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Safety of machine tools for China
Recommendations for machine tool builders

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1. Preliminary remarks

1.1 Chinese standard GB 15760-2004, safety of machine tools

This standard [CHN standard] became effective 2005-07-01 with a transition period of 12 months. It states: "From 1st July 2006 the sale of products not meeting this national standard will cease."

CECIMO checked this standard, sent comments to the EC and the Chinese authorities [EU comments], and provides the recommendations in this document for the member companies of the national associations of CECIMO.

1.2 Referenced Chinese standards

The Chinese standard for safety of machine tools references a large number of further Chinese standards. Relevant standards have been translated and commented by CECIMO. The critical points of those standards are summarised [CHN references] and partly included in the recommendations of clause 2 of this document.

Critical points caused by these standards, like technical barrier to trade, started activities of CECIMO in order to overcome these problems [CECIMO actions].

The recommendations of this document are based on the assumption that the CECIMO actions mentioned had been completed successfully.

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2. Recommendations

2.1 Fulfil European safety requirements

The Chinese safety standard partly follows the aims of the European Machinery Directive, without being as specific and detailed as the Directive. Therefore we recommend fulfilling the requirements set in the European Machinery Directive.

As Chinese authorities started translating European standards for machine tool safety into Chinese we expect Chinese requirements being more in line with the European Machinery Directive in future.

The technical standards committee CEN/TC 143 published several standards in support of the Machinery Directive, where following these standards give the presumption of conformance with the Machinery Directive. Therefore we recommend using the standards of CEN/TC 143, safety of machine tools, where applicable.

The standards of CEN/TC 143, safety of machine tools, cover safety of electro discharge machines (clause 2.1.1), safety of grinding machines and grinding tools (clause 2.1.2), safety of machines for milling and drilling and for high speed milling cutters (clause 2.1.3), safety of presses (clause 2.1.4), safety of sawing machines (clause 2.1.5), safety of turning machines (clause 2.1.6), and safety of work holding chucks (clause 2.1.7).

2.1.1 Safety of electro discharge machines

• EN 12957:2001	Safety of electro discharge machines

2.1.2 Safety of grinding machines and grinding tools

• EN ISO 6103:2005	Bonded abrasive products, permissible unbalance of grinding wheels
• EN 12413:1999	Safety requirements for bonded abrasive products
• EN 13218:2002	Safety of stationary grinding machines
• EN 13236:2001	Safety requirement for superabrasives
EN 13236:2001/A1:2005	Amendment for superabrasives related to laser welded and segmented cutting-off wheels
• EN 13743:2001	Safety requirements for coated abrasives

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2.1.3 Safety of machines for milling and drilling, and for high speed milling cutters

• EN 12417:2001	Safety of machining centres
EN 12417:2001/A1:2006	Amendment for machining centres related to manual intervention during machining
• EN 12717:2001	Safety of drilling machines
• EN 13128:2001	Safety of milling machines and boring machines
EN 13128:2001/A1:2006	Amendment for milling machines related to manual intervention during machining
• EN 14070:2003	Safety of transfer and special purpose machines
• EN ISO 15641:2001	Safety requirements for high speed milling cutters

2.1.4 Safety of presses

• EN 692:2005	Safety of mechanical presses
• EN 693:2001	Safety of hydraulic presses
• EN 12622:2001	Safety of hydraulic press brakes
• EN 13736:2003	Safety of pneumatic presses
EN 13736:2003/AC 2004	Editorial corrections for pneumatic presses
• EN 13985:2003	Safety of guillotine shears

2.1.5 Safety of sawing machines

• EN 13898:2003	Safety of sawing machines for cold metal

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2.1.6 Safety of turning machines

• EN 12415:2000	Safety of small NC turning machines and turning centres
EN 12415:2000/A1:2002	Amendment for small NC turning machines related to ageing of vision panels, especially polycarbonate vision panels
• EN 12478:2000	Safety of large NC turning machines and turning centres
EN 12478:2000/AC:2001	Corrigendum for large NC turning machines related to references to other standards
• EN 12840:2001	Safety of manually controlled turning machines with or without automatic control
• EN 13788:2001	Safety of multi-spindle automatic turning machines

2.1.7 Safety of work holding chucks

• EN 1550:1997	Safety requirements for work holding chucks

2.1.8 Revision of standards

CEN standards are regularly reviewed, which may result in a revision of the standard. The standards cited in the previous clauses are valid at the issue of this document.

An updated list of published standards of CEN/TC 143, safety of machine tools, can be obtained via www.cenorm.be > business domains > technical committees > CEN/TC 143 > published standards.

