MACHINE CATEGORY SPECIFIC GUIDELINES FOR

GRANT OF BIS CERTIFICATION AS PER "THE MACHINERY AND ELECTRICAL EQUIPMENT SAFETY (OMNIBUS TECHNICAL REGULATIONS) ORDER , 2024" UNDER SCHEME-X OF BUREAU OF INDIAN STANDARDS (CONFORMITY ASSESSMENT) REGULATIONS, 2018 – GUIDELINES FOR METAL CUTTING MACHINES

These Machine category specific Guidelines shall be used as reference document by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-X of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products notified under "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024". The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

Section of the Guidelines	Aspects dealt with
A.	Introduction
B.	Machine Category specific requirements to be submitted in Technical File of the Machines *[This section stipulates the additional Machine category specific requirements to be submitted in Technical File of the Machines, other than those specified in the General Guidelines for grant of licence]*
C.	Series/Grouping guidelines for Grant of licence/Change in Scope of licence
D.	Labelling and Marking requirements
E.	Scope of Licence
F.	Scope of Certificate of Conformity (CoC)

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CENTRAL MARKS DEPARTMENT-III

Our ref: CMD-III/OTR/Metal Cutting Machines **16 July 2025**

Subject: Machine Category Specific Guidelines for grant of BIS Certification as per "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024" under Scheme-X of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 – Guidelines for Metal Cutting Machines

This document stipulates the Machine category Specific Guidelines for Grant of Licence (GoL)/change in Scope of Licence (CSoL)/Grant of Certificate of Conformity, and are to be read in conjunction with BIS Act 2016 and Rules, Regulations framed thereunder. These guidelines are also to be read in conjunction with the general guidelines for grant of BIS Certification issued vide CMD-I/ 2:17:1 (OTR) dated 11 July 2025, as modified/revised from time to time. Any situation, in general, not covered in these guidelines is to be dealt with as per the provisions of BIS Act, Rules and Regulations by the Regional Offices (ROs) and Branch Offices (BOs).

SECTION A: Introduction

1. These Machine category Specific Guidelines shall be used for the purpose of grant of licence/change in scope of licence for "Metal Cutting Machines" specified at Sl. No. 10 of the Third Schedule of the "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024" and subsequent amendments made from time to time.

2. For the purpose of obtaining the licence/change in scope of licence from the Bureau, Manufacturer shall apply to Bureau of Indian Standards after ascertaining the scope of licence along with technical file including compliance report(s) as per the procedure defined by the Bureau of Indian Standards under the Conformity Assessment Scheme as specified in "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024" and subsequent amendments made from time to time ensuring the required number of sample(s) in respect of a product series/ range or group, as stipulated further in these Guidelines.

3. For the purpose of obtaining Certificate of Conformity (CoC) in respect of a Machine which is not intended to be manufactured on a continuous basis, from the Bureau, Manufacturer shall apply to Bureau of Indian Standards ascertaining the scope of CoC and technical file including compliance report(s), as per the procedure defined by the Bureau of Indian Standards under the Conformity Assessment Scheme as specified in "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024" and subsequent amendments made from time to time. CoC will be granted for Machines of the same Type (either Milling Machineor EDM or Turning or Presses etc.) only. The scope of CoC shall be limited to the Batch Number/Serial Nos of the Machine only and the same shall be clearly specified in the scope of CoC granted.

SECTION B. Machine specific requirements to be submitted in Technical File of the Machines:

a) General

1. Compliance to the Indian standards and Essential requirements to be submitted in the Technical file of the Machine:

i. As per the provisions of "The Machinery and Electrical Equipment Safety (Omnibus Technical Regulations) Order , 2024 (OTR)", Each machine, or as the case may be, electrical equipment specified in the first Schedule shall conform to the corresponding Indian Standards, as applicable, as given below:-
   a) Type A standards as given below: IS 16819:2018/ISO 12100:2010 (Safety of Machinery General Principles for Design- Risk Assessment and Risk Reduction and,
   b) Type B Standards –as per the second schedule of the Order;
   c) Type C Standards – as per the third Schedule of the Order:

   Provided that if a Type C standard deviates from one or more technical provisions dealt with by Type A or Type B standard, Type C standard takes precedence.

ii. For each model of the machine Applicant manufacturer shall identify the applicable Indian standard and essential requirements, and submit the same in the technical file of the machine along with the application for grant of BIS Certification.

iii. For machines, of which Type C Standard are already mapped in the Third Schedule of the OTR, compliance shall necessarily include that Standard/Essential requirement.

iv. For Machines, against which there is no Type C Standard has been mapped as of now, compliance shall necessarily include Type A Standard and Type B Standards (as identified by the manufacturer and as applicable to the machine). In such cases, Manufacturer may himself identify any one or more or Part of Type C Indian Standards available, which he thinks is/are applicable to the particular machine from the point of view of its safety. Manufacturer may submit the compliance to these standards also. In such case, compliance may be checked against these identified Standard(s) or requirements, as applicable, by BIS.

v. Indian standards and Essential requirements, as applicable, to which the Machine conform shall be specified in the Scope of licence or CoC.

2. Submission of technical file:

i) Technical file shall be submitted for each type of Machine (*Milling Machine or Electro- Discharge Machine or Turning Machine or Presses etc.*) **and for each model** of the Machine, separately.

ii) However, for any Machine type, **in case the manufacturer feels that there are number of models covered in a series, he may submit a combined technical file based on the lead model mentioning details of all models covered in the series with technical justification.** Technical file of lead model of each of the family of models shall be submitted. In the technical file of the lead model, model names/numbers, which are covered in the family shall be specified. *(Please see Section C of these Guidelines regarding family of models)*

b) Suggestive checklists for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet and their verification, for various types of Machines/Equipment:

1. **For Machines, of which Type C Standard are already mapped in the Third Schedule of the OTR**: In order to help manufacturers preparing the technical file for different types of machines, suggestive checklists for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet have been prepared by BIS based on the information contained in the respective Type C Standard. These checklists do not contain the exhaustive list and are for the purpose of guidance only. Any other hazards/Risks not listed in these checklists, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine.
    i. **Checklist for Electro-discharge Machines** based on IS 17259/ISO 28881 is given at ***Annexure-1***

    Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with Table 3 of IS 17259/ISO 28881, as applicable. These protective measures taken by the manufacturer shall be submitted to BIS. These measures may also be verified by BIS during factory visit.

    ii. **Checklist for Machining Centres, Milling Machines, Transfer Machines** based on IS 17253 (Part 1)/ISO 16090-1 is given at ***Annexure-2***

    Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with Table 3 of IS 17253 (Part 1)/ISO 16090-1, as applicable. These protective measures taken by the manufacturer shall be submitted to BIS. These measures may also be verified by BIS during factory visit.

    iii. **Checklist for Presses** based on IS 17277 (Part 1)/ISO 16092-1 is given at ***Annexure-3***

    Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with Table 1 of IS 17277 (Part 1)/ISO 16092-1, as applicable. These protective measures taken by the manufacturer shall be submitted to BIS. These measures may also be verified by BIS during factory visit.

    iv. **Checklist for Turning Machines** based on IS 17258/ISO 23125 is given at ***Annexure-4***

    Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with Table 4 of IS 17258/ISO 23125, as applicable. These protective measures taken by the manufacturer shall be submitted to BIS. These measures may also be verified by BIS during factory visit.

v. **Checklist for Sawing Machines for Cold Metal** based on IS 17254/ISO 16093 is given at ***Annexure-5***
Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with IS 17254/ISO 16093, as applicable. These measures may also be verified by BIS during factory visit.

