IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx BAS 23.0013**

Status: **Current**

Issue No: 3

Certificate history:
Issue 2 (2024-02-08)
Issue 1 (2023-09-05)
Issue 0 (2023-05-05)

Date of Issue: 2025-05-07

Applicant: **Eaton Electric Limited**
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Equipment: **MTL4500 & MTL5500 Series Galvanic Isolators – Analogue Input modules**

Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking: **[Ex ia Ga] IIC**
[Ex ia Da] IIIC
[Ex ia Ma] I

-20°C ≤ Ta ≤ +60°C – All Models
-20°C ≤ Ta ≤ +65°C – MTL5541-T Model only
-40°C ≤ Ta ≤ +60°C – MTL5544D-L Model only

Approved for issue on behalf of the IECEx Certification Body: **P Oates**

Position: **Engineering Manager**

Signature: (for printed version)

Date: (for printed version) 07/05/2025

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2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

SGS UK Limited
Rockhead Business Park
Staden Lane
Buxton, Derbyshire SK17 9RZ
United Kingdom

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Manufacturer:
Eaton Electric Limited
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Manufacturing locations:
Eaton Electric Limited
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

MTL Instruments PVT Limited
No 3 Old Mahabalipuram Road,
Sholinganallur, Chennai, 600 119
India

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

GB/BAS/ExTR23.0019/00 GB/SGS/ExTR23.0073/00 GB/SGS/ExTR24.0008/00
GB/SGS/ExTR25.0058/00

Quality Assessment Reports:

GB/BAS/QAR06.0022/11 GB/BAS/QAR07.0017/11

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EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

This certificate covers the following types:

- MTL4541* / MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
- MTL4541A / MTL4541AS Single Channel & MTL4544A / MTL4544AS Two Channel Current Repeater.
- MTL4541S, MTL4541T, MTL4544S & MTL4544D Repeater Power Supplies, 4/20mA.
- MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
- MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters.
- MTL5541 / MTL5541-T / MTL5544 Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters.
- MTL5541A / MTL5541AS Single Channel & MTL5544A / MTL5544AS Two Channel Current Repeater.
- MTL5541S, MTL5541S-T, MTL5544S, MTL5544D & MTL5544D-L Repeater Power Supplies, 4/20mA.

See Certificate Annex for a description of the types of equipment and electrical parameters

SPECIFIC CONDITIONS OF USE: NO

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

Variation 3.1

To permit the addition of the ‘Ex ic’ load parameters for all modules.

ExTR: **GB/SGS/ExTR25.0058/00**	File Reference: **25/0211**

Annex:

IECEx BAS 23.0013 Annex Issue 2.pdf

Schedule 1 – MTL4541* / MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising two conventional 2 or 3-Wire 4/20mA transmitters or a 'smart' transmitter in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC).

The MTL4544* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components, are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for the hazardous and non-hazardous area connections. All models are fitted with a power indication LED.

The MTL4541* Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is a depopulated version of the MTL4544* and has only one channel populated. Both the MTL4541* and MTL4544* available in a number of model variants, denoted by the last digit in the model number. All model variants are built on a common PCB.

Model Range:

Model No.	
MTL4541	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4541B	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4541P	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544	Dual Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544B	Dual Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

Input / Output Parameters

MTL4541, MTL4541B, MTL4544 & MTL4544B Models Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14

U_m = 253V

The apparatus is designed to operate on the above terminals from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1
or
Hazardous Area Terminals 5 w.r.t 4 (MTL4544 & MTL4544B only)

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 3 w.r.t. 1
or
Hazardous Area Terminals 6 w.r.t 4 (MTL4544 & MTL4544B only)

U_o = 1.1V U_i = 30V
I_o = 53mA I_i = 121mA
P_o = 15mW
C_i = 0
L_i = 0

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous area terminals 2 and 5 must not be used when the source is connected to these terminals.

Hazardous Area Terminals 2 w.r.t. 3
or
Hazardous Area Terminals 5 w.r.t 6 (MTL4544 & MTL4544B only)

U_o = 28V C_i = 0
I_o = 87mA L_i = 0
P_o = 0.61W

Load Parameters

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values for either channel:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4				
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
I	3.76	53.7		668
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6				
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	2.15	40.9		469
I	3.76	59.1		710

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4				
IIC	0.272	9.2		123
IIB*	1.65	36.9		472
IIA	6.6	73.9		986
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4				
IIC	1,000	28.4		5,485
IIB*	1,000	113.9		20,000
IIA	1,000	227.8		40,000
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6				
IIC	0.272	10.5		131
IIB*	1.65	42.2		499
IIA	6.6	84.5		1,053

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

MTL4541P Model Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14

U_m = 253V

The apparatus is designed to operate on the above terminals from a d.c. supply voltage of 35V d.c.

