

---

---

**Pumps — Shaft sealing systems for  
centrifugal and rotary pumps**

*Pompes — Dispositifs d'étanchéité de l'arbre pour pompes centrifuges  
et rotatives*



Reference number  
ISO 21049:2004(E)

© ISO 2004

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword.....	vi
Introduction .....	vii
<b>1</b> <b>Scope</b> .....	<b>1</b>
<b>2</b> <b>Normative references</b> .....	<b>1</b>
<b>3</b> <b>Terms and definitions</b> .....	<b>3</b>
<b>4</b> <b>Sealing systems</b> .....	<b>10</b>
<b>4.1</b> <b>Seal categories, types and arrangements</b> .....	<b>10</b>
<b>4.1.1</b> <b>General</b> .....	<b>10</b>
<b>4.1.2</b> <b>Seal categories</b> .....	<b>10</b>
<b>4.1.3</b> <b>Seal types</b> .....	<b>11</b>
<b>4.1.4</b> <b>Seal arrangements</b> .....	<b>11</b>
<b>4.1.5</b> <b>Seal orientations</b> .....	<b>12</b>
<b>4.2</b> <b>Objectives</b> .....	<b>12</b>
<b>4.3</b> <b>Specifying and/or purchasing a sealing system</b> .....	<b>12</b>
<b>5</b> <b>General</b> .....	<b>19</b>
<b>5.1</b> <b>Unit responsibility</b> .....	<b>19</b>
<b>5.2</b> <b>Dimensions</b> .....	<b>20</b>
<b>6</b> <b>Design requirements</b> .....	<b>20</b>
<b>6.1</b> <b>Common design requirements (all categories)</b> .....	<b>20</b>
<b>6.1.1</b> <b>General information</b> .....	<b>20</b>
<b>6.1.2</b> <b>Seal chamber and gland plate</b> .....	<b>23</b>
<b>6.1.3</b> <b>Cartridge seal sleeves</b> .....	<b>30</b>
<b>6.1.4</b> <b>Mating rings</b> .....	<b>32</b>
<b>6.1.5</b> <b>Flexible elements</b> .....	<b>34</b>
<b>6.1.6</b> <b>Materials</b> .....	<b>34</b>
<b>6.2</b> <b>Design requirements (category-specific)</b> .....	<b>38</b>
<b>6.2.1</b> <b>Category 1 seals</b> .....	<b>38</b>
<b>6.2.2</b> <b>Category 2 seals</b> .....	<b>39</b>
<b>6.2.3</b> <b>Category 3 seals</b> .....	<b>40</b>
<b>7</b> <b>Specific seal configurations</b> .....	<b>41</b>
<b>7.1</b> <b>Arrangement 1 seals</b> .....	<b>41</b>
<b>7.1.1</b> <b>Seal sleeves</b> .....	<b>41</b>
<b>7.1.2</b> <b>Seal chamber and gland plate</b> .....	<b>41</b>
<b>7.2</b> <b>Arrangement 2 seals</b> .....	<b>41</b>
<b>7.2.1</b> <b>General</b> .....	<b>41</b>
<b>7.2.2</b> <b>Seal sleeves</b> .....	<b>42</b>
<b>7.2.3</b> <b>Seal chamber and gland plates</b> .....	<b>42</b>
<b>7.2.4</b> <b>Contacting wet seals with a liquid buffer fluid (2CW-CW)</b> .....	<b>43</b>
<b>7.2.5</b> <b>Seal chamber and gland plates for contacting wet inner seal with a dry-running containment seal (2CW-CS)</b> .....	<b>43</b>
<b>7.2.6</b> <b>Seal chamber and gland plates for non-contacting inner seal with a dry-running containment seal (2NC-CS)</b> .....	<b>44</b>
<b>7.3</b> <b>Arrangement 3 seals</b> .....	<b>44</b>
<b>7.3.1</b> <b>General</b> .....	<b>44</b>
<b>7.3.2</b> <b>Seal sleeves</b> .....	<b>45</b>
<b>7.3.3</b> <b>Seal chamber and gland plates</b> .....	<b>45</b>
<b>7.3.4</b> <b>Contacting wet seal configurations with a liquid barrier fluid (3CW-FB, 3CW-FF, 3CW-BB)</b> .....	<b>45</b>