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Standards

Standard Recommendation  
S.R. CEN/TR 13931:2009

# Rotodynamic pumps - Forces and moments on flanges - Centrifugal, mixed flow and axial flow horizontal and vertical shafts pumps

## S.R. CEN/TR 13931:2009

*Incorporating amendments/corrigenda/National Annexes issued since publication:*  
CEN/TR 13931:2009/AC:2010

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English version  
Version Française  
Deutsche Fassung

Rotodynamic pumps - Forces and moments on flanges - Centrifugal, mixed  
flow and axial flow horizontal and vertical shafts pumps

Pompes rotodynamiques - Forces et  
moments applicables aux brides - Pompes  
centrifuges, hélico-centrifuges et hélices à  
axes horizontal et vertical

Rotodynamische Pumpen - Zulässige  
Flanschenkräfte und Momente -  
Kreiselumpen, Halbaxialaufpumpen und  
Axialpumpen mit horizontaler und vertikaler  
Achse

This corrigendum becomes effective on 23 June 2010 for incorporation in the three official language versions of the TR.

Ce corrigendum prendra effet le 23 juin 2010 pour incorporation dans les trois versions linguistiques officielles du TR.

Die Berichtigung tritt am 23.Juni 2010 zur Einarbeitung in die drei offiziellen Sprachfassungen des TR in Kraft.

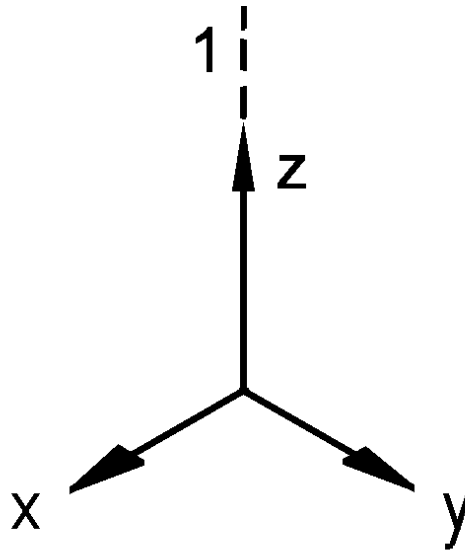


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**1 Modification to 6.2, Calculation of maximum permissible forces and moments**

Replace the figure in Table 6 (1<sup>st</sup> line, 1<sup>st</sup> column) with the following: "



".

English Version

Rotodynamic pumps - Forces and moments on flanges -  
Centrifugal, mixed flow and axial flow horizontal and vertical  
shafts pumps

Pompes rotodynamiques - Forces et moments applicables  
aux brides - Pompes centrifuges, hélico-centrifuges et  
hélices à axes horizontal et vertical

Rotodynamische Pumpen - Zulässige Flanschenkräfte und  
Momente - Kreiselpumpen, Halbaxialaufpumpen und  
Axialpumpen mit horizontaler und verticaler Achse

This Technical Report was approved by CEN on 13 October 2008. It has been drawn up by the Technical Committee CEN/TC 197.

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## **Foreword**

This document (CEN/TR 13931:2009) has been prepared by Technical Committee CEN/TC 197 "Pumps", the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CR 13931:2000.

The pumps families are numbered sequentially, leaving room for the inclusion of additional types if required at a later date:

- horizontal shaft pumps: N° 1 to 8<sup>1</sup>;
- vertical shaft pumps: N° 20 to 36<sup>1</sup>.

The pump families are described and illustrated in Tables 2 and 5.

Annexes A and B are for information only.

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1 Numbers 9 to 19 are reserved for potential new families of pumps.

## **1 Scope**

This CEN Technical Report provides information for the calculation of maximum permissible forces and moments allowed on the flanges of various types of horizontal and vertical shaft rotodynamic pumps, caused by the reaction to pipework that is rigidly connected to the installation. This document does not take into account the effect of any elastic or deformable linkages, such as bellows, elastic joints, self butting sliding joints, etc.

This CEN Technical Report is not applicable to multistage monobloc pumps, whose outlets are remote from the installation plane, or to horizontal shaft pumps mounted vertically for installation reasons, such as, fixing to a vertical wall.

## **2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 22858, *End-suction centrifugal pumps (rating 16 bar) - Designation, nominal duty point and dimensions (ISO 2858:1975)*

EN ISO 5199:2002, *Technical specifications for centrifugal pumps - Class II (ISO 5199:2002)*

API 610, *Centrifugal pumps for general refinery service*

## **3 Responsibilities of manufacturer and purchaser**

### **3.1 General**

The manufacturer should inform the purchaser of the family to which the equipment offered belongs.

The purchaser should calculate the loads applied to the pump at its flanges, considered for all possible relevant conditions (at ambient temperature, at operating temperature, at rest, under pressure).

The purchaser should ensure that the values of these loads do not exceed the corresponding calculated limits for the pump selected. If they do, the pipework should be modified to reduce the loads, or a different type of pump, capable of withstanding higher loads, shall be selected.

Both parties should agree on the type of baseplate to be provided (conventional, reinforced, concrete, etc.).

The basic values given in Tables 2 and 5 and Annex B correspond to the most common sizes of pumps; for larger sizes of pumps, the manufacturer shall indicate the limiting values.

### **3.2 Design considerations**

Excessive loads transmitted to a pump by the piping can compromise smooth running and reduce the life of the pump, the coupling and perhaps the motor bearings, increase the demand for maintenance and, in the extreme, will cause failure. These adverse effects result from two distinct causes:

- displacement of the pump shaft end relative to that of the driver. The misalignment will overload the pump and driver bearings and, when a flexible coupling is used, increase its rate of wear.



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