Hazardous Area Terminals 2 w.r.t. 1

U_o = 28V C_i = 0
I_o = 116.6mA L_i = 0
P_o = 0.82W

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.1V U_i = 30V
I_o = 53mA I_i = 121mA
P_o = 15mW
C_i = 0
L_i = 0

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous area terminal 2 must not be used when the source is connected to these terminals.

Hazardous Area Terminals 2 w.r.t. 3

U_o = 28V C_i = 0
I_o = 107mA L_i = 0
P_o = 0.75W

Load Parameters

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1				
IIC	0.083	2.7		45
IIB*	0.65	11.8		175
IIA	2.15	23.5		370
I	3.76	33.5		545
Hazardous Area Terminals 3 w.r.t. 1				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3				
IIC	0.083	3.2		50
IIB*	0.65	13.7		190
IIA	2.15	27.5		401
I	3.76	39.3		596

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1				
IIC	0.272	5.8		98
IIB*	1.65	23.5		392
IIA	6.6	47		784
Hazardous Area Terminals 3 w.r.t. 1				
IIC	1,000	28.4		5,485
IIB*	1,000	113.9		20,000
IIA	1,000	227.8		40,000
Hazardous Area Terminals 2 w.r.t. 3				
IIC	0.272	6.9		107
IIB*	1.65	27.9		427
IIA	6.6	55.9		856

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 2 – MTL4541A / MTL4541AS Single Channel & MTL4544A / MTL4544AS Two Channel Current Repeater

The MTL4544A Two Channel Current Repeater is designed to repeat up to two 4-20mA current signals from separately powered 4/20mA transmitters located in the hazardous area to unspecified apparatus in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL4544A Current Repeater comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, Zener diodes and resistors providing voltage and current limitation on each channel. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. The apparatus is fitted with a Power-on LED indication.

The MTL4541A Single Channel Current Repeater is a depopulated version of the MTL4544A and has only one channel populated.

Minor changes to the non-hazardous are circuitry of both models of the apparatus form the MTL4541AS Single Channel and MTL4544AS Two Channel Current Repeater. These models use the same common PCB and enclosure and in terms of intrinsic safety are identical.

Input/Output Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14)

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 8, 9, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL4544A / 4544AS models only)

U_o = 8.6V (Diode) C_i = 0
I_o = 0 L_i = 0
P_o = 0

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when each hazardous area channel is connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

Each hazardous area channel is also considered suitable for the connection of an external intrinsically safe source with a U_o = 30V and I_o = 100mA having a source resistance of U_o/I_o to be connected to hazardous area terminals 2 w.r.t. 1 - Channel 1 and 5 w.r.t. 4 – Channel 2.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Each channel must be considered as a separate intrinsically safe circuit.

Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined with Terminals 2 & 4 connected together – MTL4544A / 4544AS models only)

U_o = 17.2V (Diode) C_i = 0
I_o = 0 L_i = 0
P_o = 0

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

The connection of channel 1 and 2 together is also considered suitable for the connection of an external intrinsically safe source with a U_o = 30V and I_o = 100mA having a source resistance of U_o/I_o to be connected to hazardous area terminals 5 w.r.t. 1.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to the apparatus must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) or 5 w.r.t. 4 (Channel 2 – MTL4544A/44AS models only)			
IIC	6.2	5.01	1,351
IIB*	55	20.06	5,406
IIA	1,000	40.12	10,813
I	1,000	65.82	17,740
Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined – MTL4544A/44AS models only)			
IIC	0.36	5.01	675
IIB*	2.11	20.06	2,703
IIA	8.7	40.12	5,406
I	12.16	65.82	8,870

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) or 5 w.r.t. 4 (Channel 2 – MTL4544A/44AS models only)			
IIC	49	11.2	3,039
IIB*	1,000	45.0	12,157
IIA	1,000	90.1	24,300
Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined – MTL4544A/44AS models only)			
IIC	1.66	11.2	1,518
IIB*	11.4	45.0	6,081
IIA	47	90.1	12,163

*Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 3 – MTL4541S, MTL4541T, MTL4544S & MTL4544D Repeater Power Supplies, 4/20mA

The MTL4544S Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is designed to provides floating d.c. supplies for energising two 'Smart' 4/20mA Transmitters located in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC).

