OMNISCIENT TECHNOLOGY, PUNE

Design & Manufacturing of Test Equipments / Rigs and Engineering Consultancy.

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To

M/s Endurance Transmission Ltd
(Transmission Division)
K – 226 / 1, M. I. D. C. Area Waluj,
Aurangabad – 431 136, Maharashtra, INDIA.

Sub : HIRA Study (Hazard Identification and Risk Assessment)

Dear Sir,

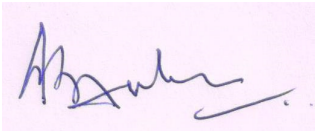
We hereby declare that ours is small proprietary unit, normally engaged in Engineering Design and Consultancy.

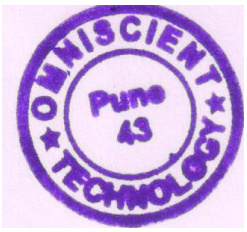
Ours is not either manufacturing unit or workshop unit, we are service unit to carry out design, development, manufacturing and AMC.
We work on AMC of our designed products, under supervision of user's team.

Therefore, herewith as below are giving / enclosing engineering equipment standard **"HIRA Study"** for reference.

Thanking you

Yours truly,
For OMNISCIENT TECHNOLOGY, PUNE





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HIRA Study

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1.1 Introduction

Hazard Identification and Risk Assessment (HIRA) The objective of hazard identification is to identify and evaluate the hazards and the unintended events, which could cause an accident. The first task usually is to identify & the hazards that are inherent to the process and/or product and then focus on the evaluation of the events, which could be associated with hazards. In hazard identification and
Quantification of probability of occurrence it is assumed that the test will perform as designed in the absence of unintended events (component and material failures, human errors, external event, process unknown), which may affect the product/process behaviour. The primary objective of this process is to provide assurance that new risks are not introduced or the existing risk profile is not increased without appropriate mitigation.

1.2 Purpose: To define guidelines for Hazard identification, Risk assessment and determination of controls.

1.3 Scope: This procedure describes specific techniques to prevent human and property losses in the operation. The overall methodology presented in this procedure allows systematic identification of hazards as well as quantification of the risks associated with the operation
of testing. Applied with due expertise and rigour the prescribed methodology can help the user understand the relative levels of hazards and risk potential in an installation. This aids the selection and prioritization of
necessary strategies for accident prevention and limiting their consequences. Therefore, the procedure can be used for improving product safety performance as well as to reduce human and property losses. Risk analysis is a process that consists of a number of sequential steps as follows:

1.4 Controlling Documents

This document is a specification under users document management system.

1.5 Review and Improvement

This specification shall be reviewed, as a minimum, every 3 years. However, Changes to the current version may be made in less than 3 years as required. Users are encouraged to participate in the ongoing improvement of this document by providing constructive feedback to the document custodian. 5

1.6 Terminology:

For the purpose of this procedure, the following technical terms used are interpreted and understood as given below.

1.6.1 Accident - A specific unplanned event or sequence of events that has undesirable consequences.

1.6.2 Basic Event - A fault tree event that is sufficiently basic that no “further development is necessary.

1.6.3 Consequence - A measure of the expected effects of an incident.

1.6.4 Explosion- A sudden release of energy characterized by accompaniment of a blast wave.

1.6.5 External Event - An event caused by a natural hazard (earthquake, flood, etc) or man-induced events (aircraft crash, -sabotage, etc).

1.6.6 Fire- A process of combustion characterized by heat or smoke or flame or any combination of these.

1.6.7 Frequency - The number of occurrences of an event per unit of time.

1.6.8 Hazard - A characteristic of the system/plant process that represents a potential for an accident causing damage to people, property or the environment.

1.6.9 .Initiating Event - The first event in an event sequence.

1.6.10 Mitigation System - Equipment and/or procedures designed to respond to an accident event sequence by interfering with accident propagation and/or reducing the accident consequence.

1.6.11 Probability - An expression for the likelihood of occurrence of an event or an event sequence during an interval of time or the likelihood of the success or failure of an event on test or on demand.

1.6.12 Risk - A measure of potential economic loss or human injury in terms of the probability of the loss or injury occurring and the magnitude of the loss or injury if it occurs.

1.6.13 Top Event - The unwanted event or incident at the top of a fault tree that is traced downward to more basic failures using logic gates to determine its causes and likelihood.

