handover</i>	24
	6.5.8	<i>xDSL Shunting Loss</i>	24

PARTICIPANTS	39
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FIGURES

Figure 1	Reference impedances	26
Figure 2	Test circuit for ring characteristics of xDSL filters	27
Figure 3	Test for xDSL filter balance about earth	28
Figure 4	Noise measurements psophometric, single frequency and unweighted	29
Figure 5	Psophometric noise measurements	29
Figure 6	Test for PSTN transient effects	30
Figure 7	Return loss measurements	31
Figure 8	Group delay measurements	32
Figure 9	Voiceband filter loss (off-line) measurements	33
Figure 10	Intermodulation measurements	34
Figure 11	DSL band loss measurements	35
Figure 12	xDSL band noise measurements	36
Figure 13	Test circuit for parallel handover	36
Figure 14	Filter use for isolation of xDSL functions from PSTN CE	37
Figure 15	Test configuration for measurement of LINE Port impedance/shunt loss in Offline state for Distributed Filter	38
Figure 16	Test configuration for measurement of LINE Port impedance/shunt loss in Offline state for Centralised Filter	38

TABLES

TABLE 1	xDSL filter return loss	14
TABLE 2	xDSL filter balance	14
TABLE 3	Group delay distortion	15
TABLE 4	Loss requirements in the On-line state	16
TABLE 5	Recommended loss in the On-line state	16
TABLE 6	Loss in the Off-line state with a 120 Ω Source	17
TABLE 7	Loss in the Off-line state with a Z_{RHF} Source	17
TABLE 8	Line Port Impedance in the OnLine State	18
TABLE 9	Line Port Shunting loss in the OnLine State	18

1 INTERPRETATIVE GUIDELINES

1.1 Categories of requirements

This Standard contains mandatory requirements as well as provisions that are recommendatory only. Mandatory requirements are designated by the words ‘**shall**’ or ‘**shall not**’. All other provisions are voluntary.

1.2 Compliance statements

Compliance statements, in italics, suggest methodologies for demonstrating CE’s compliance with the requirements.

1.3 Definitions, expressions and terms

If there is any conflict between the definitions used in this Standard and the definitions used in the *Telecommunications Act 1997*, the definitions in the Act take precedence.

1.4 Notes

Text denoted as ‘Note’ is for guidance in interpretation and is shown in smaller size type.

1.5 References

- (a) Applicable editions (or versions) of other documents referred to in this Standard are specified in Section 3: REFERENCES.
- (b) If a document refers to another document, the other document is a sub-referenced document.
- (c) Where the edition (or version) of the sub-referenced document is uniquely identified in the reference document, then that edition (or version) applies.
- (d) Where the edition (or version) of the sub-referenced document is not uniquely identified in the reference document, then the applicable edition (or version) is that which is current at the date the reference document is legislated under the applicable regulatory framework, or for a non- legislated document, the date upon which the document is published by the relevant standards organisation.
- (e) A number in square brackets ‘[]’ refers to a document listed in Section 3: REFERENCES.

1.6 Units and symbols

In this Standard the International System (SI) of units and symbols is used in accordance with Australian Standard AS ISO 1000 [1].

2 SCOPE

- 2.1 This Standard specifies the technical requirements for xDSL Filter Customer Equipment (CE), or the xDSL Filter parts of the CE that are designed or intended for connection to an xDSL service that shares the metallic local loop with an analogue PSTN two-wire service.
- 2.2 This Standard does not apply to CE or the parts of CE designed or intended only for connection to an analogue PSTN two-wire service.
- 2.3 CE is not excluded from the scope of this Standard by reason only that it is capable of performing functions additional to those listed in this Standard.

Note 1: For the purposes of this scope xDSL filters are examples of CE designed for connection to a DSL service operating over a shared metallic local loop with an analogue PSTN two-wire service.

Note 2: AS/CA S002 [2] specifies the technical requirements for connection to an analogue PSTN two-wire service.

