

# DIN EN ISO 10439-4:2015-05 (E)

**Petroleum, petrochemical and natural gas industries - Axial and centrifugal compressors and expander-compressors - Part 4: Expander-compressors (ISO 10439-4:2015); English version EN ISO 10439-4:2015**

---

## Contents

Page

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms, abbreviated terms, and definitions</b> .....	<b>1</b>
<b>4 General</b> .....	<b>1</b>
4.1 Dimensions and units.....	1
4.2 Statutory requirements.....	1
4.3 Unit responsibility.....	2
4.4 Basic design.....	2
4.5 Materials.....	2
4.6 Casings.....	2
4.6.1 Pressure-containing casings.....	2
4.6.2 Casing repairs.....	3
4.6.3 Material inspection of pressure containing parts.....	3
4.6.4 Pressure casing connections.....	3
4.6.5 Casing support structures.....	3
4.6.6 External forces and moments.....	3
4.6.7 Variable nozzles and heat shields.....	3
4.7 Rotating elements.....	4
4.7.1 General.....	4
4.7.2 Shaft sleeve.....	4
4.7.3 Shafts.....	4
4.7.4 Impellers.....	5
4.8 Dynamics.....	5
4.8.1 Vibration balancing.....	5
4.9 Bearings and bearing housings.....	6
4.9.1 General.....	6
4.9.2 Hydrodynamic radial bearings.....	7
4.9.3 Hydrodynamic thrust bearings.....	7
4.9.4 Bearing housings.....	7
4.10 Expander-compressor shaft seals.....	8
4.11 Integral gearing.....	8
4.12 Nameplates and rotation arrows.....	8
<b>5 Accessories</b> .....	<b>8</b>
5.1 Drivers.....	8
5.2 Couplings and guards.....	9
5.3 Lubrication and sealing systems.....	9
5.4 Mounting plates.....	9
5.5 Controls and instrumentation.....	9
5.5.1 Vibration and position monitoring.....	9
5.5.2 Hydrodynamic bearings.....	9
5.5.3 Magnetic bearings.....	9
5.5.4 Overspeed shutdown system.....	10
5.5.5 Permanent strainer.....	11
5.6 Piping and appurtenances.....	11
5.7 Special tools.....	12

**6 Inspection, testing, and preparation for shipment**..... **12**  
6.1 General..... 12  
6.2 Inspection..... 12  
6.3 Testing..... 12  
6.3.1 General..... 12  
6.3.2 Wheel shaker test..... 12  
6.3.3 Mechanical running test..... 12  
6.3.4 Assembled machine gas leakage test..... 14  
6.3.5 Optional tests..... 14  
6.4 Preparation for shipment..... 15

**7 Supplier’s data**..... **15**  
7.1 General..... 15  
7.2 Proposals..... 16  
7.2.1 Technical data..... 16  
7.3 Contract data..... 16  
7.3.1 General..... 16  
7.3.2 Curves and data sheets..... 16

**Annex A (normative) Datasheets**..... **17**  
**Annex B (informative) Vendor (Supplier) data and drawing requirements (VDDR)**..... **23**  
**Annex C (informative) Nomenclature**..... **33**  
**Annex D (informative) Typical materials**..... **35**  
**Annex E (informative) Inspector’s checklist**..... **41**  
**Annex F (informative) Nozzle forces and moments**..... **46**  
**Annex G (informative) Lubrication and sealing requirements**..... **50**  
**Bibliography**..... **52**