1.6.14 Worst Case Consequence - A conservative (high) estimate of the consequences of the most severe accident identified.
1.6.15 : Hazard Identification — Identifying sources of process accidents involving release of hazardous material in the atmosphere and the various -ways (that is scenarios) they could occur.
1.6.16:*Consequence Assessment* — Estimating the probable zone of impact of accidents as well as the scale and/or probability of damages with respect to human beings and plant equipment and other structures.
1.7: Roles and Responsibility: Respective Testing House or Laboratory Heads / HODs (Unless otherwise specified).
1.8: Procedure for Hazard Identification and Risk assessment and Control.
1.8.1 The Company has established, implemented and maintained a procedure for the ongoing Hazard identification, risk assessment and determination of necessary risk controls. The Procedure for Hazard identification and Risk assessment is defined below.

1.8.1 Procedure for HIRA:

Sr. No.	**Activity details / Procedure**	Responsibility
1	The sequence / flow chart of Hazard identification and Risk assessment is as follows. □ Classify the work activities □ Identify the Hazards □ Determine Risks □ Determine existing control measures □ Assess the Risk considering the probable failures in the existing risk control measures (i.e., Effectiveness of existing risk control measures) □ Decide whether the risk is tolerable □ Decide the Risk control Plan.	----------
2	Classification of work activities: Department Heads in association with the core team member shall list out routine and non-routine activities, activities of all personnel having access to the workplace (including Contractors and Visitors) in the respective department. and gather the following information wherever possible, for each work activity. □ Tasks being carried out; their duration and frequency. □ Location/s where the work is carried out. □ Who normally carries out the tasks. □ Others who may be affected by the work (e.g. visitors, contractors, the public) □ Training, that personnel have received about the tasks	User HODs/ Testing Section Heads

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	□ Work permit system for the job □ Size, shape, surface character of and weight of materials that might be handled. □ Utility services such as compressed air/steam. □ Substances used or encountered during the work □ Physical form of substances used and recommendations as per MSDS. □ Legal and other requirements. □ Records of accident/s and incident/s and analysis □ Communications from employees and other interested parties. □ Work place monitoring data. □ Control measures believed to be in place. □ Safety committee reports Note: Any interested party can request concerned department heads and he/she shall fill up the risk assessment format and the Department Head shall evaluate the same.	
3	Identify hazards and determine risks. Hazard identification and risk assessment to be pro-active rather than reactive. The broad categories of hazards are: a) **Mechanical** (Example: Fall / slip due to slippery floor, Exposure to moving / rotating parts of machine etc) b) **Electrical** (Example: Electric shocks / electrocution) c) **Substances** (Example: Direct contact with acids / chemicals). d) Fire and explosion. e) **Radiation** (Example: Exposure to X-rays etc) f) **Toxic release** (Example: Leakage of chlorine, ammonia etc) g) **Natural calamities.**(Earth quake, Floods, h) Severe wind storm, lightening etc) i) **Biological hazards** (Example: Sources of biological hazards include bacteria, viruses, insects, plants, birds, animals, and humans. These sources can cause a variety of health effects ranging from skin irritation and allergies to infections (e.g., tuberculosis, AIDS), cancer and so on.	User HODs/ Testing Section Heads
4	The following three questions enable hazard identification. a) Is there a source of harm? b) Who (or what) could be harmed? c) How could harm occur? While identifying the hazards and determining the risks, the following factors shall be considered. □ Human behaviour, capabilities and other human factors. □ Hazards originating outside the workplace capable of adversely affecting the health and safety of personnel	User HODs/ Section Heads