3 REFERENCES

	Publication	Title
	Australian Standards	
[1]	AS ISO 1000-1998	The international System of Unit (SI) and its application. http://nfostore.saiglobal.com/store/details.aspx?ProductID=341659
	AS/CA Standards	
[2]	AS/CA S002:2010	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network http://www.commsalliance.com.au/Documents/all/Standards/s002
	AS/CA S041	Requirements for DSL Customer Equipment for connection to the Public Switched Telephone Network
[3]	AS/CA S041.1:2015	Part 1: General http://www.commsalliance.com.au/Documents/all/Standards/s041
	AS/ACIF S043	Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network
[4]	AS/CA S043.2:2015	Part 2: Broadband http://www.commsalliance.com.au/Documents/all/Standards/s043.2
	ETSI Standards and Reports	
[5]	ETSI TS 101 952-1-1 V1.2.1 (2004-12)	Access Network xDSL Transmission Filters; Part 1; ADSL Splitters for European Deployment; Sub Part 1:Generic Specification of the Low Pass Part of DSL over POTS Splitters including Dedicated Annexes for Specific xDSL Variants http://www.etsi.org/deliver/etsi_ts/101900_101999/1019520101/01.02.01_60/ts_1019520101v010201p.pdf

	Publication	Title
[6]	ETSI TS 101 952-1-5 V1.2.1 (2006-10)	Access Network xDSL Transmission Filters; Part 1; ADSL Splitters for European Deployment; Sub Part 5: Specification for ADSL over POTS Distributed Filters http://www.etsi.org/deliver/etsi_ts/101900_101999/1019520105/01.02.01_60/ts_1019520105v010201p.pdf
[7]	TR 101 953-1-1 V1.1.1 (2002-11)	Access and Terminals (AT); Unified and Generic Testing Methods for European Specific DSL splitters; Part 1: ADSL splitters for European deployment; Sub-part 1: Specification of Testing methods for Low Pass part of ADSL/POTS splitters http://www.etsi.org/deliver/etsi_tr/101900_101999/1019530101/01.01.01_60/tr_1019530101v010101p.pdf
ITU-T and CCITT Recommendations		
[8]	G.122 (03/1993)	Influence of national systems on stability, talker echo, and listener echo in international connections http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=766
[9]	G.992.5 (01/2009)	Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2plus) http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=9653
[10]	G.993.2 (12/2011)	Very high speed digital subscriber line transceivers 2 (VDSL2) http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=11415
[11]	O.9 (03/1999)	Measuring arrangements to assess the degree of unbalance about earth http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=4632

	Publication	Title
[12]	O.41 (10/1994)	Psophometer for use on telephone-type circuits http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=1702
[13]	O.42 (11/1988)	Equipment to measure non-linear distortion using the 4-tone intermodulation method http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=1703

4 ABBREVIATIONS AND DEFINITIONS

For the purposes of this Standard, the following abbreviations and definitions and those of Part 1 apply:

4.1 Abbreviations

ACA	Australian Communications Authority
ACIF	Australian Communications Industry Forum
ACMA	Australian Communications and Media Authority
ADSL	Asymmetric Digital Subscriber Line
AS	Australian Standard
CE	Customer Equipment
DC	Direct Current
DSL	Digital Subscriber Line
DUT	Device under test
ITU-T	International Telecommunications Union – Telecommunications
LCL	Longitudinal Conversion Loss
LCTL	Longitudinal Conversion Transfer Loss
PE	Protective Earth
PSTN	Public Switched Telephone Network
SI	International System
TN12	Termination Network 12
TRC	Telecommunications Reference Conductor
VDSL	Very high speed Digital Subscriber Line
VF	Voice Frequency
xDSL	Digital Subscriber Line

4.2 Definitions

4.2.1 Carrier

Refer to the *Telecommunications Act 1997*.

4.2.2 Carriage Service Provider

Refer to the *Telecommunications Act 1997*.

4.2.3 Centralised Filter (Master Splitters)

Centralised filters are typically three port devices, designed to be located and hard-wired at a central point in the customer premises (often the carrier demarcation point) from which all Voiceband PSTN CE cabling radiates, providing separation of PSTN and xDSL signals at a single location.

Note 1: Figure 14(b) shows how the Centralised filter is used to isolate the DSL functions from the PSTN CE.