2. **For Machines, against which there is no Type C Standard has been mapped as of now in the OTR**: In order to help manufacturers preparing the technical file for different types of machines, suggestive checklists evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet have been prepared by BIS for compliance to Type A and Type B Standards. These checklists do not contain the exhaustive list and are for the purpose of guidance only. Any other hazards/Risks not listed in these checklists, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine.
   i. **Checklist for Machines** based on IS 16819/ISO 12100 is given at ***Annexure-6***
   ii. **Checklist for Machines** based on IS 16504-1/IEC 60204-1 is given at ***Annexure-7.***

c) Compliance of the Safety related Parts of Control System (SRP/CS) for various Machines as specified in respective Type C Indian standard to be submitted in the Technical file of the Machine:

1. For Machines, of which Type C Standard are already mapped in the Third Schedule of the OTR:

i. **For Electro-discharge Machine**: Safety-related parts of control systems implementing the safety functions shall meet the requirements for the performance level and category of ISO 13849-1, as listed in Table 2 of IS 17259/ISO 28881.

ii. **For Machining Centres, Milling Machines, Transfer Machines**: safety-related parts of control systems implementing the safety functions shall meet the requirements for the performance level and category of ISO 13849-1, as specified at Cl. 5.8.6 of IS 17253 (Part 1)/ISO 16090-1.

iii. **For Presses:** safety-related parts of control systems implementing the safety functions shall meet the requirements for the performance level and category of ISO 13849-1, as required for the Machine as per IS 17277 (Part 1)/ISO 16092-1.

iv. **For Turning Machines:** safety-related parts of control systems implementing the safety functions shall meet the requirements for the performance level and category of ISO 13849-1, as required for the Machine as per IS 17258/ISO 23125.

v. **For Sawing Machines for Cold Metal:** safety-related parts of control systems implementing the safety functions shall meet the requirements for the performance level and category of ISO 13849-1, as listed in Table 2 of IS 17254/ISO 16093.

2. Machines of which there is no Type C Standard specified in the OTR, Safety-related parts of control systems (SRP/CS) implementing the safety functions shall meet the requirements for the performance level and category as required as per Risk assessment done**.**

SECTION C. Series/Grouping guidelines for Grant of licence/Change in Scope of licence:

a) General:

1. Manufacturer shall declare all the models of each type of the Machine (*Milling Machine or Electro- Discharge Machine or Turning Machine or Presses etc.*) intended to be covered in the Licence.
2. For CoC, Manufacturer shall declare Type of Machine intended to be covered in the scope of CoC. Further, Date/Month of manufacturing, Model name/number and Lot No./Batch Number along with Serial Nos. of the Machine, shall also be declared for unique identification of Machines covered in the scope of CoC.
3. **Manufacturer shall ensure that each model of the Machine conforms to the Indian standard or Essential requirements, as applicable**. However, for the purpose of demonstration of the compliance to applicable Indian Standards or the essential requirements, manufacturer may submit the Risk assessment and compliance reports of the representative model (Lead model) only as described below at sub-para (*b)*:

b) Family of models and Lead model in a family:

1. The manufacturer shall declare all the models (by name/ number/ code, as uniquely defined by the manufacturer) of the machine of each type (viz. Milling Machines, Electro-discharge Machines, Presses etc.)
2. The manufacturer shall identify and declare **Family of models** and the **lead model** in each family of models. **Lead model** represents a family of models declared by manufacturer. **While declaring a family of models, similarity of risks including Type of Hazards which are associated with the members of the family of machines shall be considered. Model posing highest risk and hence employing the maximum safety features shall be declared as the lead model of the family**.
3. For the purpose of demonstration of the compliance to applicable Indian Standards or the essential requirements, manufacturer shall submit compliance of the lead model. Technical file containing Risk assessment and compliance of this lead model shall be submitted along with application.
4. Based on the justification submitted by the manufacturer and subsequent desk-assessment and factory assessment, BIS may agree/modify/not agree to such

groupings.

5. Coverage of varieties of Machines in the scope of Machines shall be determined accordingly by BIS.
6. During operation of the licence if any new model is intended to be covered within the existing scope of licence and which are considered to be in the same family already covered, application for inclusion of all such new models (Change in scope of licence) in scope of licence along with necessary fee and technical file shall be submitted by licensee to BIS. Based on the assessment made, new models may be included in the scope of licence after review of technical file and/or factory visit. Provision of family of models and submission of technical file of the lead model, as above, may be applicable for such inclusions.

SECTION D. Labelling and Marking requirements:

a) Each machine or equipment, shall conform to the labeling and marking requirements as specified in the Scheme X of the BIS (Conformity Assessment) Regulations, 2018 and also to be complied with the safety instructions or symbols, if any required to be labeled or marked on the machinery or electrical equipment, as the case may be.

b) Each machine or equipment, shall also conform to the labeling and marking requirements including information for use, as specified in the respective Indian Standards i.e. to IS 17259/ISO 28881 for Electro-discharge Machine: to IS 17253 (Part 1)/ISO 16090-1 for **Machining Centres, Milling Machines, Transfer Machines;** to IS 17277 (Part 1)/ISO 16092-1 for Presses; to IS 17258/ISO 23125 for **Turning** Machines; to IS 17254/ISO 16093 for **Sawing Machines for Cold Metal. Machines for which there is no Type C Standard specified in the OTR, labelling and Marking requirements shall conform to IS 16819/ISO 12100 and other applicable Type B Standards.**

c) Information to be given as above shall be given at least in English language.

d) The BIS Standard Mark, as given in the Schedule of the licence, shall be marked on each machine, provided always that the product thus marked conforms to the corresponding Indian standard or Essential requirements, as applicable.

SECTION E. SCOPE OF LICENCE:

Licence is granted to use Standard Mark with following scope:

Product	**Scope of licence**	**Standard Mark**
Metal Cutting Machines	Please see Annexure attached	IS 16819:2018/ISO 12100:2010  CM/L- XXXXXXXXXX

Annexure to the scope of licence Number……..

Type of Machine/Equipment *(Milling Machine or Electro- Discharge Machine or Turning Machine or Presses etc.)*	Models covered		Conforming to Indian Standard(s) or Essential requirements
	Model number/name as uniquely identified, of the lead model in the family	Model number/name as uniquely identified, of the machines covered in the family	

Illustrative example 1 of Annexure to scope of licence (applicable for scope covering electro-discharge machine and Milling Machine):

Type of Machine/Equipment *(Milling Machine or Electro- Discharge Machine or Turning Machine or Presses etc.)*	Models covered		Conforming to Indian Standard(s) or Essential requirements
	Model number/name as uniquely identified, of the lead model in the family	Model number/name as uniquely identified, of the machines covered in the family	
Electro- Discharge Machine	LM-EDM-1	EDM-1-1	IS 16819/ISO 12100 IS 17259: 2020/ ISO 28881: 2013
		EDM-1-2	
		EDM-1-3	
Electro- Discharge Machine	LM-EDM-2	EDM-2-1	IS 16819/ISO 12100 IS 17259: 2020/ ISO 28881: 2013
		EDM-2-2	
		EDM-2-2	
Milling Machine	LM-MM-1	MM-1-1	IS 16819/ISO 12100 IS 17253 (Part 1): 2024/ISO 16090 (Part 1): 2022
		MM-1-2	
		MM-1-3	

SECTION F. SCOPE OF CERTIFICATE OF CONFORMITY (CoC):

Certificate of Conformity is granted with following scope:

Product	Scope of licence
Metal Cutting Machines	Please see Annexure attached

Annexure to the scope of Certificate of Conformity number ……..