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	under the control of the organization within the workplace. □ Hazards created in the vicinity of the workplace by work related activities under the control of the organization. □ Infrastructure, equipment and materials at the workplace, whether provided by the organization or others. □ Changes or proposed changes in the organization, it's activities and materials. □ Modification to the OH&S Management system including temporary changes. □ Applicable legal obligations relating to risk assessment and implementation of necessary controls. □ Design of workplace, processes installations, machinery / equipment, operating procedures and work organization, including their adaptation to human capabilities.	
6	After identifying the hazards and determination of risks, carrying out risk assessment and classify the risks based on the risk priority number (RPN).	User HODs/ Section Heads
7	Hazard identification and Risk assessment shall be reviewed at least once in 6 months to keep this information up-to-date.	User HODs/ Section Heads
8	However, Hazard identification and Risk assessment shall be reviewed before implementing changes to the activity / process / equipment / existing risk control measures. Review of Risk assessment shall be carried out during the following situations. □ During changes from normal operation, new or modified process/ installation, changes in raw materials, chemicals etc, □ During expansion, contraction, restructuring □ New or modified legislation. □ New information/inputs from interested parties ***Note : Care should be taken to ensure that risk level is not increased due to the introduction of change/ modification to the existing activities, materials , equipment, processes, risk control measures***	User HODs/ Section Heads
9	The significant Risks identified by all departments are reviewed in the Management Review Meeting to identify the objectives of the organization. In addition to this, the individual departments may identify objectives in a proactive manner.	User HODs/ Section Heads
10	**Hierarchy of Risk Control measures:** While determining risk controls or considering changes to existing controls, consideration shall be given to reducing the risks according to the following hierarchy: □ ELIMINATE (REMOVE) / SUBSTITUTION	User HODs/ Testing Section Heads

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	ENGINEERING CONTROLS SIGNAGE / WARNINGS and / or ADMINISTRATIVE CONTROLS. PERSONAL PROTECTIVE EQUIPMENTS (PPEs - Last resort). **Examples:** a. **Eliminate / Substitution →** (If practicable, Eliminate the hazards altogether, or combat the risk at source….. For example→ Use a safe substance instead of dangerous one). b. **Engineering Controls →** If elimination or Substitution is not possible, try to reduce the risk through engineering controls such as Usage of low voltage electrical appliance, remote operation from enclosure. Other examples for Engineering controls are: (Machine guarding, Proper platforms, Acoustic enclosures, automation instead of manual operations) c. **Administrative controls →** (Work permit systems, Barricading, Limited access, providing training, display of signages etc). d. **PPEs →** If hazard cannot be avoided, protect yourself (Example: Helmets, Safety belts, Goggles, Nose masks, shields, Hand gloves, Gum boots, Safety shoes, Aprons etc).	

1.8.2 RISK ASSESSMENT:

A. QUALITATIVE ASSESSMENT OF RISKS:

a) **LC – Legal Concern**: The hazard or risk is addressed by applicable legal requirements such as Factories Act / State factory rules or Indian electricity rules etc.

b) **IPC – Interested Party Concern**: The hazard / Risk having a concern expressed by Employees, Neighbors, local residents. (Note: The head of the department conducts the risk assessment for any complaint received by any employee or interested party and if he feels that the risk is intolerable then the same is considered as interested party concern and the risk is treated as intolerable. Proper control measures are taken for the to reduce the risk)

c) **BC** – **Business Concern** : Any hazard and Risk which will result in:

- Fatal accidents / severe damage to human health and safety.
- Damage to property resulting in loss of Production.
- Huge financial implications.

d) E – Potential Emergency situations which result in loss or damage to humans / property / environment.(Emergency : Any situation, arising out of major fire, gas

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leak, explosion, toxic release, flooding which is likely to go out of control and requires controlling by a pre determined team. The situation may result in injury/ill health to group of employees and/or general public and/or, property damage which require mitigation of losses.

B. **Any Hazard / risk which is associated with a Legal Concern (LC), Interested Party Concern (IPC), Business Concern (BC) and Potential Emergency situations (E) are considered as Significant Risks by default.**

The following **Qualitative Risk Assessment** will be used across for maintaining consistency.

Vey High : Almost certain, occurs above 80%, in any time frame
Consequences : Potential Health / Partial Disability / Fatality Problem

High : Expected to occur 10% to 80%, chance in time frame
Consequences : First Aid Cases / Low Health / Partial Disability / Medium Fatality Problem

Medium : It could occur less than up to10%, chance in time frame
Consequences : First Aid Cases / Low Health / Partial Disability / Less Fatality Problem

Low : Not expected to occur less than up to1%, in time frame
Consequences : First Aid Cases / Low Health / Less Partial Disability

Very Low : Almost certain, it will occur greater than 0.01%, Chance in time frame
Consequences : No Health injury Risk / First Aid Cases

Imp Note : Generally Chassis Dynamometers, Clutch test Rigs or Any Test Rig for either Automotive Components or Vehicle Testing, are designed such that they normally falls in “Low” and “Very Low” qualitative risk assessment category. Those are provided all sorts of required safeties on rotating components and exposed areas by heavy duty guards. Similarly control system – drives and control panels are provided with all safety interlocks viz. mechanical, electrical, electronic as well as software