

VALVE STEM PACKING FOR OXYGEN SERVICE

Carlos D. Girão
Managing Director
Teadit Packings & Gaskets
cdgirao@teadit.in

Luiz P. Romano
R&D Manager
Teadit Industria e Comercio
luiz.paulo@teadit.com.br



Agenda

- Background
- Production Requirements
- Testing
 - Thermal Analysis
 - Extraction Analysis
- BAM Testing
- Emissions Evaluation
- Conclusions

Background

- Oxygen Service Products
- Usual Practice
- New Approach

Production Requirements

- Dedicated Facilities
- Operator Training
- Dedicated Equipment
 - From Yarn to Braiding to Die Forming
- Packaging
- Traceability

Production Facilities

- Produced in a controlled environment
- Product free of contamination by grease / oil, unwanted substances or microorganism.



Dedicated Equipment

Clean equipment for oxygen process (CGA G-4.1 -2009)

- Knitting
- Braiding
- Finishing
- Packaging



Control

Labeling

Solvent Cleanig

Protection
recontamination

All operational steps must
comply with the compressed
gas association (CGA)
standard (CGA G-4.1-2009
Cleaning equipment for
oxygen service, 6th ed.):

Vacuuming

Steam water
cleaning

Packaging

Personal safety



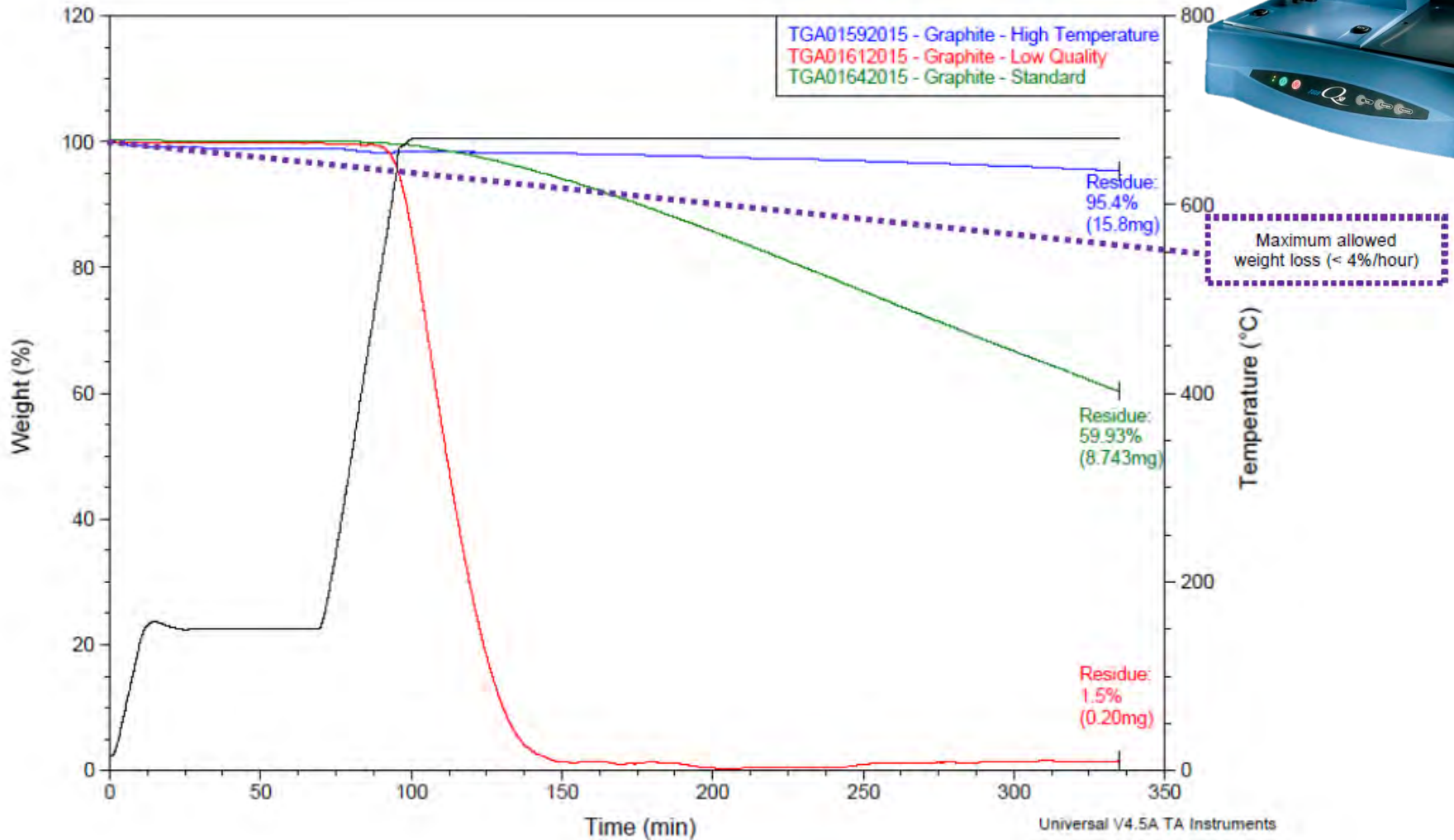
Packaging

"CLEANED FOR OXYGEN SERVICE"
"DATE OF INSPECTION: ~~MAY, 06 2016~~"
BAM REFERENCE NUMBER: ~~2-2930/2014 E~~
"DO NOT OPEN UNTIL READY TO USE"
"DO NOT USE IF THE PLASTIC PACKAGE IS OPEN"
"OXYGEN SERVICE - ONLY OPEN IN CLEAN ROOM"