Type of Machine/Equipment *(Either Milling Machine or Electro-Discharge Machine or Turning Machine or Presses etc.)*	Models covered		Conforming to Indian Standard(s) or Essential requirements	Lot No./ Batch no. with serial numbers of the Machine (from…to…)	Date/month of manufacturing of the Machine
	Model number/name as uniquely identified, of the lead model in the family	Model number/name as uniquely identified, of the machines covered in the family			

Illustrative example 1 for CoC:

Type of Machine/Equipment *(Either Milling Machine or Electro-Discharge Machine or Turning Machine or Presses etc.)*	Models covered		Conforming to Indian Standard(s) or Essential requirements	Lot No./ Batch no. with serial numbers of the Machine (from…to…)	Date/month of manufacturing of the Machine
	Model number/name as uniquely identified, of the lead model in the family	Model number/name as uniquely identified, of the machines covered in the family			

Milling Machine	LM-MM-1	MM-1-1	IS 16819/ISO 12100 IS 17253 (Part 1): 2024/ISO 16090 (Part 1): 2022	Batch no.- MM 01 Serial No. 001 to 200	January 2025 to March 2025
Milling Machine	LM-MM-1	MM-1-2	IS 16819/ISO 12100 IS 17253 (Part 1): 2024/ISO 16090 (Part 1): 2022	Batch no.- MM 02 Serial No. 201 to 300	January 2025 to March 2025

Illustrative example 2 for CoC:

Type of Machine/Equipment *(Either Milling Machine or Electro-Discharge Machine or Turning Machine or Presses etc.)*	Models covered		Conforming to Indian Standard(s) or Essential requirements	Lot No./ Batch no. with serial numbers of the Machine (from…to…)	Date/month of manufacturing of the Machine
	Model number/name as uniquely identified, of the lead model in the family	Model number/name as uniquely identified, of the machines covered in the family			
Electro-Discharge Machine	LM-EDM-1	EDM-1-1	IS 16819/ISO 12100 IS 17259: 2020/ ISO 28881: 2013	Batch no.- EDM 01 Serial No. 001 to 200	January 2025 to March 2025

Electro-Discharge Machine	LM-EDM-1	EDM-1-2	IS 16819/ISO 12100 IS 17259: 2020/ ISO 28881: 2013	Batch no.- EDM 02 Serial No. 201 to 300	January 2025 to March 2025

Annexure-1

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- Electro Discharge Machines (*For guidance*)

		Risk Analysis							Risk mitigation					Reference documents for complaince	Risk evaluation
		Hazard identification			Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)					Measures taken to eliminate (or) reduce risk					
	Type of Hazard	Element / Source of hazard			Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of identified type-C Standard IS 17259: 2020	Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)	Risk level/Index/Score after Risk Mitigation measures taken	Technical Documentation / Compliance report (*may contain report of visual inspection or testing or documentation analysis*)	Has the risk been adequetly reduced (Yes/No)
		Hazardous situation action	Activity	Danger zone											
1	**Mechanical hazards:**														
1.1	Acceleration, deceleration (kinetic energy of elements in controlled or uncontrolled motion): being run over, impact	Movements of machine elements, failure of the control circuit	Setting, machining and maintenance	At and near the machine					A3 to A5						
1.2	Cutting parts, sharp edges: crushing and shearing	1.2.1 Workpiece cla	Loading/unloading, reorienting	Between clamps and workpiece					A1, A2, A3						
		1.2.2 Automatic workpiece/ electrode changing	Power-operated, workpiece/ electrode change	Envelope of workpiece/electrode motion					A1, A2, A3						
		1.2.3 Moving parts (e.g. axes, rolling elements), failure of the control circuit	Manual operation/ workpiece/electrode change	Between workpiece/ electrode and machine parts					A1, A2, A3, B4						
1.3	Moving and/or rotating elements: entanglement	Manual or automatic workpiece/electrode changing, spindle rotation and wire rollers rotation, failure of the control circuit	Manual or power-operated workpiece/ electrode changing and spindle rotation	Between workpiece/ electrode and machine parts					A1, A2, A3, B4						

1.4	High-pressure: fluid injection or ejection	Hydraulic/pneumatic systems ejection, leakage, flushing and residual pressure	Setting, machining and maintenance	At and near the machine					A4							
1.5	Rough, slippery surface: slipping, tripping and falling of persons (related to machinery)	Ejection or spillage of fluids and lubricants; trailing floor-mounted or loose connection cables	During and after machining and main- tenance	Work tanks where whole-body access is possible, slippery floor and high working positions; area surround- ing the machine					A6							
1.6	Loss of stability:	Impact, trapping and/or crushing by inclination and/or falling of machine	Machine assembly, transportation, installation and commissioning	At and near the machine					A9							
2	**Electrical Hazards:**															
2.1	Live parts (direct contact): electrical shocks to persons,	Contact with workpiece/ electrode,	Process control, setting and mainte- nance	Workpiece, electrode, tooling fixture					B1, B2							
2.2	Parts that become live under fault conditions (indirect contact): electrocution of persons, effect on medical implants, shock	Contact with parts of the machine which are not live during normal operation	Maintenance and service on the gen- erator and/or the machine	At and near the machine, insulation of electrical cables and equipment					B1, B3							
3	**Thermal Hazards (Not relevant to EDM)**															
4	**Noise Hazards:**															
4.1	Manufacturing pro- cess (fluid pumps, moving and/or rotating parts, whis- tling pneumatics): hearing damage loss or other physiological disturbances	Emission of hazard- ous noise from the EDM equipment or its auxiliary devices	During operation, setting, cleaning, maintenance and repair activities	At and in the vicinity of the machine or the auxiliary devices					C1							
5	**Vibration hazards (not relevant to EDM):**															
6	**Radiation Hazards:**															
	Electro-magnetic															

6.1	radiation: effect on failure of safety-related parts of the control circuit and medical implants	Hazardous radiation imme-diately near the work area	During operation of machine and setting	In the vicinity of the machine or the auxil- iary devices					B4, B5, B6						
7	**Material/Substance Hazards:**														
7.1	Contact with or inhalation of harm-ful fluids, gases, mists and dust	Conditions near the machine caused by ejection of dielectric fluid, droplets or evaporation, mists, etc.	During the EDM pro- cess, setting, main- tenance and disposal of the machine	At and near the machine					D1 to D4						
7.2	Fire or explosion	Fire hazard originated by flammable gas bubbles or mist generation, long-lasting arcing condition, loss of dielectric fluid, fault of electrical or hydraulic power supply, failure of the control circuit, etc.	During the EDM process	In the work tank, the work area and near the machine					D4 to D12						
8	**Ergonomic Hazards:**														
8.1	Specific require-ments resulting from neglect of ergo- nomic principles	Unhealthy posture or excessive effort including the design of machines in accordance with ergonomic principles	During loading and unloading of electrode or work-piece on the EDM equipment and EDM system	At operator's position					EN 614-1 EN 614-2						
9	**Hazards associated with the environment in which the machine is used:**														
9.1	Electro-magnetic disturbances: exter nal influences on electrical equipment	Malfunction of the machine itself or electrical equip-ment due to electro-mag- netic disturbances, failure of the control circuit	Machine in opera-tion, setting and maintenance	At and in the vicinity of the machine					B4						
10	**Combination of Hazards:**														
		Malfunction resulting from power loss on the													

