INTERNATIONAL STANDARD

ISO 11630

First edition
1997-12-01

Cranes — Measurement of wheel alignment

Appareils de levage à charge suspendue — Mesure de l'alignement des galets

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

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.

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

International Standard ISO 11630 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 4, *Test methods*.

Annex A of this International Standard is for information only.

ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

© ISO 1997

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 the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

Cranes — Measurement of wheel alignment

1 Scope

This International Standard establishes requirements for methods of measuring the alignment of crane wheels in accordance with ISO 4310, ISO 9373 and ISO 12488-1.

The procedures given are based on the use of optical methods for measurement, however this International Standard permits the use of other methods which ensure at least an equivalent accuracy of measurements.

This International Standard applies to measurements on four-wheel cranes which move on rails (except railway cranes).

NOTE — Procedures for measurements on cranes with more than four wheels are intended for the next edition of this International Standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

2 Normative references

The following standards contain provisions, which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4310:1981, *Cranes — Test code and procedures.*

ISO 9373:1989, *Cranes and related equipment — Accuracy requirements for measuring parameters during testing.*

3 Measurement of the alignment of crane wheels in plan view

The measurement of the alignment of wheels on cranes should proceed by the following steps:

a) select the baseline for the coordinate system;

b) establish the geodetic rectangle;

c) measure distances from the sides of the geodetic rectangle to the wheels;

d) calculate actual deviations of the wheels in plane from the design position.

Measurements shall be made in accordance with ISO 4310 and ISO 9373. See also ISO 12488-1.

3.1 Selection of baseline for the coordinate system

To simplify the calculation of deviations, it is necessary to assume a base coordinate system and take measurements in reference to it.

3.1.1 From two select points on the external surface of the crane end-carriage, erect perpendiculars as shown in figure 1.

3.1.2 On the perpendicular thus erected from the crane end-carriage, measure off segments Y_0 of equal length. The theodolite should be positioned so that the direction of the collimating ray passes through the ends of the segments Y_0.

3.1.3 Taking the location of the theodolite as point O and arbitrary point of the theodolite collimating ray outside the crane as point R, then O and R will identify the direction of the x axis and serve as a base to establish the geodetic rectangle (see figure 1).

3.2 Establishing the geodetic rectangle

3.2.1 Based on the points O and R, the geodetic rectangle OPQR is established using the theodolite. The error in laying out corners of the rectangle should not exceed 6 seconds of arc.

Identify the vertices P and Q by corresponding points as shown in figure 2.

3.2.2 Measure distances OP, QR, PQ and OR. Differences in the dimensions (OP-QR) and (PQ-OR) shall not exceed

a) for cranes with span $S \leqslant 10$ m: ± 2 mm;

b) for cranes with span $S > 10$ m: ± [2 + 0,1(S – 10)] mm.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703203e5-bb03-4cf5-801e-5b9dbc7fdf58/iso-11630-1997

3.3 Measurement of distances from the sides of the geodetic rectangle to the crane wheels

3.3.1 Establish references points corresponding to the crane wheels (see figure 2) and measure distances on the sides OR and PQ of the geodetic rectangle from points O, P, Q and R to the reference points, distances X_O, X_P, X_Q and X_R.

Record the measurements in table 1.

3.3.2 Measure distances Y_{O1}, Y_{O2}, Y_{P1}, Y_{P2}, Y_{Q1}, Y_{Q2}, Y_{R1}, Y_{R2}, D_{OH}, D_{PH}, D_{QH} and D_{RH} from each crane wheel as shown in figure 2.

Record the measurements in table 1.

Table 1 — Position of crane wheels in plan view

Dimensions in millimetres

Geodetic rectangle side dimension				x-axis distance to wheels				y-axis distance to wheels								Reference dimension[1)]			
OP		PQ	QR	OR	X_O	X_P	X_Q	X_R	Y_{O1}	Y_{O2}	Y_{P1}	Y_{P2}	Y_{Q1}	Y_{Q2}	Y_{R1}	Y_{R2}	D_{OH}	D_{PH}	D_{QH}	D_{RH}
$_{OH}$, D_{RH}, D_{PH} and D_{QH} shall be as large as practical.																				