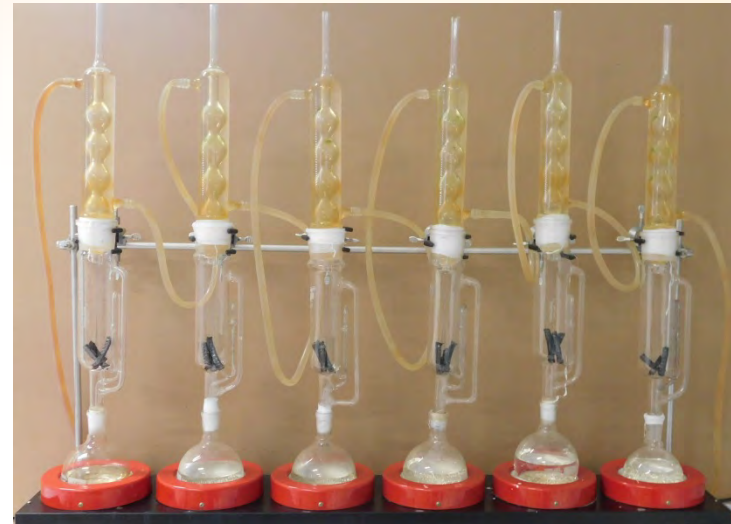
Thermal Analysis

Thermogravimetric analyzer (TGA) - model TA Q500

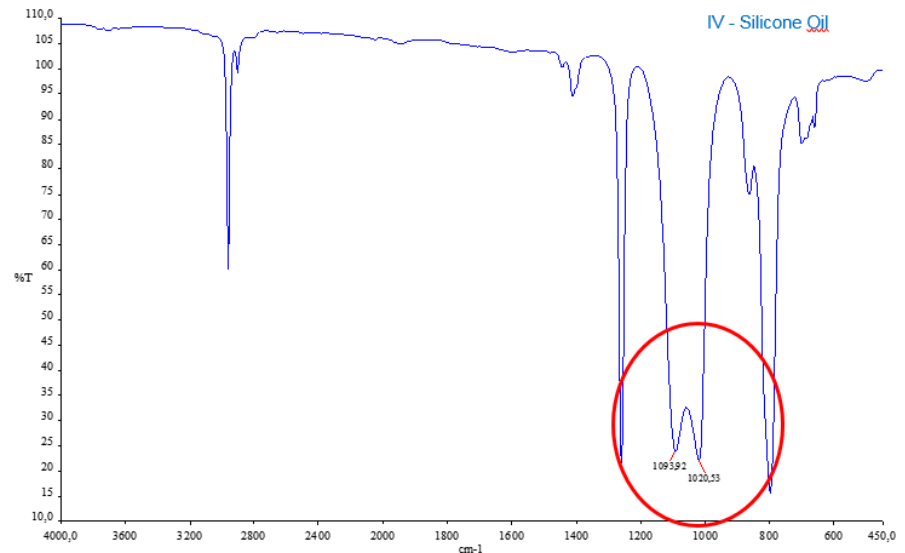


Extraction Testing

	Sample OX	Sample Regular
1 st Determination	0,08	1,26
2 nd Determination	0,09	1,29
3 th Determination	0,07	1,35
Average (%)	0,08	1,30



Specification is less than 0.5 wt % of oils or organic substances



BAM Testing

- Gaseous O₂ test
 - Pressure burst: up to xxx bar (reaction)
 - Temperature: Specified
- AIT
 - Pressure: up to ignition (or above defined max.)
 - Temperature: up to 500°C
- Liquid O₂
- Falling Hammer –mm high

BAM Test Results Summary

Packing tested for gaseous oxygen and for liquid oxygen service.

MAXIMUM TEMPERATURE	MAXIMUM OXYGEN PRESSURE
UP 60C	210 BAR
>60 UP TO 300C	140 BAR

For liquid oxygen service no pressure limit.

Emissions Evaluation



Teadit Research and Development

Nº EF.010-R

DATA SUMMARY

Start Date: 02/03/15

Contact:		
Packing Description: GA 2238-OX		
EXP GA1-203/2		
5 rings of 1/4" cross section cut from spool and installed by Teadit		
Test Valve: 4 inch Class 300		Project #: EF.010/15 GA
Manufacturer's Recommended Packing Torque:	57.7	ft-lb
Stem Diameter:	1	inches
	1.5	inches
Number of Handwheel Turns During Cycling:	11.5	(each direction)
Stem Travel During Cycling:	3.9	inches
Cycling Speed:	33	RPM
Cycling Rate:	60	seconds per cycle
Maximum Allowable Leakage:	500	PPMv (stem static)
Test Pressure:	600	psig
Test Media:	99%	Methane

RESULTS

Number of Mechanical Cycles Completed:	1510
Number of Thermal Cycles Completed:	5
Number of Packing Adjustments Required:	0

	Stem Seal Leakage Readings (PPMv)	
	Static Reading (PPMv)	Stem Torque (ft-lb)
Average:	36	56
Maximum:	94	76



Valve World Conference 2016

Conclusion

With extreme care in all operational steps which includes tough controls for production, storage, distribution and use, comply with the compressed gas association (CGA) standard (CGA G-4.1-2009 Cleaning equipment for oxygen service), is possible to produced packing for high temperature and pressure oxygen service.

VALVE STEM PACKING FOR OXYGEN SERVICE

Thanks!

Carlos D. Girão
Managing Director
Teadit Packing & Gaskets
cdgirao@teadit.in

Luiz P. Romano
R&D Manager
Teadit Industria e Comercio
luiz.paulo@teadit.com.br

