Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer

ABB Low-voltage Products Division
8155 T&B Blvd
Memphis, Tennessee 38125
USA

Object of declaration

Connector, Compression Lugs

Type: **See Annex 1**

The object of the declaration described above is in conformity with the following standard or other normative documents

EN 61238-1 IEC 61238-1:2003

Signed for and on behalf of

ABB Low-voltage Products Division
2015-11-17

David Kendall
Director, Industry Affairs

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VP, Global Business Unit
Technology Manager

ANNEX 1

Type: IEC 61238-1:2003 Class A connectors, for use with IEC 60228:2004 copper conductors Classes 2 and 5

* For 15 Ton Hydraulic Tools, must use adapters 15500-TB

For 45º and 90º Angled Lugs, add suffix **-45** or **-90**

For 2-hole Straight Lugs, add suffix **-2**

Catalog Number**	Wire Size Surface Area	Bolt Size (Diameter)	Strip Length	Die Number (Crimps)		Dieless Smart Tool	Hand Tool	
	mm²		mm	6 Ton Hydraulic Tools	12/14 Ton and 15 Ton* Hydraulic Tools	TBM8-750 Series	ERG4002	TBM6SM (Crimps)
6M4-A	6	M4	10	6TON06M (1)	N/A	N/A	"C" NEST	N/A
6M5-A		M5						
6M6-A		M6						
6M8-A		M8						
6M10-A		M10						
10M5-A	10	M5	12	6TON08M (1)	15508M (1)	(1)	N/A	(1)
10M6-A		M6						
10M8-A		M8						
10M10-A		M10						
16M6-A	16	M6	12	6TON09M (1)	15509M (1)	(1)	N/A	(1)
16M8-A		M8						
16M10-A		M10						
16M12-A		M12						
25M6-A	25	M6	13	6TON11M (1)	15511M (1)	(1)	N/A	(1)
25M8-A		M8						
25M10-A		M10						
25M12-A		M12						
35M6-A	35	M6	16	6TON13M (1)	15513M (1)	(1)	N/A	(2)
35M8-A		M8						
35M10-A		M10						
35M12-A		M12						
50M6-A	50	M6	20	6TON145M (1)	155145M (1)	(1)	N/A	(2)
50M8-A		M8						
50M10-A		M10						
50M12-A		M12						
70M6-A	70	M6	24	6TON17M (1)	15517M (1)	(1)	N/A	(2)
70M8-A		M8						
70M10-A		M10						
70M12-A		M12						
70M16-A		M16						
95M8-A	95	M8	26	6TON20M (2)	15520M (1)	(1)	N/A	N/A
95M10-A		M10						
95M12-A		M12						
95M16-A		M16						
120M8-A	120	M8	28	6TON22M (2)	15522M (1)	(1)	N/A	N/A
120M10-A		M10						
120M12-A		M12						
120M16-A		M16						
150M10-A	150	M10	33	6TON25M (2)	15525M (1)	(1)	N/A	N/A
150M12-A		M12						
150M16-A		M16						
150M20-A		M20						
185M10-A	185	M10	38	6TON27M (2)	15527M (2)	(2)	N/A	N/A
185M12-A		M12						
185M16-A		M16						
185M20-A		M20						
240M10-A	240	M10	38	6TON30M (2)	15530M (2)	(2)	N/A	N/A
240M12-A		M12						
240M16-A		M16						
240M20-A		M20						
300M10-A	300	M10	45	N/A	15532M (2)	(2)	N/A	N/A
300M12-A		M12						
300M16-A		M16						
300M20-A		M20						
300M24-A		M24						
400M12-A	400	M12	51	N/A	15536M (2)	(2)	N/A	N/A
400M16-A		M16						
400M20-A		M20						
400M24-A		M24						

ANNEX 2

Lab Test Report

Test samples

According to IEC 61238-1:2003, representative samples of the Class A connectors were selected from the full range of sizes. The samples selected were 6mm^2, 10mm^2, 35mm^2, 70mm^2, and 400mm^2. The results of tests conducted on these sizes were deemed to be representative of the full range of sizes.

ELECTRICAL TESTS – According to IEC 61238-1:2003 for Class A connectors
1000 Heat-cycles with short-circuit starting at cycle 200

Test loop assemblies:

A typical test loop assembly for the electrical tests consisted of six Class A[a] connectors of the same size applied one at each end, to three IEC 60228 stranded copper conductors of the appropriate size using a compression tool according to supplied instructions. A fourth stranded copper conductor was included as a reference conductor.

For each size of connector, test loops using both IEC 60228 Class 2[b] and Class 5[c] stranded copper conductors were tested.

1000 Heat-cycles:

Each test loop assembly was subjected to 1000 heat-cycles according to IEC 61238-1.

Cycle 1:

During the first cycle, the temperature of the reference conductor was recorded. The steady-state current at a temperature of 120 °C on the reference conductor was then recorded and used to identify the median connector [d]. The temperature of the reference conductor shall not exceed 140 °C. (i.e. $120 \leq \theta_{ref} \leq 140$)

Result:
The temperature of the reference conductor did not exceed 140 °C in any of the test loops.