10.1	Failure of the external power supply and restoration of the energy supply after an interruption	machine itself and/or electrical/ pneumatic equipment, powered clamping failures and machine elements moving and/or rotating under residual forces (e.g. inertia, gravity)	All activities at the machine	At the machine and all moving elements of the machine					E1, E2, E3						

Note: This is not an exhaustive list, any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine

Annexure- 2

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- Machining Centres, Milling, Transfer Machines (*For guidance*)

Risk Analysis								Risk mitigation					Reference documents for complaince	Risk evaluation
Hazard identification				Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)										
Type of Hazard	Element / Source of hazard			Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of identified type-C Standard IS 17253: part 1: 2024	Measures taken to eliminate (or) reduce risk			Risk level/Index/Score after Risk Mitigation measures taken	Technical Documentation / Compliance report	Has the risk been adequetly reduced (Y/N)
	Cause of hazards and hazardous situation	Examples of operations, hazardous situations and hazardous areas	possible consequences						Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)			
1	**Mechanical hazards:**													
1.1	Approach of a moving element to a fixed part	Manual operations between the area of tool and parts of the machine, for milling application, especially the workpiece support or between tool and workpiece Manual operations between the areas of changing mechanisms, e.g. tool changer / workpiece changer or pallet changer	Crushing hazard Shearing hazard Drawing-in or trapping hazard					5.1, 5.2						
		Feed motion of tool to the workpiece	Crushing hazard Shearing hazard Ejected parts					5.1, 5.2						
		Manual operations near to the workpiece or machine spindle	Entanglement hazard					5.1, 5.2						
		Clamping of tools and workpieces	Crushing hazard Shearing hazard					5.2.5						
1.2	Moving elements	Operations in the near area of moving axes and in the area of automatic loading/ unloading devices	Impact hazard Drawing-in or trapping hazard					5.1, 5.2						

			during processing, setting, maintenance, repair	Crushing hazard Shearing hazard												
1.3		Rotating elements	Unintended contact with the rotating tool or rotating workpiece or tool cleaning device	Drawing-in or trapping hazard Friction or abrasion hazard					5.1, 5.2							
1.4		Cutting parts, sharp edges	Unintended contact with sharp edges of machine elements, workpiece or tool	Stabbing or puncture hazard Friction or abrasion hazard					5.1, 5.2							
1.5		Falling or ejected objects	Ejection or fall of work material and chips during machining, machine setting , tool changing, maintenance, or shut down — falling workpiece; — tool break; — ejected broken machine element(s) at or near machine	Crushing hazard Impact hazard Stabbing or puncture hazard					5.1 5.2 5.8 5.11 Annex A, Annex B							
1.6		Gravity	Falling of moving machine elements during machine setting, e.g. during tool changing or workpiece changing and weight loaded axes Breakage during operation Dropping or falling of machine elements during transport or setup, e.g. activities in the vicinity of gravity-loaded axes Operations in the area of operating platforms or pits	Crushing hazard Shearing hazard Impact hazard					5.2.5.5 5.2.5.6 Annex G							
1.7		Height in relation to the floor	Fall from high situated work places	Impact hazard Slip, trip, and fall hazards					5.14							

1.8		High pressure	At hydraulic elements during stay at or near machine, especially during installation of the machine Start-up and working on coolant systems	Penetration or impact of media under pressure into the skin/eyes					5.8.1 b) 5.8.1 c)						
1.9		Lack of stability	Unrestrained machine or machine part falls or overturns during stay at or near machine	Impact hazard Crushing hazard Shearing hazard					5.12						
1. 10		Rough, slippery surface	Operations on ground and in the area of stairs around the machine, as well as work at height due to: — ejection or spillage of metal cutting fluid, lubricants or hydraulic fluid; — residuals, contained in ejected fluids; — insufficient railing or other restraining facilities, especially	Slip, trip, and fall hazards					5.13 5.14						
2	**Electrical Hazards:**														
2.1		Live parts	Contact with live parts	Electric shock hazard					5.3						
2.2		Parts which have become live under fault	Contact with parts which are live by fault	Electric shock hazard					5.3						
3	**Thermal Hazards:**														
3.1		Objects or materials with high/low temperature	Ejection of hot swarf or workpieces during milling operation during stay at and/or near machine, and hot/cold surfaces	Burn hazard Frostbite hazard					5.6						
3.2		explosion		Burn, fall, and bump hazards					5.6 Annex E Annex F						
3.3		flame		Burn hazard					5.6 Annex E Annex F						
4	**Noise Hazards:**														
			Vibration of tools and/	Permanent hearing											

4.1		Manufacturing process and moving elements	Vibration of tool and/or work material while processing, drive and transmission elements, during stay at or near machine blowing air for cleaning	loss All further (e.g. mechanical, electrical) problems due to Interference with speech communication or acoustical signals					5.4						
5	**Vibration hazards :**														
5.1		Vibrating elements	Transfer of vibrations from the milling process to the operator	Discomfort Neurological disorder					5.7						
6	**Radiation Hazards:**														
6.1		Low- and high-frequency electromagnetic radiation	At electrical equipment, especially during setup or maintenance	Burn hazard					5.5						
6.2		Optical radiation (infrared, visible and ultraviolet),	At measuring equipment especially during setup or maintenance	Eye and skin injuries					5.5						
7	**Material/Substance Hazards:**														
7.1		Biological or microbiological substance (viral or bacterial)	Contact with contaminated coolant during stay at and/or near machine	Infection hazard					5.6						
7.2		Fluid	Skin contact with coolant, during stay at and/or near machine	Skin damage					5.6						
7.3		Mists and vapour	Inhalation and ingestion of substances used or generated during operation (e.g. coolant) during stay at and/or near machine	Difficulties of breathing, poisoning					5.6						
7.4		Combustible dust	Operating with- combustible dust, e.g. aluminium-, titan-, magnesium swarf, and/ or — flammable coolant, e.g. oily coolant	Fire Explosion hazard, burns					5.6 Annex E Annex F						
8	**Ergonomic Hazards:**														
8.1		Design or location of visual display units	Misinterpretation of displayed information at work place of operator	All further (e.g. mechanical, electrical)					5.7						