The MTL4544S Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. LED indication is fitted to indicate power-on.

The MTL4541S Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is a depopulated version of the MTL4544S and has only one channel populated.

The MTL4544D Repeater Power Supply, 4/20mA for 2 or 3 Wire Transmitters with two outputs is designed to provide a floating d.c. supplies for energising a 2 or 3-Wire 4/20mA Transmitter located in the hazardous area and repeat the current on two channels in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC). The apparatus uses the same printed circuit board and enclosure as the MTL4544S but is populated with only one hazardous area transmitter connection and two non-hazardous area outputs fitted.

The MTL4541T Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is similar to the MTL4541S but is fitted with different voltage and current limitation components and therefore has different output parameters.

Model Range

MTL4541S	Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters
MTL4541T	Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters
MTL4544S	Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters
MTL4544D	Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters with Two Outputs

Input / Output Parameters

MTL4541S, MTL4544S & MTL4544D Input / Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 12, 13 & 14

U_m = 253V r.m.s.

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 12, 13 & 14 from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)
Or

Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL4544S model)

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL4544S model)

U_o = 1.1V U_i = 30V C_i = 0
I_o = 53mA I_i = 121mA L_i = 0
P_o = 15mW

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 or terminals 6 w.r.t 4 (MTL4544S model only) are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminals 2 and 5 must not be used when the source is connected.

Hazardous Area Terminals 2 w.r.t. 3 (Channel 1)
Or
Hazardous Area Terminals 5 w.r.t. 6 (Channel 2 – MTL4544S model)

U_o = 28V C_i = 0
I_o = 87mA L_i = 0
P_o = 0.61W

Each channel must be considered as a separate intrinsically safe circuit.

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values for either channel:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t. 4 (MTL4544S only)				
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
I	3.76	53.7		668
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4 (MTL4544S only)				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229

Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t. 6 (MTL4544S only)			
IIC	0.083	4.9	59
IIB*	0.65	20.0	222
IIA	2.15	40.9	469
I	3.76	59.1	710

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4			
IIC	0.272	9.2	123
IIB*	1.65	36.9	472
IIA	6.6	73.9	986
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4			
IIC	1,000	28.4	5,485
IIB*	1,000	113.9	20,000
IIA	1,000	227.8	40,000
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6			
IIC	0.272	10.5	131
IIB*	1.65	42.2	499
IIA	6.6	84.5	1,053

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

MTL4541T Input / Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 13 & 14

U_m = 253V r.m.s.

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 13 & 14 from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1

U_o = 22V C_i = 0

I_o = 167mA L_i = 0
P_o = 0.92W

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.0V U_i = 30V C_i = 0
I_o = 53mA I_i = 121mA L_i = 0
P_o = 14mW

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminal 2 must not be used when the source is connected.

Hazardous Area Terminals 2 w.r.t. 3

U_o = 22V C_i = 0
I_o = 145mA L_i = 0
P_o = 0.80W

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1				
IIC	0.165	0.91		39
IIB*	1.14	5.5		147
IIA	4.20	10.7		322
I	6.00	16.4		517
Hazardous Area Terminals 3 w.r.t. 1				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3				
IIC	0.165	1.49		45
IIB*	1.14	7.5		174
IIA	4.20	14.9		381
I	6.00	22.5		575

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1			
IIC	0.63	2.8	87
IIB*	3.9	11.4	330
IIA	15	22.9	700
Hazardous Area Terminals 3 w.r.t. 1			
IIC	1,000	28.4	5,485
IIB*	1,000	113.9	20,000
IIA	1,000	227.8	40,000
Hazardous Area Terminals 2 w.r.t. 3			
IIC	0.63	3.8	100
IIB*	3.9	15.2	391
IIA	15	30.4	806

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 4 – MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising a conventional 2 or 3-Wire 4/20mA Transmitter in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from unspecified non-hazardous area equipment to the intrinsically safe circuits by means of limitation of current and voltage. The equipment also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL4541Y Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters comprises two isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components, are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. A LED is fitted to provide power on indication.

Input / Output Parameters

Non-Hazardous Area Terminals 8, 9, 12, 13 & 14

U_m = 253V

The apparatus is designed to operate on the above terminals from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 3 w.r.t. 1

U_o = 1.1V C_i = 0 U_i = 30V
I_o = 53mA L_i = 0 I_i = 121mA
P_o = 15mW

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous Area Terminal 2 must not be used when the source is connected to these terminals.

