
**Gas cylinders — Design, construction
and testing of refillable composite gas
cylinders and tubes —**

Part 2:

**Fully wrapped fibre reinforced
composite gas cylinders and tubes up
to 450 l with load-sharing metal liners**

*Bouteilles à gaz — Conception, construction et essais des tubes et
bouteilles à gaz rechargeables en matériau composite —*

*Partie 2: Tubes et bouteilles à gaz entièrement bobinés en matériau
composite renforcés de fibres et d'une contenance allant jusqu'à 450 l
avec liners métalliques structuraux*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols	4
5 Inspection and testing	4
6 Materials	4
6.1 Liner materials.....	4
6.2 Composite materials.....	5
7 Design and manufacture	5
7.1 General.....	5
7.2 Design submission.....	6
7.3 Manufacturing.....	7
8 Type approval procedure	8
8.1 General requirements.....	8
8.2 Prototype tests.....	8
8.3 New design.....	9
8.4 Design variants.....	10
8.5 Type approval test procedures and criteria.....	13
8.5.1 Proof pressure test.....	13
8.5.2 Hydraulic volumetric expansion test.....	13
8.5.3 Liner burst test.....	14
8.5.4 Cylinder burst test.....	14
8.5.5 Ambient cycle test.....	15
8.5.6 Environmental cycle test.....	17
8.5.7 Flaw test.....	18
8.5.8 Drop/impact test.....	19
8.5.9 High velocity impact (gunfire) test.....	23
8.5.10 Fire resistance test.....	24
8.5.11 Salt water immersion test.....	26
8.5.12 Torque test.....	27
8.5.13 Environmentally assisted stress rupture test.....	27
8.5.14 Resin shear strength.....	27
8.5.15 Glass transition temperature.....	28
8.6 Failure of type approval tests.....	28
9 Batch inspection and testing	28
9.1 Liner.....	28
9.2 Failure of liner batch tests.....	29
9.3 Overwrap materials.....	29
9.4 Composite cylinder.....	29
9.5 Cylinder failure during type approval or batch testing.....	30
10 Cylinder marking	31
10.1 General.....	31
10.2 Additional marking.....	31
Annex A (informative) Examples of design approval certificate	32
Annex B (informative) Specimen test reports	33
Annex C (informative) Test report for equivalency	36