3.4 Calculation of actual deviations of crane wheels in plan view

3.4.1 Using the data in table 1, calculate the angle of deviation (in radians or per thousand) of crane wheels in plan using the equations:

$$\gamma_{O} = \frac{Y_{O1} - Y_{O2}}{D_{OH}} - \gamma; \qquad \gamma_{P} = \frac{Y_{P1} - Y_{P2}}{D_{PH}} - \gamma;$$

$$\gamma_{Q} = \frac{Y_{Q1} - Y_{Q2}}{D_{QH}} - \gamma; \qquad \gamma_{R} = \frac{Y_{R1} - Y_{R2}}{D_{RH}} - \gamma;$$

where

$$\gamma = \frac{Y_{O1} - Y_{O2} + Y_{P1} - Y_{P2} + Y_{Q1} - Y_{Q2} + Y_{R1} - Y_{R2}}{D_{OH} + D_{PH} + D_{QH} + D_{RH}}$$

3.4.2 Using the data from table 1 and the crane base length B (see figure 4) given in the crane specification, calculate deviations of the crane base, for each side of the crane from the equations:

$$\Delta e_{PQ} = B - \left[PQ - X_{P} - X_{Q} - \left(\frac{D_{PH} + D_{QH}}{2} \right) \right]$$

$$\Delta e_{OR} = B - \left[OR - X_{O} - X_{R} - \left(\frac{D_{OH} + D_{RH}}{2} \right) \right]$$

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.4.3 Using the data from table 1, calculate the misalignment of the crane wheel planes in plan view from the equations:

ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

$$\Delta F_{PQ} = \frac{Y_{P1} + Y_{P2} - Y_{Q1} - Y_{Q2}}{2}$$

$$\Delta F_{OR} = \frac{Y_{O1} + Y_{O2} - Y_{R1} - Y_{R2}}{2}$$

3.4.4 Using the data from table 1, the length of the crane span S and the crane wheel tread width S_{w} given in the crane specification, calculate deviations of the span ΔS for each pair of crane wheels

$$S_{OP} = S - \left(OP - \frac{Y_{O1} + Y_{O2} + Y_{P1} + Y_{P2}}{2} - S_{w} \right)$$

$$S_{QR} = S - \left(QR - \frac{Y_{R1} + Y_{R2} + Y_{Q1} + Y_{Q2}}{2} - S_{w} \right)$$

3.4.5 Using the data from table 1, calculate the misalignment ΔN in plan view for a pair of crane wheels

$$\Delta N_{OP} = X_{O} - X_{P}$$

$$\Delta N_{QR} = X_{Q} - X_{R}$$

4 Determination of the alignment of crane wheels in elevation profile

4.1 General

For measurements required to calculate the deviations of crane wheels in elevation profile, use the geodetic rectangle established according to the procedures given in 3.1 and 3.2.

Then, proceed with the following steps to determine the deviations of crane wheels in elevation profile:

a) measure distances from the sides of the geodetic rectangle to the crane wheels;

b) calculate the actual deviations of crane wheels from the vertical.

4.2 Measurement of distances from the sides of the geodetic rectangle to crane wheels

Measure distances T_{O1}, T_{O2}, T_{P1}, T_{P2}, T_{Q1}, T_{Q2}, T_{R1}, T_{R2}, D_{OV}, D_{RV}, D_{PV} and D_{QV} from each crane wheel as shown in figure 3.

Record the measurements in table 2.

Table 2 — Position of crane wheels in elevation profile

Dimensions in millimetres

T_{O1}	T_{O2}	T_{P1}	T_{P2}	T_{Q1}	T_{Q2}	T_{R1}	T_{R2}	D_{OV}	D_{RV}	D_{PV}	D_{QV}

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801a-5b9dbc7fdf58/iso-11630-1997

4.3 Calculation of actual deviations of crane wheels from the vertical in elevation profile

Using the data from table 2, calculate the angles of deviations δ (in radians or per thousand) of the crane wheels from the vertical in elevation profile using the equations:

$$\delta_O = \frac{T_{O1} - T_{O2}}{D_{OV}}; \qquad \delta_P = \frac{T_{P1} - T_{P2}}{D_{PV}};$$

$$\delta_Q = \frac{T_{Q1} - T_{Q2}}{D_{QV}}; \qquad \delta_R = \frac{T_{R1} - T_{R2}}{D_{RV}}.$$

5 Determination of vertical deviations of crane wheels from the horizontal

5.1 General

Before taking measurements, the crane should be positioned on a specially aligned section of the crane rails whose length is not less than that of the crane base and along which the difference in rail height does not exceed 1 mm.

In order to determine the vertical deviations of the crane wheels, proceed as follows:

a) raise one side of the crane;

b) measure perpendicular distances from the raised wheels to the rail;

c) repeat the procedure for other side of the crane;

d) calculate the actual vertical deviations of the crane wheels from the horizontal.

