



Fire Resistance and Anti-Static (FRAS) Testing

FRAS testing of HELI Series Antenna
Housing to requirements of
(TRG) MDG 3608:2022

Client: Poynting Antennas

Report Information

Title: *FRAS testing of HELI Series Antenna Housing to requirements of (TRG) MDG 3608:2022*

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A		
B		

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1.0 Introduction

At the request of Poynting Antennas, Fire Resistance and Anti-Static (FRAS) testing was conducted on Poynting Heli/Omni Series Antenna Housing (Radome) material at Simtars Redbank facility. Samples of Heli Series Part No: A-HELI-13-ENCL-FRAS radomes were supplied by the client for testing. The sample radomes are of ABS plastic construction with a conductive grey paint on the external surface and with approximate dimensions of 315 mm long by 112 mm diameter at the base and 61 mm diameter at the top. The unpainted (internal) surfaces of the radome samples varied in colour with the interior of some samples being light sky-blue, some dark sky blue and some grey in colour. Several models of radomes in the HELI and OMNI Series of antennas are manufactured from the same material and paint finish. The testing aimed to determine compliance against the requirements specified in the NSW Technical Reference Guide MDG 3608¹.

2.0 Test Specification

FRAS testing was conducted on the Antenna Housing (radome) material to the requirements specified in (TRG) MDG 3608:2022 for non-defined applications. The following clauses and test methods were applied:

- Clause 6.3.1.2 – Fire resistance - Combustion propagation characteristics, AS 1180.10B:1982
- Clause 6.3.2 – Oxygen Index test, ISO 4589-2:2017
- Clause 6.3.3.1 – Electrical Resistance test, MDG 3608:2022, C5

3.0 Results

3.1. Fire resistance, AS 1180.10B:1982

Fire resistance (Combustion propagation characteristics) testing was conducted to the requirements of AS 1180.10B:1982 in accordance with Clause 6.3.1.2 of (TRG) MDG 3608:2022. Six radome samples were tested as supplied. The results of the combustion propagation characteristics tests are shown in Table 1.

MDG 3608, Clause 6.3.1.2 states that when tested in accordance with AS 1180.10B:1982, the average duration of flame and glowing combined should not exceed 30 seconds.

Table 1: Combustion Propagation Characteristics Test Results (Date of Test: 26/10/2023)

Test Piece	1	2	3	4	5	6
Duration of Flaming (s)	0	3	0	0	4	2
Duration of Afterglow (s)	0	0	0	0	0	0
Duration of Flaming + Afterglow (s)	0	3	0	0	4	2
Charred Length (mm)	188.1	166.6	163.1	151.1	144.9	139.4
Mean Duration Flaming (s)	1.5					
Mean Duration Afterglow (s)	0					
Mean of Flaming + Afterglow (s)	1.5					
Maximum Charred Length (mm)	188.1					

¹ NSW Government, Department of Regional NSW, Technical reference guide – Non-metallic materials for use in underground coal mines and reclaim tunnels in coal mines.

General Notes

This test result alone does not assess the fire hazard of the product under actual fire conditions. Consequently, the results of this test alone shall not be quoted in support of claims with respect to the fire hazard of the product under actual fire conditions.

3.2. Oxygen Index Test

Oxygen Index testing of radome material test specimens was carried out according to ISO 4589-2:2017 in accordance with Clause 6.3.2 of (TRG) MDG 3608:2022. The average size of samples tested was 148 mm long, 11.3 mm wide, and 2.6 mm thick (deviation from standard test specimen form in accordance with ISO 4589-2:2017) and the samples were conditioned at 23 °C and 50 % RH for at least 88 hours. The Oxygen Index of the material was assessed by testing in accordance with ISO 4589-2:2017 Procedure A (top surface ignition). The oxygen index test results are shown in Table 2.

When tested in accordance with ISO 4589-2:2017, the result shall not be less than 28%.

Table 2: Test Result – Oxygen Index Testing (Date of Test: 24/10/2023)

Required Oxygen Index (% O ₂)	Oxygen Index of material (% O ₂)	Uncertainty of Measurement (% O ₂)
≥28	27.7	±0.54

Notes:

- Oxygen concentrations are percentage by volume.
- The estimated standard deviation of the Oxygen Index concentration measurements is 0.151.
- Interval d = 0.2 (It is the interval between oxygen volume fraction levels used and controlled in accordance with 8.7 of ISO 4589-2:2017)
- The uncertainty on OI is maximized depending on the value of d. For d = 0.2: OI_{max} = 0.54.
- Test pieces exhibited heavy soot. The Oxygen Index of the material was determined by the extent of burning along the length of the sample.
- The result relates only to the behaviour of the test specimens under the conditions of the test and these results shall not be used to infer the fire hazards of the materials in other forms or under other fire conditions.