8.2		Design, location or identification of control devices	Maloperation of the machine at work place of operator	problems due to human errors					5.7							
8.3		Excessive effort	At control devices and during handling Inadequate consideration of anatomy of hand/arm or foot/leg during workpiece or tool changing Inadequate consideration of body posture during maintenance tasks	Fatigue					5.7							
8.4		Body posture		Musculoskeletal disorders					5.7							
8.5		Repetitive activities		Fatigue, Motivation for defeating of safeguarding equipment					5.7							
8.6		Visibility, local lighting	Operations during handling/positioning of work material and the tool, during loading/unloading, during machine setting, tool changing and maintenance	Judgement and accuracy of manual actions impaired Fatigue Human errors					5.7							
8.7		Human error/human behaviour	Reasonably foreseeable misuse of the machine Incorrect work material and milling tool handling and setting Insufficient design of work place and/or organization of the machining process Inadequate consideration of anatomy of hand/arm or foot/leg Faulty mounting	All above listed hazards					5. 10							
9	**Hazards associated with the environment in which the machine is used:**															
9.1		Electromagnetic interference	Uncontrolled movements (including changes in speed, unintentional,	Crushing, shearing, trapping, entanglement					5.8.8							
10	**Combination of Hazards:**															
10.1		Failure of the power supply	Fall or ejection of moving machine elements or clamped workpiece or tool Failure of stopping moving elements	Crushing hazard					5.8, 5.9							

10.2		Restoration of energy supply after an interruption	Uncontrolled movements (including change of velocity) unintended/ unexpected start-up	Shearing hazard Impact hazard Cutting or severing hazard Entanglement hazard Drawing-in or Trapping hazard Stabbing or puncture hazard Friction and abrasion hazard					5.8, 5.9						
10.3		Failure/disorder of the control system	Fall or ejection of moving machine elements or clamped workpiece or tool Failure of stopping moving elements Uncontrolled movements (including change of velocity) Unintended/unexpected start-up Other hazardous situations due to failure or inadequate design of the control system						5.8, 5.9						

Note: Any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine

Annexure- 3

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- Presses (*For guidance*)

	Risk Analysis													
	Hazard identification			Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)				**Risk mitigation**					**Reference documents for complaince**	**Risk evaluation**
	Type of Hazard	Element / Source of hazard		Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of identified type-C Standard IS 17277 (Part 1): 2019	Measures taken to eliminate (or) reduce risk			Risk level/Index/Score after Risk Mitigation measures taken	Technical Documentation / Compliance report (*may contain report of visual inspection or testing or documentation analysis*)	Has the risk been adequetly reduced (Yes/No)
		Origin of Hazards	Hazardous situations on Presses						Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)			
1														
		Cutting Parts	Tooling					7.3, 7.4.2						
		Elastic elements	Maintenance on hydraulic and pneumatic elements					5.2.1, 5.2.2, 5.2.3, 5.8.3, 7.3, 7.4.2						
		Falling objects	Falling of workpiece					5.6.4, 7.3, 7.4.2						
		Gravity	Maintenance or repair/setting of the slide/ram					5.3.6, 7.3						
		Height from the ground	Maintenance, repair on the top of the press					5.5.1, 5.7, 7.3						
		High pressure	Maintennace on hydraulic and pneumatic elements					5.2.1, 5.2.2, 5.6.4, 5.8.3, 7.3						
	Mechanical hazards:	Instability	Transport, installation, operation for unfixed machines					7.2, 7.3						
		Kinetic energy	see ISO 16092-2					5.3, 7.3						

		Moving elements	All operations					5.3, 5.4, 5.5, 5.6, 7.3						
		Rotating elements	see ISO 16092-2					5.3, 5.4, 7.3						
		Rough, slippery surface	Maintenace, repair					5.7.2, 7.3						
		Stored energy	Maintenance on hydraulic and pneumatic elements, variable speed drives					5.2, 7.3						
2	**Electrical Hazards:**													
		Arc Electromagnetic phenomena Electrostatic phenomena Live parts Overload Parts which have become live under fault conditions Short circuit Thermal radiation	Setting, Machining and maintenance					5.8.1, 7.3						
3	**Thermal Hazards**													
		Objects or materials with a high or low temperature Radiation from heat sources	Hot tools, Machine parts and workpiece					5.8.2, 7.3, 7.4.2						
4	**Noise Hazards:**													
		Cavitation phenomena												

		Exhausting system Gas leaking at high speed Manufacturing process (stamping, cutting, etc.) Moving parts Scraping surfaces Unbalanced rotating parts Whistling pneumatics Worn parts	All modes of operation and maintenance situation					5.8.4, 7.3						
5	**Vibration hazards :**													
		Cavitation phenomena Misalignment of moving parts Mobile equipment Scraping surfaces Unbalanced rotating parts Worn parts	All modes of operation and maintenance situation					5.8.5, 7.3						
6	**Material/Substance Hazards:**													
		Dust Fluid Mist	All modes of operation and maintenance situation					5.8.6, 7.3						
7	**Ergonomic Hazards:**													
		Access Design or location of indicators and visual displays units Design, location or identification of control devices	All modes of operation and maintenance situation											

		Effort Flicker, dazzling, shadow, stroboscopic effect Local lighting Mental overload/underload Posture Repetitive activity Visibility	All modes of operation and maintenance situation					5.3.2, 5.3.3, 5.4, 5.5.1, 5.5.7, 5.5.8, 5.8.7, 7.3						
8	**Hazards associated with the environment in which the machine is used:**													
		Dust and fog Electromagnetic disturbance Moisture Pollution Temperature Water	All modes of operation and maintenance situation					7.3, 7.4.1						
9	**Additional requirements applicable for specific Press type, as given in relevant Type C Standard**													
	In addition to the hazards given above, additional requirements applicable for specific Press type (Hydraulic Press, Pneumatic Press, Mechanical Press), as given in relevant identified Type C Standard i.e. IS 17277 (Part 2), IS 17277 (Part 3) or IS 17277 (Part 5) shall also be identified, safety measures taken and submitted in technical file for the respective type of Press.													

Note: This is not an exhaustive list, any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine

Annexure- 4

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- Turning Machines (*For guidance*)

Risk Analysis							Risk mitigation					Reference documents for complaince	Risk evaluation
Hazard identification			Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)										
Type of Hazard	Element / Source of hazard		Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of identified type-C Standard IS 17258: 2019/ISO 23125: 2015	Measures taken to eliminate (or) reduce risk			Risk level/Index/ Score after Risk Mitigation measures taken	Technical Documentation / Compliance report (*may contain report of visual inspection or testing or documentation analysis*)	Has the risk been adequetly reduced (Yes/No)
	Hazards, hazardous situations and hazardous events	Situations on turning machines						Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)			
1	**Mechanical hazards:**												
	Acceleration, deceleration (kinetic energy)	Movements of machine ele-ments, failure of the control circuit					5.2.1.1 g) 5.2.3 a) 4) ii)						
	Angular parts						5.1.2, 5.2						
	Approach of a moving ele-ment to a fixed part						5.1.2 5.2						
	Cutting parts, sharp edges: crushing and shearing						5.1.2 5.2						
	Elastic elements High pressure: fluid injec-tion or ejection Vacuum, Gravity (stored energy) High pressure Height from the ground	Dissipation of accumu-lated energy inside the machine					5.2.4.5 b) 1) iii) 5.2.2.4 a) 1) 5.2.2.4 c) 6) 5.2.4.4 b) 5.2.4.3 a) 3) 5.2.4.4.1 c) 5.2.4.5 a) 3) 5.8 e) 1) iv) 5.8 h) 4) 5.10 d)						