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2.2 Special requirements due to sound level limits for idling machine tool

The European Machinery Directive does not set limits for noise emission, but it asks for additional data and information how to reduce noise, if the sound pressure level at the work station exceeds 70 dB(A).

The Chinese standard sets limits, which are quite high, but does not offer possibilities for exceeding these limits. The limits are:

Weight of the machine tool [1000 kp]	≤ 10	10 – 30	> 30
Noise limit for general purpose machine tool [dB(A)]	85	85	90
Noise limit for NC machine tool [dB(A)]	83	85	90

The measurements shall be taken on the "idling machine tool". The standard does not give any details on requested movements of the machine tool axes and auxiliary equipment.

2.3 Special requirements due to different anthropometric data of the Chinese population

2.3.1 Different reach

The following table shows the different reach of the upper limbs before gripping, the forearm reach, and the arm reach to the side, which differ for the 5th percentile of the Chinese population between 8 and 14 mm from the ISO values.

Symbol	Explanation	CHN value	ISO value	difference
b_2	extension of upper limbs before gripping P_5	607 mm	615 mm	-8 mm
t_2	forearm reach P_5	156 mm	170 mm	-14 mm
t_3	arm reach to the side P_5	487 mm	495 mm	-8 mm

In general machine tools are designed including aspects of service and maintenance. Therefore these different reach values should not cause any problems.

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2.3.2 Different conditions for access openings

Due to the different anthropometric data of the Chinese population some limits for access openings are different form the ISO values, see following table.

Most access openings already foresee a changeable height of the supporting surface, therefore the difference in the limits should not cause any problems.

For cases B.12, B.14, and B.16 (see following table) the difference can be bridged by a simple step, as the difference in each of these cases is just 40 mm.

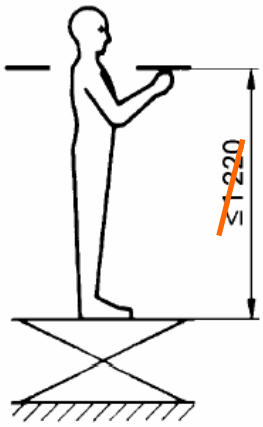
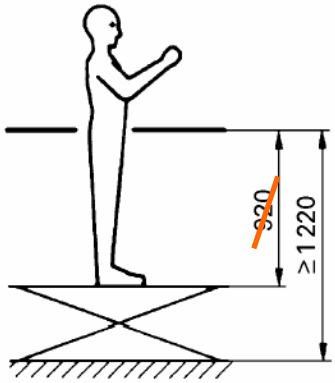
Fig.	Task	CHN value	ISO value	difference
B.4	for monitoring tasks, access opening above the supporting surface (shoulder height of small person) 	≤1190 mm	≤1220 mm	-30 mm
B.5	task to be undertaken through the opening requires the use of arms (opening below elbow of upright standing person) 	900 mm	920 mm	-20 mm

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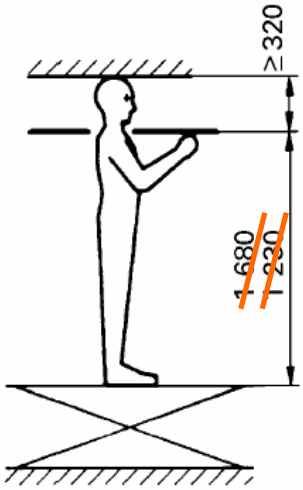
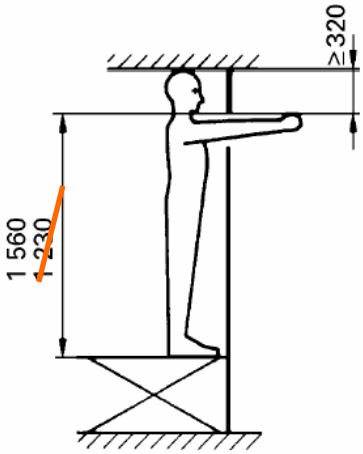
Fig.	Task	CHN value	ISO value	difference
B.6	access opening in horizontal surfaces for head, distance between horizontal surface and supporting surface 	1190 mm to 1560 mm	1230 mm to 1680 mm	-40 mm to -120 mm
B.8	access openings in vertical surfaces, height of opening from supporting surface 	1190 mm to 1560 mm	1230 mm to 1560 mm	-40 mm to 0 mm