3.3. Electrical Resistance

Electrical resistance tests were carried out to the requirements of Clause C5.1 of MDG 3608:2022 in accordance with Clause 6.3.3.1 of MDG 3608. Five radome samples were cleaned and prepared prior to conditioning in an environment chamber at 20 °C and relative humidity of 65% for > 2 hours.

A conductive solution was applied between the electrode bands and the sample surface. Testing was carried out on the outer surface of the radome samples with a 100 mm distance between electrodes. The results of these electrical resistance tests are shown in Table 3.

When tested to the requirements of the method in Clause 5.1 as required by Clause 6.3.3.1 of MDG 3608:2022 for rods, the material shall meet the requirements of Clause 5.2. Clause 5.2 of MDG 3608 states each of the five observations of electrical resistance shall not exceed $7.5 \times 10^9 / D \Omega$, where D is the measured outside diameter of the rod in millimetres. The results of the electrical resistance tests are summarised in Table 4.

The reference equipment used in these tests, calibrations and/or measurements included in this document are traceable to national standards.

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Table 3: Electrical Resistance Test Results – (Date of Test – 18/10/2023)

Sample No	Temp (°C)	RH (%)	Surface Tested	Voltage Applied (VDC)	Voltage Measured (VDC)	Current (mA)	Distance Between Electrodes (mm)	Duration (s)	Measured Resistance Value (KΩ)
1	20.0	65	Housing OD	500	502	1.510	100	60	332
2	20.0	65	Housing OD	500	503	1.192	100	60	422
3	20.0	65	Housing OD	500	258	1.611	100	60	160
4	20.0	65	Housing OD	500	329	1.607	100	60	205
5	20.0	65	Housing OD	500	503	1.092	100	60	461

3.3.1 Summary of Electrical Resistivity Test Results

The results of the Electrical Resistance tests are summarised in Table 5.

Table 4: Summary of Electrical Resistance Test Results

Sample No	Measured Resistance Value (KΩ)	Rod Diameter * (mm)	Max Allowable Resistance R_{Max} (Ω)	Max Allowable Resistance R_{Max} (KΩ)	Pass or Fail
1	332	81.0	92592592.5	92592	Pass
2	422	81.0	92592592.5	92592	Pass
3	160	81.0	92592592.5	92592	Pass
4	205	81.0	92592592.5	92592	Pass
5	461	81.0	92592592.5	92592	Pass

* The samples are slightly conical in shape and the larger of the diameters measured at the location of the two electrodes was used as the diameter for the calculation of the maximum allowable resistance.

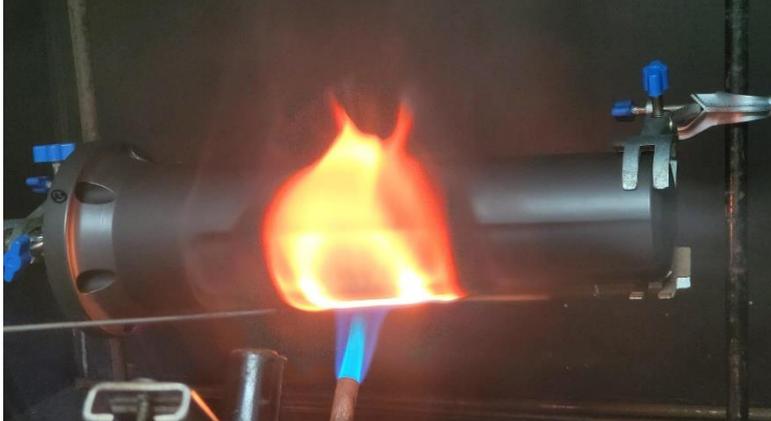
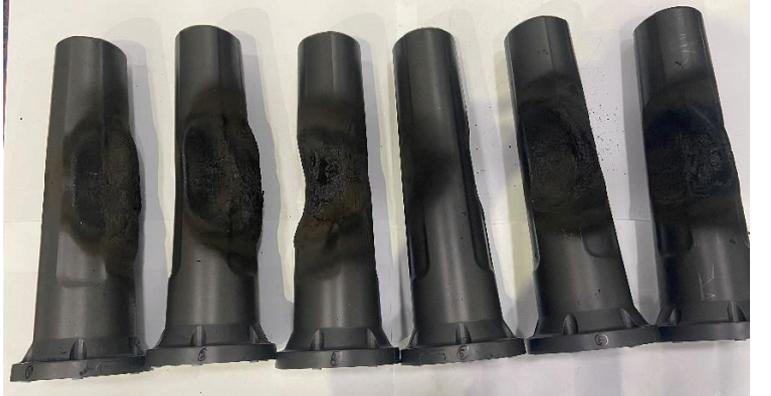
4.0 Conclusion