		Falling objects	Falling workpiece					5.2.3						
		Moving elements: entangle ment						5.1.2 5.2						
		Rotating elements: entangle ment						5.1.2 5.2						
		Rough, slippery surface: slipping, tripping and fall-ing of persons (related to machinery)	Ejection or spillage of metal cutting fluid (metal removal fluid), lubricants or hydraulic fluid; fall of persons during access to/or at/ from the work position on large machines during setting and machining mode					5.15						
		Sharp edges						5.1.2, 5.2						
		Stability	Loss of stability					5.14						
		Assembly and installation Error of fitting	During tool workpiece clamping change					5.12 6.2.1 to 6.2.3 6.2.9						
		Operation	Restarting the machine after stopping/interru p- tion					5.1						
		Fault finding and trouble-shooting	Isolation and energy dissipation					5.8 h)						

		Falling or ejection of objects	At work clamping, during machining, at bar feed and coolant (workpiece, part of tool, swarf)					5.13 Annex A , Annex B, Annex C						
		Failure of control system	— dropping or ejection of moving parts of the machine or of a work-piece clamped by the machine — failure to stop moving parts — uncontrolled move-ments (including speed change) — unintended/ unexpected start-up — other haz-ardous events due to failure(s)					5.8 5.9 5.10 5.11						
2	**Electrical Hazards:**													
		Live parts (direct contact)	At electrical equipment during maintenance					5.3 a)						
		Parts which have become live under fault conditions (indirect contact)	At electrical equipment during setting, machin- ing and maintenance					5.3 b)						
		Short circuit	At any mode of opera- tion, in case of pene-tration of conducting substances					5.3 c)						

3	**Thermal Hazards:**													
		Explosion or flame	Working with flammable metal working fluid or pyrophoric material					5.6 c) 6.2.1 c), n), o) 6.2.8 Annex E						
		Objects or materials with a high or low temperature	At hot tools, chips and workpiece					6.2.2 c)						
4	Noise Hazards													
		Manufacturing process (stamping, cutting, etc.) and/or — moving parts, — scraping surfaces, — unbalanced rotating parts, — whistling pneumatics, — exhausting system	At any mode of operation or in maintenance situation					5.4 6.2.6 6.2.8						
5	**Radiation Hazards:**													
		Low-frequency elec-tromagnetic radiation Radio frequency elec-tromagnetic radiation	At electrical equipment during setting mode or maintenance					5.5 a) 5.8 k)						
		Optical radiation (infrared, visible and ultraviolet), including laser	At laser equipment during setting mode or maintenance					5.5 b) 6.2.1 g)						
6	**Material/Substance Hazards:**													

		Biological and microbi-ological (viral or bacterial) agent	Contact with metal cutting fluids during loading/ unloading maintenance, setting mode					5.6 b) 5.6 d) 6.2						
		Explosive, flammable, combustible	At work zone during machining					5.6 c) 6.2						
		Fume, mist, dust	At delivery system of metal cutting fluid, during setting, machining, maintenance After extinguishing system has been activated					6.2.1 m), Annex F						
7	**Ergonomic Hazards:**													
		Design or location of indicators and visual displays units	At operator's position					5.7 a) 5.7 b) 5.7 g)						
		Design, location or identification of con- trol devices	At operator's position					5.7 a) 5.7 b) 5.7 d) 5.7 f)						
		Posture, effort	At control devices and dur-ing handling of workpiece tools and machine parts					5.7 c)						
		Repetitive activity	Inadequate consideration of hand-arm or foot-leg anat-omy at workpiece or tool exchange					5.7 d)						

		Visibility, local lighting	At cutting process, during setting, handling/positio n- ing of workpiece					5.7 e)						
8	**Hazards associated with environment in which the machine is used:**													
		Electromagnetic dis- turbances	At NC control equipment during all modes of opera- tion and maintenance					5.8 k)						
		Human error, human behaviour	Workstation and/or work process design Inad- equate consideration of hand-arm or foot-leg anatomy					5.7 g) 5.7 f) 6.1 c) 6.2.4						

Note: This is not an exhaustive list, any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine
Note 2: While ensuring the safety of the machines against the hazards identified as above, Safety requirements/protective measures as applicable to the specific machine and for each applicable mode of operation, as given in Cl. 5 of IS 17258/ISO 10693, shall also be complied with. Evidence of conformity shall be submitted in the technical file of the Machine.

Annexure- 5

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- Sawing Machines for Cold Metal (*For guidance*)

	Risk Analysis														
	Hazard identification				Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)				**Risk mitigation**					**Reference documents for complaince**	**Risk evaluation**
	Type of Hazard	Element / Source of hazard			Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of identified type-C Standard IS 17254: 2019/ISO 10693: 2017	Measures taken to eliminate (or) reduce risk			Risk level/Index/Score after Risk Mitigation measures taken	Technical Documentation / Compliance report (*may contain report of visual inspection or testing or documentation analysis*)	Has the risk been adequetly reduced (Yes/No)
		Causes of hazards and hazardous situations	Examples of hazardous situations and hazard zones on sawing machines	Possible consequences						Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)			
1	**Mechanical hazards:**														
1.1		Approach of a moving component to a stationary component	Power-operated work material clamping during loading/re-orientating/ unloading work material — between clamps and work material	Crushing hazard					5.1.1 5.4.3 5.10						
			Power-operated in feed dur- ing running of the machine, during sawing process, saw- ing tool changing, mainte-nance, repair — between material and workpiece support; between fixed and moving parts of the machine	Crushing hazard					5.1.1 5.4.3						

			Power-operated and manual work material feeding during loading, unloading, machine setting, sawing tool fitting — between sawing tool and workpiece support; workpiece and workpiece support	Shearing hazard					5.4.4						
1.2		Moving parts	Moving sawing tool during operation, machine setting, sawing tool changing, mainte- nance, repair — power-operated and man- ual sawing tool feed during operation Chip transportation/eject ion — at moving machine ele- ments	Impact hazard Crushing hazard Cutting or sever- ing hazard Entanglement hazard Drawing-in or trapping hazard					5.1.1 5.4.4						
1.3		Rotating parts	At or near sawing tools or power transmission elements	Cutting or sever- ing hazard Drawing-in or trapping hazard					5.1.1 5.3 5.4						
1.4		Sharp/cutting parts	Unintended contact with the idle sawing tool while loading/unloading and/or measuring	Cutting or punc- ture hazard Abrasion hazard					5.1.1 5.3 5.4						

1.5		Falling or ejected objects	Ejection or fall of work material and swarf during running, sawing, machine setting, sawing tool changing, maintenance — falling workpiece — sawing tool break or sawing tool teeth stripping and ejection Ejected broken machine element(s) — at or near machine	Crushing hazard Impact hazard Stabbing or puncture hazard					5.1.1						
1.6		Gravity	Falling of moving machine elements during machine setting, sawing tool changing, maintenance — sawing head at column guide	Crushing hazard Impact hazard Shearing hazard cutting hazard					5.1.1						
1.7		High pressure	At hydraulic elements — during stay at or near machine	Penetration of pressurized media					5.1.3						
1.8		Stability	Unrestrained machine or machine part falls or overturns — during stay at or near machine	Impact hazard Crushing hazard					5.14						

