

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.

Third edition  
2012-12-15

---

---

---

## Petroleum, petrochemical and natural gas industries — Fired heaters for general refinery service

*Industries du pétrole, de la pétrochimie et du gaz naturel —  
Réchauffeurs à brûleurs pour usage général dans les raffineries*



Reference number  
ISO 13705:2012(E)

© ISO 2012

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.



## **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2012

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

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.

## Contents

Page

<b>Foreword .....</b>	v
<b>Introduction.....</b>	vi
<b>1 Scope.....</b>	1
<b>2 Normative references.....</b>	1
<b>3 Terms, definitions, abbreviated terms and symbols .....</b>	4
<b>3.1 Terms and definitions .....</b>	4
<b>3.2 Abbreviated terms and symbols.....</b>	11
<b>4 General .....</b>	12
<b>4.1 Pressure design code .....</b>	12
<b>4.2 Regulations .....</b>	12
<b>4.3 Heater nomenclature.....</b>	12
<b>5 Proposals .....</b>	16
<b>5.1 Purchaser's responsibilities.....</b>	16
<b>5.2 Vendor's responsibilities .....</b>	16
<b>5.3 Documentation .....</b>	16
<b>5.4 Final reports .....</b>	18
<b>6 Design considerations .....</b>	18
<b>6.1 Process design .....</b>	18
<b>6.2 Combustion design.....</b>	19
<b>6.3 Mechanical design.....</b>	19
<b>7 Tubes .....</b>	20
<b>7.1 General .....</b>	20
<b>7.2 Extended surface.....</b>	21
<b>7.3 Materials .....</b>	22
<b>8 Headers.....</b>	22
<b>8.1 General .....</b>	22
<b>8.2 Plug headers .....</b>	23
<b>8.3 Return bends .....</b>	24
<b>8.4 Materials .....</b>	24
<b>9 Piping, terminals and manifolds .....</b>	25
<b>9.1 General .....</b>	25
<b>9.2 Allowable movement and loads .....</b>	26
<b>9.3 Materials .....</b>	28
<b>10 Tube supports .....</b>	28
<b>10.1 General .....</b>	28
<b>10.2 Loads and allowable stress .....</b>	29
<b>10.3 Materials .....</b>	30
<b>11 Refractories and insulation .....</b>	31
<b>11.1 General .....</b>	31
<b>11.2 Brick and tile construction .....</b>	32
<b>11.3 Castable construction.....</b>	33
<b>11.4 Ceramic-fibre construction.....</b>	33
<b>11.5 Multi-component lining construction .....</b>	35
<b>11.6 Materials .....</b>	35
<b>12 Structures and appurtenances .....</b>	36
<b>12.1 General .....</b>	36

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.

<b>12.2</b>	<b>Structures .....</b>	<b>36</b>
<b>12.3</b>	<b>Header boxes, doors and ports .....</b>	<b>37</b>
<b>12.4</b>	<b>Ladders, platforms and stairways .....</b>	<b>37</b>
<b>12.5</b>	<b>Materials .....</b>	<b>38</b>
<b>13</b>	<b>Stacks, ducts and breeching .....</b>	<b>39</b>
<b>13.1</b>	<b>General.....</b>	<b>39</b>
<b>13.2</b>	<b>Design considerations .....</b>	<b>39</b>
<b>13.3</b>	<b>Design methods .....</b>	<b>41</b>
<b>13.4</b>	<b>Static design.....</b>	<b>41</b>
<b>13.5</b>	<b>Wind-induced vibration design .....</b>	<b>42</b>
<b>13.6</b>	<b>Materials .....</b>	<b>43</b>
<b>14</b>	<b>Burners and auxiliary equipment.....</b>	<b>43</b>
<b>14.1</b>	<b>Burners .....</b>	<b>43</b>
<b>14.2</b>	<b>Sootblowers .....</b>	<b>48</b>
<b>14.3</b>	<b>Fans and drivers .....</b>	<b>48</b>
<b>14.4</b>	<b>Dampers and damper controls for stacks and ducts.....</b>	<b>48</b>
<b>15</b>	<b>Instrument and auxiliary connections .....</b>	<b>49</b>
<b>15.1</b>	<b>Flue gas and air.....</b>	<b>49</b>
<b>15.2</b>	<b>Process fluid temperature .....</b>	<b>50</b>
<b>15.3</b>	<b>Auxiliary connections .....</b>	<b>50</b>
<b>15.4</b>	<b>Tube-skin thermocouples .....</b>	<b>51</b>
<b>15.5</b>	<b>Access to connections .....</b>	<b>51</b>
<b>16</b>	<b>Shop fabrication and field erection.....</b>	<b>51</b>
<b>16.1</b>	<b>General.....</b>	<b>51</b>
<b>16.2</b>	<b>Structural-steel fabrication .....</b>	<b>52</b>
<b>16.3</b>	<b>Coil fabrication .....</b>	<b>53</b>
<b>16.4</b>	<b>Painting and galvanizing .....</b>	<b>54</b>
<b>16.5</b>	<b>Refractories and insulation .....</b>	<b>54</b>
<b>16.6</b>	<b>Preparation for shipment .....</b>	<b>55</b>
<b>16.7</b>	<b>Field erection.....</b>	<b>56</b>
<b>17</b>	<b>Inspection, examination and testing.....</b>	<b>56</b>
<b>17.1</b>	<b>General.....</b>	<b>56</b>
<b>17.2</b>	<b>Weld examination .....</b>	<b>57</b>
<b>17.3</b>	<b>Castings examination .....</b>	<b>57</b>
<b>17.4</b>	<b>Examination of other components .....</b>	<b>58</b>
<b>17.5</b>	<b>Testing .....</b>	<b>59</b>
<b>Annex A</b>	<b>(informative) Equipment data sheets .....</b>	<b>61</b>
<b>Annex B</b>	<b>(informative) Purchaser's checklist .....</b>	<b>90</b>
<b>Annex C</b>	<b>(informative) Proposed shop-assembly conditions .....</b>	<b>94</b>
<b>Annex D</b>	<b>(normative) Stress curves for use in the design of tube-support elements .....</b>	<b>96</b>
<b>Annex E</b>	<b>(normative) Centrifugal fans for fired-heater systems .....</b>	<b>111</b>
<b>Annex F</b>	<b>(normative) Air preheat systems for fired process heaters .....</b>	<b>128</b>
<b>Annex G</b>	<b>(informative) Measurement of efficiency of fired process heaters .....</b>	<b>186</b>
<b>Annex H</b>	<b>(informative) Stack design .....</b>	<b>254</b>
<b>Annex I</b>	<b>(informative) Measurement of noise from fired-process heaters .....</b>	<b>264</b>
<b>Bibliography</b>	<b>.....</b>	<b>300</b>

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 13705 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This third edition cancels and replaces the second edition (ISO 13705:2006), which has been technically revised.

This is a preview of "ISO 13705:2012". Click here to purchase the full version from the ANSI store.

## **Introduction**

Users of this International Standard should be aware that further or differing requirements may be needed for individual applications. This International Standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this International Standard and provide details.

In International Standards, the SI system of units is used. Where practical in this International Standard, US Customary (USC) units are included in brackets for information.

A bullet (●) at the beginning of a clause or subclause indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on data sheets (see examples in Annex A) or stated in the enquiry or purchase order. Decisions should be indicated on a checklist (see example in Annex B).