[a] IEC 61238-1:2003 Edition 2 defines Class A as connectors intended for electricity distribution or industrial networks in which they can be subjected to short-circuits of relatively high intensity and duration. As a consequence, Class A connectors are suitable for the majority of applications.

[b] IEC 60228 defines Class 2 conductor as stranded

[c] IEC 60228 defines Class 5 conductor as stranded, flexible

[d] IEC 61238-1 defines “median connector” as the connector which during the first heat cycle records the third highest temperature of the six connectors in the test loop.

Cycles 200 (before Short-circuit and after) 250, 325, 400, 475, 550, 625, 700, 775, 850, 925, 1000

At these cycle intervals, using the reference conductor temperature as the control parameter:

Requirement	Result – All Samples
No connectors shall overheat: *The recorded temperature shall not exceed that of the reference conductor* (θ_{ref})	Pass
The resistances shall not change excessively as a result of the short-circuit test *The resistance factor ratio λ shall not exceed 2.0*	Pass
All connectors in a test loop shall be similar in resistance: *The initial scatter δ between the six values of k (connector resistance factor) before heat cycling shall not exceed the value 0.3.*	Pass
The resistance shall not change excessively: *The mean scatter β shall not exceed the value 0.3, and the change in resistance factor D shall not exceed 0.15.*	Pass

Short-circuit test (for Class A connectors only): Six short-circuits are applied after the 200th heat cycle. The short-circuit current level was raised to bring the bare reference conductors from a temperature of ≤35 °C to a temperature between 250 °C and 270 °C. The short-circuit duration is 1 second with a maximum current of 25 kA, but it can be up to 5 seconds with a current between 25 and 45 kA. After each short-circuit, the test loop is cooled to a temperature ≤35 °C.

Electrical Test Results and Maximum Acceptable Values per IEC 61238-1:

Parameter	Designation	T&B Results	IEC 61238-1 Requirements
Initial Scatter	δ	Pass	≤ 0.30
Mean Scatter	β	Pass	≤ 0.30
Change in Resistance Factor	*D*	Pass	≤ 0.15
Resistance factor ratio	λ	Pass	≤ 2.0
Maximum Temperature	θ_{max}	Pass	θ_{ref} *

Where:

δ initial scatter of the connector resistance factors

λ resistance factor ratio: change in the resistance factor of the connector, relative to its initial resistance factor

β mean scatter of the connector resistance factors

D change in the resistance factor of the connector

θ_{max} maximum temperature recorded on a connector over the total period of test

θ_{ref} temperature of the reference conductor at the moment of measuring θ_{max}

* θ_{ref} ≤ 124 °C value during T&B tests

MECHANICAL TESTS – According to IEC 61238-1:2003 for Class A connectors, using Tensile pull-out force for mechanical tests

Sample Assemblies:

According to IEC 61238-1:2003, five samples of each connector were applied separately to IEC 60228 stranded copper conductors of the appropriate size using a compression tool according to supplied instructions. Per IEC 61238-1, Section 5.3 Range of approval, minimum samples chosen are: the largest, the smallest and two intermediate connector sizes. The below table shows the largest, the smallest and three intermediate connector sizes.

Tensile Pull:

Each sample was subjected to a tensile force in Newtons (N) equivalent to 60 times the nominal cross-sectional area in mm^2 (maximum 20,000 N) for one minute. No slipping is permitted.

Result:

Mechanical Test Results and Maximum Acceptable Values per IEC 61238-1:

Connector Size (mm^2)	Conductor		Required* Tensile Force (N)	Rate of application exceeded 10 N/mm^2 (**Yes**/No)	Sample maintained the required tensile force for 1 minute without slipping (Yes/No)
	Area (mm^2)	Length (mm)			
6	6	500	600	No	Yes
10	10	500	600	No	Yes
35	35	500	2,100	No	Yes
70	70	500	4,200	No	Yes
400	400	500	20,000	No	Yes

ANNEX 3
Additional Tests

MECHANICAL TESTS – In addition to 61238-1:2003 mechanical tests requirements for Class A connectors, using Tensile pull-out force for mechanical tests

Sample Assemblies:
In addition to 61238-1:2003 mechanical tests requirements, eight additional samples to the five representative samples of each Class A connector were applied separately to IEC 60228 stranded copper conductors of the appropriate size using a compression tool according to supplied instructions.

Tensile Pull:
Each sample was subjected to a tensile force in Newtons (N) equivalent to 60 times the nominal cross-sectional area in mm^2 (maximum 20,000 N) for one minute. No slipping is permitted.

Result:

Mechanical Test Results and Maximum Acceptable Values per IEC 61238-1:

Connector Size (mm^2)	Conductor		Required* Tensile Force (N)	Rate of application exceeded 10 N/mm^2 (Yes/No)	Sample maintained the required tensile force for 1 minute without slipping (Yes/No)
	Area (mm^2)	Length (mm)			
16	16	500	960	No	Yes
25	25	500	1,500	No	Yes
95	95	500	5,700	No	Yes
120	120	500	7,200	No	Yes
150	150	500	9,000	No	Yes
185	185	500	11,100	No	Yes
240	240	500	14,400	No	Yes
300	300	500	18,000	No	Yes