1.9		Rough, slippery surface	Floor and stepping areas on and around machine and work material — ejection or spillage of met-alworking fluid, lubricants and hydraulic fluid — swarf and detritus en-trained in spilled fluids — inadequate railing (edge protection) or other restraint means particularly where there is a risk of falling from one level to another	Slip, trip and fall hazards					5.15						
2	**Electrical hazards:**														
2.1		Live parts	Contact with live parts during operation, machine setting, sawing tool changing, and maintenance — control and other electrical equipment	Electric shock					5.5						
2.2		Parts which have become live under fault conditions	Contact with parts which are live by fault during operation, machine setting, sawing tool changing, and maintenance — conductive parts of the machine	Electric shock					5.5						
3	**Thermal hazards:**														
		Objects or materials with high temperature	Ejection of hot swarf or work-pieces during sawing — during stay	Burn					5.1.1 5.6						
4	**Noise hazards:**														

		Manufacturing process and moving elements	Aerodynamic noise from sawing tool Vibration of sawing tool and/or work material while processing Work material handling The power generation and transmission elements — during stay at and/or near machine	Permanent hearing loss All further (e.g. mechanical, electrical) problems due to interference with speech communication Disturbance of acoustical signals					5.7						
5	**Vibration hazards:**														
		Vibrating elements	Work material or handle held by operator during running or sawing, machine or operating element	Discomfort Neurological disorder Damage of bone joints					5.8						
6	**Radiation hazard:**														
		Laser	Alignment laser	Damage of eyes					5.1.1						
7	**Material/Substance hazard:**														
7.1		Biological and microbio- logical (viral or bacterial) hazard	Contact with contaminated coolant — during stay at and/or near machine	Infection					5.9						
7.2		Liquid	Skin contact with coolant — during stay at and/or near machine	Skin damage					5.9.1						
7.3		Mists	Inhalation and ingestion of substances used or generated during operation (e.g. coolant) — during stay at and/or near machine	Difficulties of breathing Poisoning					5.9						
8	**Ergonomic hazards:**														

8.1		Design or location of visual display units	Misinterpretation of dis- played information — at workplace of operator	All further (e.g. mechanical, elec- trical) problems due to human errors					5.10.6						
8.2		Design, location or identi- fication of control devices	Maloperation of the machine — at workplace of operator						5.10.5						
8.3		Excessive effort	Feeding work material by hand into sawing tool during idle running and sawing	Fatigue					5.10.1						
8.4		Body posture		Musculoskeletal disorders					5.10.1						
8.5		Repetitive activities		Fatigue					5.10.1						
8.6		Visibility, local lighting	Judgement and accuracy of manual actions impaired during handling/positionin g of work material and sawing tools — during loading and unload- ing, during machine setting, sawing tool changing and maintenance — at load/unload and sawing tool mounting positions	Fatigue All further (e.g. mechanical, elec- trical) problems due to human errors					5.10.3						
9	**Hazards related to the operational environment of the machine:**														
		Human errors, human behaviour	Reasonably foreseeable misuse Maloperation of the machine Incorrect work material and sawing tool handling and setting	All further (e.g. mechanical, elec- trical) problems due to human errors					5.10.4						
10	**Combination of hazards:**														

10.1		Failure of the power supply	Fall or ejection of moving machine elements or clamped workpiece Failure of stopping moving elements	Crushing hazard Shearing hazard Impact hazard Cutting or severing hazard Entanglement hazard Drawing-in or trapping hazard Stabbing or puncture hazard Abrasion hazard					5.11						
10.2		Restoration of energy supply after an interruption	Uncontrolled movements (including change of velocity) unintended/unexpected start up						5.11.2						
10.3		Failure/disorder of the control system	Fall or ejection of moving machine elements or clamped workpiece Failure of stopping moving elements Uncontrolled movements (including change of velocity) unintended/unexpected start up Other hazardous situations due to failure or inadequate design of the control system						5.11						

Note 1: This is not an exhaustive list, any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine

Note 2: While ensuring the safety of the machines against the hazards identified as above, Machine-specific safegurading requirements as given in Cl. 5.3 of IS 17254/ISO 10693, as applicable to the various types of sawing machine, shall also be complied with. Evidence of conformity shall be submitted in the technical file of the Machine.

Annexure- 6

Suggestive Check list for evaluation of conformity to applicable Indian Standards and Risk Assessment Sheet- (*Machine name*) (*For guidance*)

	Risk Analysis						**Risk mitigation**						**Reference documents for complaince**	**Risk evaluation**
	Hazard identification			Risk Estimation (Using any Tool such as Risk Matrix (or) Risk Graph (or) Numerical Scoring (or) Combination of Tools as per IS/ISO/TR/ 14121-2)						Measures taken to eliminate (or) reduce risk					
	Type of Hazard	Element / Source of hazard (Please refer to Annex B of IS 16819/ ISO 12100)		Harm	Severity	Probability of occurrence of harm	Risk level/Index/Score	Relevant subclause of IS 16819/ ISO 12100	Relevant subclause of identified type-C Standard IS XXXX, if identified (Optional)	Safety by Design	Safety through additional measures (eg, guard, interlocks, CBs etc)	Safety through any other measures (including warning signs, Information for Use, etc)	Risk level/Index/ Score after Risk Mitigation measures taken	Technical Documentation / Compliance report	Has the risk been adequetly reduced (Y/N)
		Origin[a]	Potential consequences[b]												
1	**Mechanical hazards:**	□ acceleration, deceleration; □ angular parts; □ approach of a moving element to a fixed part; □ cutting parts; □ elastic elements; □ falling objects; □ gravity; □ height from the ground; □ high pressure; □ instability; □ kinetic energy; □ machinery mobility; □ moving elements; □ rotating elements; □ rough, slippery surface;	□ being run over; □ being thrown; □ crushing; □ cutting or severing; □ drawing-in or trapping; □ entanglement; □ friction or abrasion; □ impact; □ injection; □ shearing; □ slipping, tripping and falling; □ stabbing or puncture; □ suffocation.												

2	**Electrical Hazards:**	□ arc; □ electromagnetic phenomena; □ electrostatic phenomena; □ live parts; □ not enough distance to live parts under high voltage; □ overload; □ parts which have become live under fault conditions; □ short-circuit; □ thermal radiation	□ burn; □ chemical effects; □ effects on medical implants; □ electrocution; □ falling, being thrown; □ fire; □ projection of molten particles; □ shock.												
3	**Thermal Hazards**	□ explosion; □ flame; □ objects or materials with a high or low temperature; □ radiation from heat sources.	□ burn; □ dehydration; □ discomfort; □ frostbite; □ injuries by the radiation of heat sources; □ scald.												
4	**Noise Hazards:**	□ cavitation phenomena; □ exhausting system; □ gas leaking at high speed; □ manufacturing process (stamping, cutting, etc.); □ moving parts; □ scraping surfaces; □ unbalanced rotating parts; □ whistling pneumatics; □ worn parts.	□ discomfort; □ loss of awareness; □ loss of balance; □ permanent hearing loss; □ stress; □ tinnitus; □ tiredness; □ any other (for example, mechanical, electrical) as a consequence of an interference with speech communication or with acoustic signals.												