5.2 Procedure to raise one side of the crane

Raise one side of the crane as shown in figure 4 so that both wheels on that side are clear of the rail.

5.3 Measurement of distances from the raised wheels to the rail

The measuring instrument error shall not exceed 0,1 mm.

Measure the perpendicular distances Z_O and Z_R from the rail to the bottom of the respective wheels, as shown in figure 4.

After taking measurements, lower the raised side of the crane to its initial position and repeat the procedure for the other side of the crane to determine Z_P and Z_Q.

Record the measurements in table 3.

Table 3 — Vertical distances from the raised wheels of the crane to the rail

Dimensions in millimetres

Z_O	Z_P	Z_Q	Z_R

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5.4 Calculation of vertical deviations of the crane wheels from the horizontal position

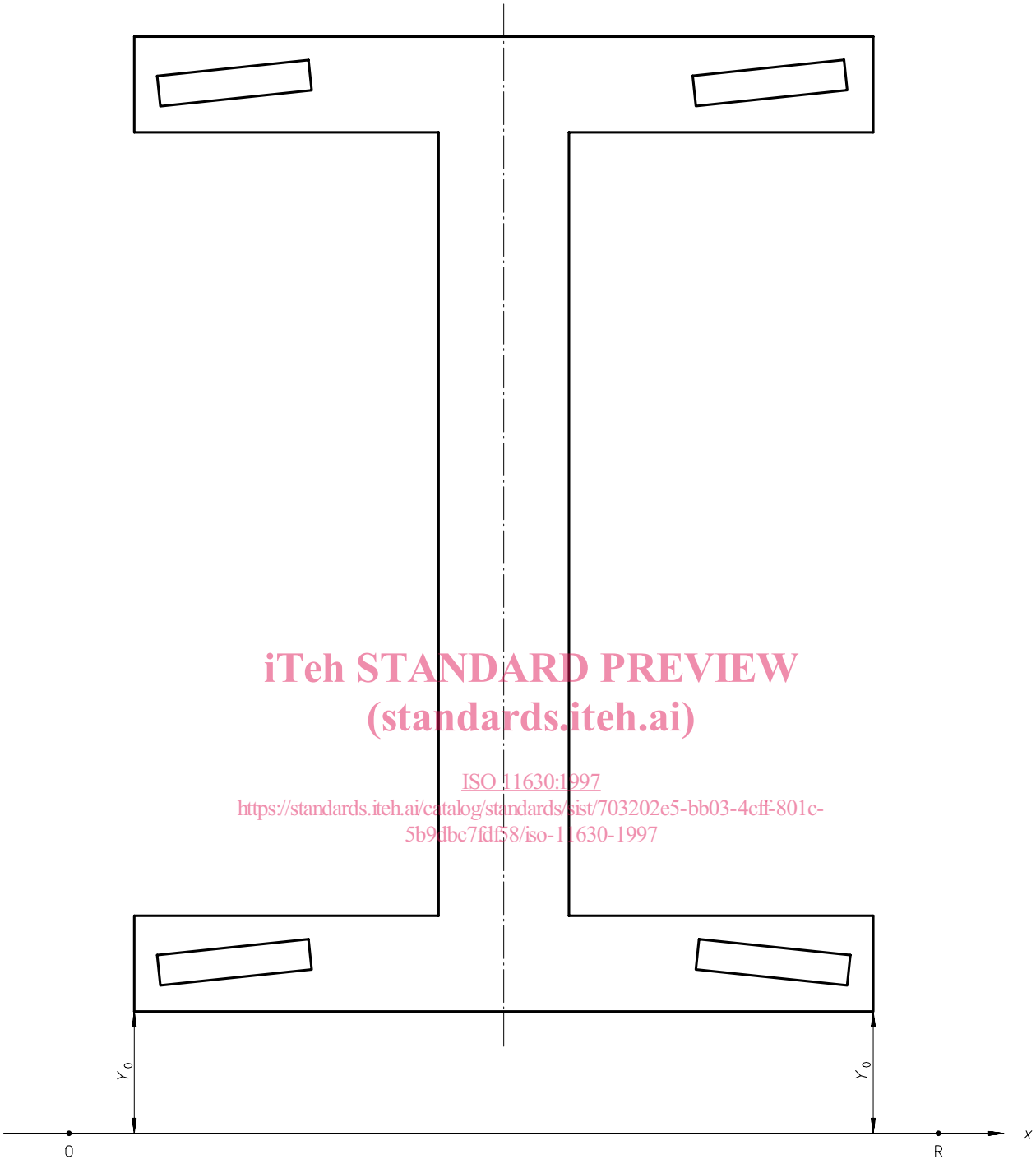
Using the data from table 3, calculate the deviations of the crane wheels from the horizontal position Δh for each side of the crane

ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

$$\Delta h_{R1} = Z_O - Z_R$$

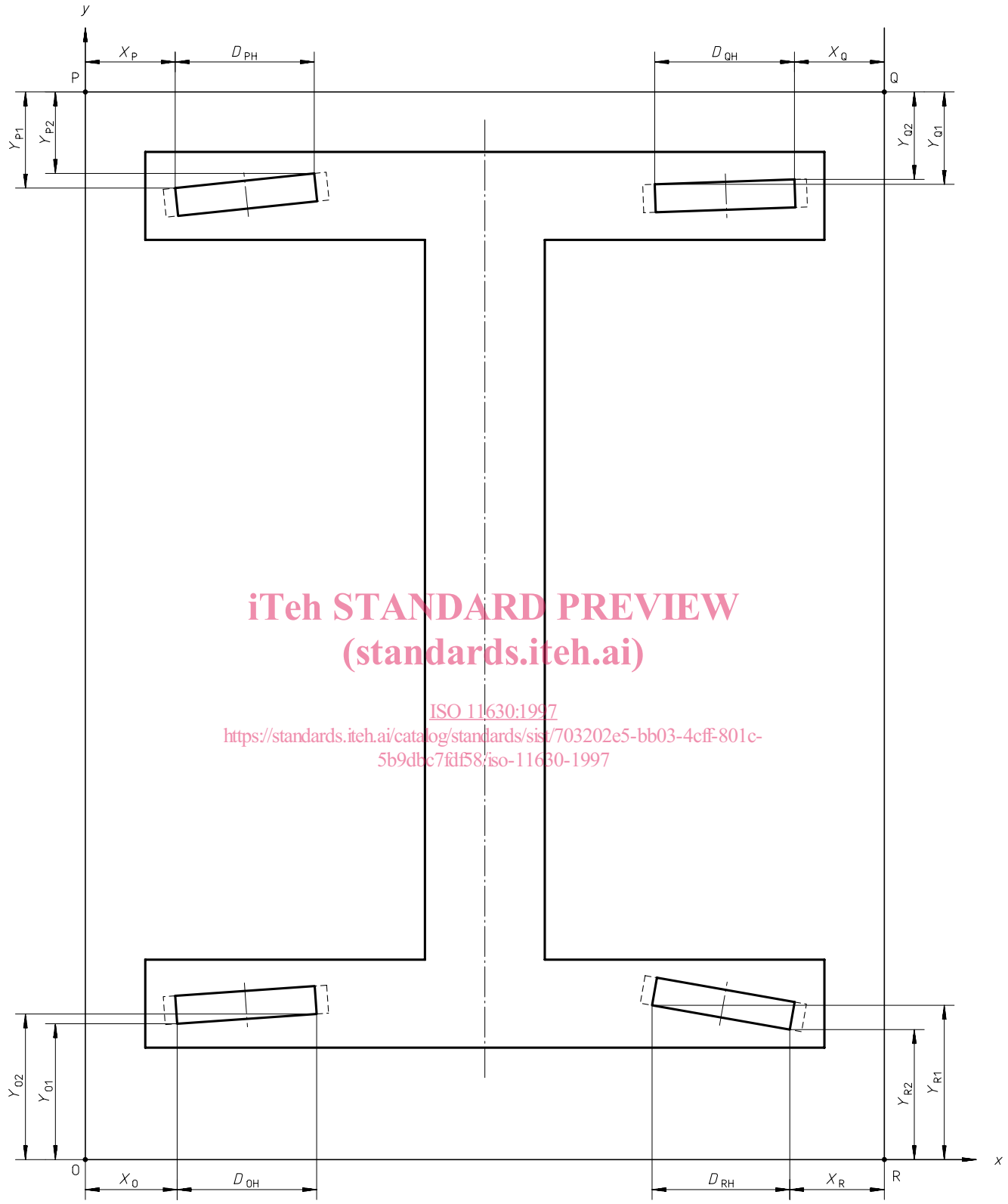
$$\Delta h_{R2} = Z_P - Z_Q$$

© ISO



iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

Figure 1



iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 11630:1997
https://standards.iteh.ai/catalog/standards/sist/703202e5-bb03-4cff-801c-5b9dbc7fdf58/iso-11630-1997

Figure 2