Hazardous Area Terminals 2 w.r.t. 3

U_o = 28V C_i = 0
I_o = 87mA L_i = 0
P_o = 0.61W

Load Parameters

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1				
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
I	3.76	53.7		668
Hazardous Area Terminals 3 w.r.t. 1				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3				
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	2.15	40.9		469
I	3.76	59.1		710

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4				
IIC	0.272	9.2		123
IIB*	1.65	36.9		472
IIA	6.6	73.9		986
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4				
IIC	1,000	28.4		5,485
IIB*	1,000	113.9		20,000
IIA	1,000	227.8		40,000
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6				
IIC	0.272	10.5		131
IIB*	1.65	42.2		499
IIA	6.6	84.5		1,053

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 5 – MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters

The MTL4541YA Single Channel Current Repeater, 4/20mA Passive Input for Smart Transmitters is designed to repeat a current signal from a separately powered 4/20mA transmitter located in the hazardous area to unspecified equipment location in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area equipment to the intrinsically safe equipment by means of voltage and current limitation. The equipment also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The equipment comprises two isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, diodes, zener diodes and resistors providing voltage and current limitation. The above, together with other electronic components, are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. The equipment is fitted with a power-on LED indication.

Input / Output Parameters

Non-Hazardous Area Terminals 8, 9, 12, 13 & 14

U_m = 253V

The apparatus is designed to operate on the above terminals from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1

U_o = 8.6V (Diode) C_i = 0
I_o = 0 L_i = 0
P_o = 0

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when the hazardous area terminals are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

The hazardous area terminals are also considered suitable for the connection of an external intrinsically safe source with a U_o = 30V and I_o = 100mA having a source resistance of U_o/I_o connected to hazardous area terminals 2 w.r.t. 1. The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	6.2	5.01		1,351
IIB*	55	20.06		5,406
IIA	1,000	40.12		10,813
I	1,000	65.82		17,740

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
IIC	49	11.2		3,039
IIB*	1,000	45.0		12,157
IIA	1,000	90.1		24,300

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 6 – MTL5541 / MTL5541-T / MTL5544 Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters

The MTL5544 Two Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is designed to provide a floating d.c. supply for energising two conventional 2 or 3-Wire 4/20mA transmitters or a 'smart' transmitter in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of voltage and current. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC).

The MTL5544 Two Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. A power indicator LED is fitted to the top of the equipment.

The MTL5541 Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is a depopulated version of the MTL5544 and has only one channel populated.

The MTL5541-T Single Channel Repeater Power Supply, 4/20mA for 2 or 3-Wire Transmitters is of similar construction to the MTL5541 variants of the equipment with the same input and output parameters, but has an extended ambient temperature range of -20°C to +65°C.

Input / Output Parameters

Non-Hazardous Area Terminals 7 to 14 (10 to 14 on MTL5541 & MTL5541-T models)

U_m = 253V

The apparatus is designed to operate on the above terminals from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1
or
Hazardous Area Terminals 5 w.r.t 4 (MTL5544 model only)

U_o = 28V C_i = 0
I_o = 93mA L_i = 0
P_o = 0.65W

Hazardous Area Terminals 3 w.r.t. 1
or
Hazardous Area Terminals 6 w.r.t 4 (MTL5544 model only)

U_o = 1.1V U_i = 30V
I_o = 53mA I_i = 121mA
P_o = 15mW
C_i = 0
L_i = 0

When an intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source.

Hazardous area terminals 2 and 5 must not be used when the source is connected to these terminals.
Hazardous Area Terminals 2 w.r.t. 3
or
Hazardous Area Terminals 5 w.r.t 6 (MTL5544 model only)

U_o = 28V C_i = 0
I_o = 87mA L_i = 0
P_o = 0.61W

On the MTL5544 each channel must be considered as a separate intrinsically safe circuit.

Load Parameters

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed must not exceed the following values for either channel:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t. 4				
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
I	3.76	53.7		668
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t. 4				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t. 6				
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	2.15	40.9		469
I	3.76	59.1		710

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4				
IIC	0.272	9.2		123
IIB*	1.65	36.9		472
IIA	6.6	73.9		986
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4				
IIC	1,000	28.4		5,485
IIB*	1,000	113.9		20,000
IIA	1,000	227.8		40,000

Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6			
IIC	0.272	10.5	131
IIB*	1.65	42.2	499
IIA	6.6	84.5	1,053

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

The values of L_o and C_o determined by this method shall not be exceeded by the sum of all the L_i plus cable inductances in the circuit and the sum of all of the C_i plus cable capacitances respectively.