5	**Vibration hazards:**	□ cavitation phenomena; □ misalignment of moving parts; □ mobile equipment; □ scraping surfaces; □ unbalanced rotating parts; □ vibrating equipment; □ worn parts.	□ discomfort; □ low-back morbidity; □ neurological disorder; □ osteo-articular disorder; □ trauma of the spine; □ vascular disorder												
5	**Vibration hazards (not relevant to EDM):**														
6	**Radiation Hazards:**	□ ionizing radiation source; □ low frequency electromagnetic radiation; □ optical radiation (infrared, visible and ultraviolet), including laser; □ radio frequency electromagnetic radiation.	□ burn; □ damage to eyes and skin; □ effects on reproductive capability; □ mutation; □ headache, insomnia, etc.												
7	**Material/ Substance Hazards:**	□ aerosol; □ biological and microbiological (viral or bacterial) agent; □ combustible; □ dust; □ explosive; □ fibre; □ flammable; □ fluid; □ fume; □ gas; □ mist; □ oxidizer.	□ breathing difficulties, suffocation; □ cancer; □ corrosion; □ effects on reproductive capability; □ explosion; □ fire; □ infection; □ mutation; □ poisoning; □ sensitization.												

8	**Ergonomic Hazards:**	□ access; □ design or location of indicators and visual displays units; □ design, location or identification of control devices; □ effort; □ flicker, dazzling, shadow, stroboscopic effect; □ local lighting; □ mental overload/underload; □ posture; □ repetitive activity; □ visibility.	□ discomfort; □ fatigue; □ musculoskeletal disorder; □ stress; □ any other (for example, mechanical, electrical) as a consequence of a human error.												
9	**Hazards associated with the environment in which the machine is used:**	□ dust and fog; □ electromagnetic disturbance; □ lightning; □ moisture; □ pollution; □ snow; □ temperature; □ water; □ wind; □ lack of oxygen.	□ burn; □ slight disease; □ slipping, falling; □ suffocation; □ any other as a consequence of the effect caused by the sources of the hazards on the machine or parts of the machine.												
10	**Combination of Hazards:**	□ for example, repetitive activity + effort + high environmental temperature	□ for example, dehydration, loss of awareness, heat stroke												

Note: This is not an exhaustive list, any other hazards not listed above, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine. a. Origin: A single origin of a hazard can have several potential consequences.

b. Potential consequences: For each type of hazard or group of hazards, some potential consequences can be related to several origins of hazard

Annexure- 7

Suggestive Check list for evaluation of conformity to Type B Standard - IS 16504-1/IEC 60204-1 for General requirements (*For guidance*)

Clause of IEC 60204-1	Specified requirements	Whether requirement is applicable to the Machine or not applicable	Conformity (Yes/No)	Technical documentation submitted as evidence of conformity (Design document/Risk assement/ Safety function diagrams/safety validation reports/Test report/supplier test certificate etc.)
4	General Requirements			
4.1	Whether information as per Annexure B of IEC 60204-1 : 2016 is provided by the manufacturer?			
4.2	Selection of equipment			
4.2.1	Components and devices			
4.2.2	Switchgear: Compliance to IEC 61439			
4.3	Electrical supply: Whether equipment deisgned as per prscribed Electrical supply conditions?			
4.3.2	AC Supply			
4.3.3	DC Supply			
4.3.4	Whether can be categorized as special supply system?			
4.4	Physical Environment and Operating Conditions			
5	Incoming supply conductor terminations and devices for disconnecting and switching off			
5.1	Incoming supply conductor terminations			
	Identification of terminals for incoming supply connection			
5.2	Terminal for connection of the external protective conductor			
5.3	Whether supply disconneting (isolating) device provided?			
	Whether provided for each incoming supply?			
	Whether provided for each on-board power supply?			
5.3.2	Type of supply disconneting device			
5.3.3	Requirements			
5.3.4	Operating means of the supply disconnecting device			
5.3.5	Excepted circuits			
5.4	Devices for removal of power for prevention of unexpected start-up			
5.5	Devices for isolating electrical equipment			
5.6	Protection against unauthorized, inadvertent and/or mistaken connection			
6	Protection against electric shock			
6.2.2	Whether protection by enclosure?			
6.2.3	Whether protection by insulation?			
6.2.4	Whether protection against residual voltage required?			
6.2.5	Protection by barrier			
6.2.6	Protection by placing out of reach or protection by obstacles			
6.3	Fault protection			
6.3.2	Whether by prevention of occurrence of touch voltage?			
6.3.3	Whether protection by automatic disconnection of supply?			
6.4	Protection by the use of PELV			
7	Protection of equipment			
7.2	Overcurrent protection			

7.3	Protection of motors against overheating			
7.4	Protection against abnormal temperature			
7.5	Protection against the effects of supply interruption or voltage reduction and subsequent restoration			
7.6	Motor overspeed protection			
7.7	Additional earth fault/residual current protection			
7.8	Phase sequence protection			
7.9	Protection against overvoltages due to lightning and to switching surges			
7.10	Short-circuit current rating			
8	Equipotential bonding			
8.2	Protective Bonding Circuit			
8.3	Measures to restrict the effects of high leakage current			
8.4	Functional bonding			
9	Control circuits and control functions			
9.1	Control circuits			
9.1.2	Control circuit voltages			
9.1.3	Protection			
9.2	Control functions			
9.2.2	Categories of stop functions			
9.2.3	Operations			
9.2.3.4	Emergency operations (emergency stop, emergency switching off			
9.2.4	Cableless control system (CCS)			
9.3	Protective interlocks			
9.4	Control functions in the event of failure			
10	Operator interface and machine-mounted control devices			
10.1.2	Location and mounting			
10.1.3	Protection			
10.1.4	Position sensors			
10.1.5	Portable and pendant control stations			
10.2	Actuators			
10.3	Indicator lights and displays			
10.4	Illuminated push-buttons			
10.5	Rotary control devices			
10.6	Start devices			
10.7	Emergency stop devices			
10.8	Emergency switching off devices			
10.9	Enabling control device			
11	Controlgear: location, mounting, and enclosures			
11.2	Location and mounting			
11.3	Degrees of protection			
11.4	Enclosures, doors and openings			
11.5	Access to electrical equipment			
12	Conductors and cables			
12.2	Conductors			
12.3	Insulation			
12.4	Current-carrying capacity in normal service			

12.5	Conductor and cable voltage drop			
12.6	Flexible cable			
12.7	Conductor wires, conductor bars and slip-ring assemblies			
13	Wiring practices			
13.1	Connections and routing			
13.2	Identification of conductors			
13.3	Wiring inside enclosures			
13.4	Wiring outside enclosures			
13.5	Ducts, connection boxes and other boxes			
14	Electric motors and associated equipment			
15	Socket-outlets and lighting			
15.1	Socket-outlets for accessories			
15.2	Local lighting of the machine and of the equipment			
16	Marking, warning signs and reference designations			
17	Technical documentation			
18	Verification			
Annex - B	Enquiry form for the electrical equipment of machines			
Annex - C	Examples of machines covered by this part of IEC 60204			
Annex - F	Guide for the use of this part of IEC 60204			
	Note: This is not an exhaustive list, any other requirements not listed above from IEC 60204-1 or any other Type B Standard, which may be identified by the manufacturer shall also be listed and adequate safety measures shall be taken and indicated in the above check-list by the manufacturer while submitting the technical file of the Machine			