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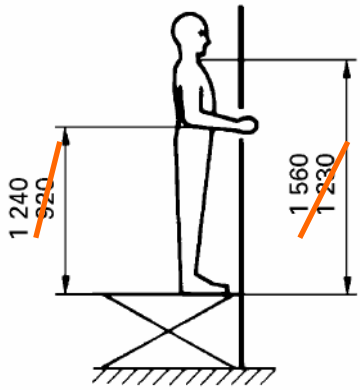
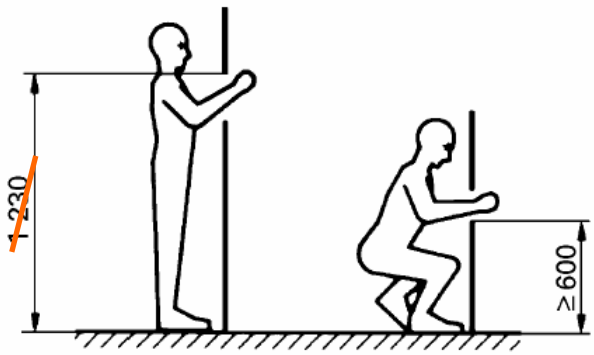
Fig.	Task	CHN value	ISO value	difference
B.11	access openings in vertical surfaces located between shoulder and elbow height with the body in an upright posture - shoulder height - elbow height 	 1190 mm to 1560 mm 900 mm to 1240 mm	 1230 mm to 1560 mm 920 mm to 1240 mm	 -40 mm to 0 mm -20 mm to 0 mm
B.12	access opening in vertical surface, shoulder height of a small person 	1190 mm	1230 mm	-40 mm

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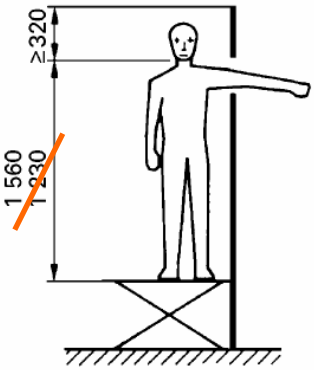
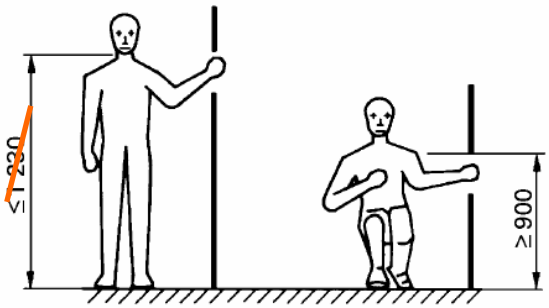
Fig.	Task	CHN value	ISO value	difference
B.13	access opening in vertical surface, shoulder height 	1190 mm to 1560 mm	1230 mm to 1560 mm	-40 mm to 0 mm
B.14	access opening in vertical surface, shoulder height of a small person 	≤1190 mm	≤1230 mm	-40 mm

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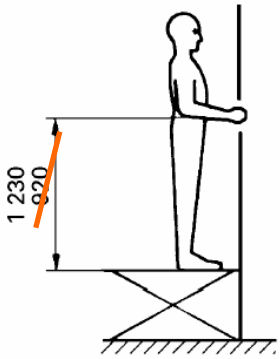
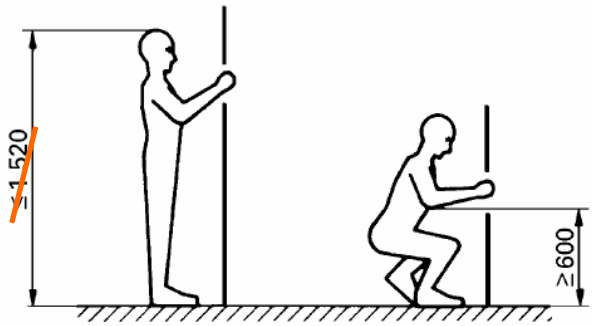
Fig.	Task	CHN value	ISO value	difference
B.15	access opening in vertical surface located between shoulder height and elbow height 	900 mm to 1230 mm	920 mm to 1230 mm	-20 mm to 0 mm
B.16	access opening in vertical surface, height of a small person 	≤1480 mm	≤1520 mm	-40 mm

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3 References

The referenced documents are available at CECIMO and labelled as follows:

[CHN standard] PDF document "[15] CHN47.final.text.en"
This is the Chinese standard GB 15760-2004, safety of machine tools.

[EU comments] PDF document "[20] GB 15760-2004 E detailed EU comments 2005-12-13"
These are the comments provided by CECIMO with first comments from China.

[CHN referenced] PDF document "[22] Report on CHN standards related to machinery"
This is the summary to referenced Chinese standards with potential problems.

[CECIMO actions] PDF document "[23] Suggested EU_CECIMO action"
These are the suggested actions in order to reduce problems with the Chinese standard.