Schedule 7 – MTL5541A / MTL5541AS Single Channel & MTL5544A / MTL5544AS Two Channel Current Repeater

The MTL5544A Two Channel Current Repeater is designed to repeat up to two 4-20mA current signals from separately powered 4/20mA transmitters located in the hazardous area to unspecified apparatus in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by the means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by connection of a hand-held communicator (HHC).

The MTL5544A Current Repeater comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, fuses, zener diodes and resistors providing voltage and current limitation on each channel. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plug and sockets are provided for hazardous and non-hazardous area connections. The apparatus is fitted with a Power-on LED indication.

The MTL5541A Single Channel Current Repeater is a depopulated version of the MTL5544A and has only one channel populated.

Minor changes to the non-hazardous are circuitry of both models of the apparatus form the MTL5541AS Single Channel and MTL5544AS Two Channel Current Repeater. These models use the same common PCB and enclosure and in terms of intrinsic safety are identical.

Input/Output Parameters

Non-Hazardous Area Terminals 8, 9, 11, 12, 13 & 14)

U_m = 253V r.m.s.

The circuit connected to non-hazardous area terminals 8, 9, 11, 12, 13 & 14 is designed to operate from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL5544A / 5544AS models only)

U_o = 8.6V (Diode) C_i = 0
I_o = 0 L_i = 0
P_o = 0

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

Although the apparatus does not itself comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when each hazardous area channel is connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.

Each hazardous area channel is also considered suitable for the connection of an external intrinsically safe source with a U_o = 30V and I_o = 100mA having a source resistance of U_o/I_o to be connected to hazardous area terminals 2 w.r.t. 1 - Channel 1 and 5 w.r.t. 4 – Channel 2.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Each channel must be considered as a separate intrinsically safe circuit.

Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined with Terminals 2 & 4 connected together – MTL5544A / 5544AS models only)

U_o = 17.2V (Diode) C_i = 0
I_o = 0 L_i = 0
P_o = 0

This output voltage does not contribute to the short circuit spark risk, but must be considered for the calculation of load capacitance.

The connection of channel 1 and 2 together is also considered suitable for the connection of an external intrinsically safe source with a U_o = 30V and I_o = 100mA having a source resistance of U_o/I_o to be connected to hazardous area terminals 5 w.r.t. 1.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area cable must not exceed the values as detailed in the original schedule or the certificate relating to the external intrinsically safe source.

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to the apparatus must not exceed the following values:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) or 5 w.r.t. 4 (Channel 2 – MTL5544A/44AS models only)			
IIC	6.2	5.01	1,351
IIB*	55	20.06	5,406
IIA	1,000	40.12	10,813
I	1,000	65.82	17,740
Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined – MTL5544A/44AS models only)			
IIC	0.36	5.01	675
IIB*	2.11	20.06	2,703
IIA	8.7	40.12	5,406
I	12.16	65.82	8,870

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 (Channel 1) or 5 w.r.t. 4 (Channel 2 – MTL5544A/44AS models only)				
IIC	49	11.2		3,039
IIB*	1,000	45.0		12,157
IIA	1,000	90.1		24,300
Hazardous Area Terminals 5 w.r.t. 1 (Channels 1 & 2 combined – MTL5544A/44AS models only)				
IIC	1.66	11.2		1,518
IIB*	11.4	45.0		6,081
IIA	47	90.1		12,163

*Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

   The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.

Schedule 8 – MTL5541S, MTL5541S-T, MTL5544S, MTL5544D & MTL5544D-L Repeater Power Supplies, 4/20mA

The MTL5544S Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is designed to provide floating d.c. supplies for energising two 'Smart' 4/20mA Transmitters located in the hazardous area and repeat these currents in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC).

The MTL5544S Two Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters comprises four isolating transformers that provide galvanic isolation between the hazardous and non-hazardous area circuitry, zener diode chains and resistors providing voltage and current limitation. The above, together with other electronic components are mounted on a single printed circuit board (PCB) and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for hazardous and non-hazardous area connections. LED indication is fitted to indicate power-on.

The MTL5541S Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is a depopulated version of the MTL5544S and has only one channel populated.