- When tested in accordance with AS 1180.10B:1982, the Poynting Antenna Housing samples complied with the combustion propagation characteristics requirements of MDG 3608:2022, Clause 6.3.1.2 for non-defined applications.
- The oxygen index of the Poynting Antenna Housing material was assessed to be 27.7% by testing in accordance with ISO 4589-2:2017. Compliance with the Oxygen Index requirements of (TRG) MDG 3608:2022 Clause 6.3.2 for non-defined applications is indeterminate when taking into account uncertainty of measurement.
- When tested in accordance with the method in Clause C5.1, the Poynting Antenna Housing samples complied with the electrical resistance requirements of Clause C5.2 as required by Clause 6.3.3.1 of MDG 3608:2022.
- This test report is valid only for the samples tested by Simtars.

The reference equipment used in these tests, calibrations and/or measurements included in this document are traceable to national standards.

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5.0 Photographs

Description	Photograph
<p>1- Poynting Antenna Housing Part No: A-HELI-13-ENCL-FRAS, selection of samples as received</p>	
<p>2- Combustion Propagation Characteristics samples before test.</p>	
<p>3- Combustion Propagation Characteristics test set up</p>	
<p>4- Combustion Propagation Characteristics test samples after test</p>	

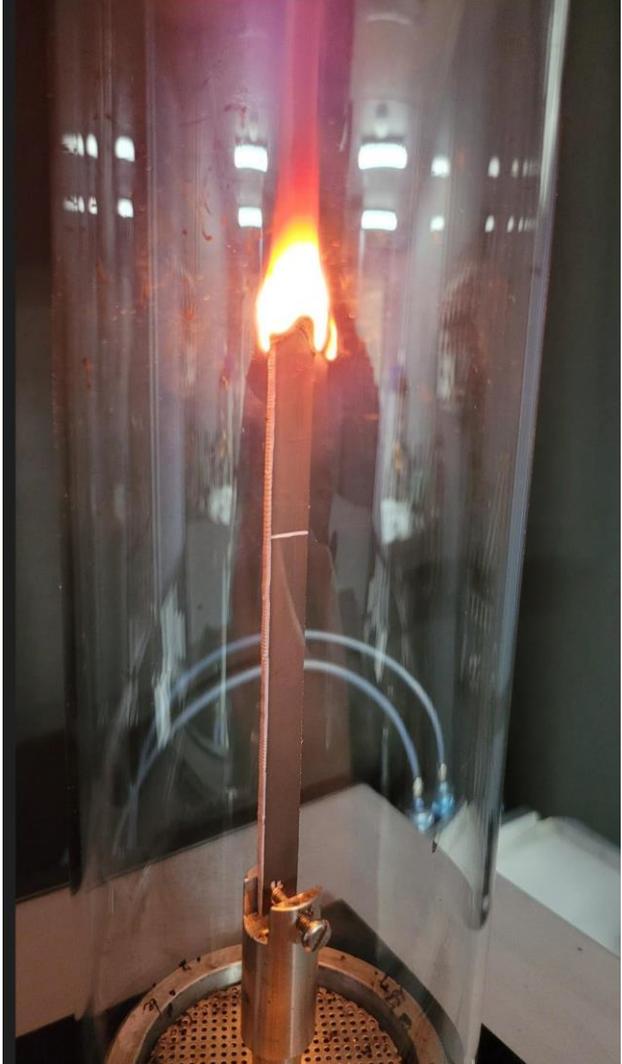
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Description	Photograph
<p>5- Electrical Resistance Test Samples</p>	
<p>6- Electrical Resistance Test</p>	
<p>7- Electrical Resistance Test</p>	

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Description	Photograph
<p>8- Oxygen Index Test samples before test</p>	
<p>9- Oxygen Index Testing</p>	

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Description	Photograph
10- Oxygen Index test samples after test	 A photograph showing 11 vertical, rectangular test samples arranged in a row. Each sample is labeled with a number from 1 to 11 at the bottom. The samples are dark grey or black, indicating they have been charred. Samples 1, 2, 3, 5, 6, 8, and 9 appear relatively intact with some surface charring. Samples 4, 7, 10, and 11 show significant charring and residue, particularly at the top and bottom edges. Sample 11 is the most heavily charred and appears to have a large, irregular mass of residue at its top end.

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