The MTL5541S-T Single Channel Repeater Power Supply, 4/20mA for 'Smart' Transmitters is of a similar construction to the MTL5541S variant of the equipment with the same input and output parameters, but has an extended ambient temperature range of -20°C to +65°C.

The MTL5544D Repeater Power Supply, 4/20mA for 2 or 3 Wire Transmitters with two outputs is designed to provide a floating d.c. supplies for energising a 2 or 3-Wire 4/20mA Transmitter located in the hazardous area and repeat the current on two channels in the non-hazardous area, whilst restricting the transfer of energy from the unspecified non-hazardous area apparatus to the intrinsically safe circuits by means of limitation of current and voltage. The apparatus also allows bi-directional signal communication between the hazardous and non-hazardous area by the connection of a hand-held communicator (HHC). The apparatus uses the same printed circuit board and enclosure as the MTL5544S but is populated with only one hazardous area transmitter connection and two non-hazardous area outputs fitted.

The MTL5544D-L Repeater Power Supply, 4/20mA for 2 or 3 Wire Transmitters is of a similar construction to the MTL5544D variant of the equipment with the same input and output parameters, but has an extended ambient temperature range of -40°C to +60°C.

Input/Output Parameters

Non-hazardous Area Terminals 8, 9, 11, 12, 13 & 14

U_m = 253V r.m.s.

The apparatus is designed to operate on non-hazardous area terminals 8, 9, 11, 12, 13 & 14 from a d.c. supply voltage of up to 35V.

Hazardous Area Terminals 2 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 5 w.r.t. 4 (Channel 2 – MTL5544S model)

U_o = 28V
I_o = 93mA
P_o = 0.65W

C_i = 0
L_i = 0

Hazardous Area Terminals 3 w.r.t. 1 (Channel 1)
Or
Hazardous Area Terminals 6 w.r.t. 4 (Channel 2 – MTL5544S model)

U_o = 1.1V U_i = 30V C_i = 0
I_o = 53mA I_i = 121mA L_i = 0
P_o = 15mW

Although the apparatus does not comply with the simple apparatus requirements of Clause 5.7 of IEC 60079-11: 2011, when terminals 3 w.r.t. 1 or terminals 6 w.r.t 4 (MTL5544S model only) are connected in an intrinsically safe circuit the internal stored energy, voltage and current of the interface will not add more than the values specified in Clause 5.7 of IEC 60079-11: 2011 to the parameters of the circuit into which it is connected.
When an external intrinsically safe source is connected to these terminals it should have a source resistance of U_i / I_i and the capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area connections must not exceed the values detailed in the certificate of the intrinsically safe source. Hazardous area terminals 2 and 5 must not be used when the source is connected.

Hazardous Area Terminals 2 w.r.t. 3 (Channel 1)
Or
Hazardous Area Terminals 5 w.r.t. 6 (Channel 2 – MTL5544S model)

U_o = 28V C_i = 0
I_o = 87mA L_i = 0
P_o = 0.61W

Each channel must be considered as a separate intrinsically safe circuit.

Load Parameters

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected must not exceed the following values for either channel:

'Ex ia':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t. 4 (MTL5544S only)				
IIC	0.083	4.2		56
IIB*	0.65	12.6		210
IIA	2.15	33.6		444
I	3.76	53.7		668
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4 (MTL5544S only)				
IIC	100	12.8		2,438
IIB*	1,000	47.8		8,932
IIA	1,000	104.7		18,140
I	1,000	156.2		28,229
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t. 6 (MTL5544S only)				
IIC	0.083	4.9		59
IIB*	0.65	20.0		222
IIA	2.15	40.9		469
I	3.76	59.1		710

'Ex ic':

GROUP	CAPACITANCE (µF)	INDUCTANCE (mH)	OR	L/R RATIO (µH/ohm)
Hazardous Area Terminals 2 w.r.t. 1 or 5 w.r.t 4				
IIC	0.272	9.2		123
IIB*	1.65	36.9		472
IIA	6.6	73.9		986
Hazardous Area Terminals 3 w.r.t. 1 or 6 w.r.t 4				
IIC	1,000	28.4		5,485
IIB*	1,000	113.9		20,000
IIA	1,000	227.8		40,000
Hazardous Area Terminals 2 w.r.t. 3 or 5 w.r.t 6				
IIC	0.272	10.5		131
IIB*	1.65	42.2		499
IIA	6.6	84.5		1,053

* Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB, IIA & I and 600nF for Group IIC.