

**Appendix 4.1 OEE Measurement Procedure****OEE-measurement procedure**

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## 1 PURPOSE AND SCOPE

This OEE-measurement procedure shall be used in the event of new investment in lines or individual equipment within HKScan (OEE = Overall Equipment Effectiveness).

Calculation is as follows:

OEE-value = Availability value \* Capacity value \* Quality output value.

During test operation and after take-over at the start of the guarantee period the Supplier must prove that the Equipment fulfils the set OEE-value.

The main purpose of the measurement of OEE-value is, in the first place, to gain knowledge of and take care of any recurring faults to ensure as problem-free and cost-effective Equipment as possible and thus avoid delivery disruptions in Purchaser's manufacturing process.

The OEE-value calculation should be based on the conditions during normal operation:

- If the normal operating mode, for the Equipment is automatic operation and this is out of action, the Equipment is regarded as completely out of action even if a backup system for semi-automatic or manual operation is available.
- Performed at agreed maximum capacity.
- The test will only be performed when HKScan can produce a product as per requirement specification or another product that HKScan considers equivalent.
- HKScan's operator(s) "run" the Equipment.

If there are any special requirements with regard to maintenance, spare parts, training or documentation in order to achieve the set OEE-value, the Supplier must clearly specify this in the Agreement.

With procurement, the following is to be stated in the related requirement specification:

- Relevant period for measurement of the Equipment's availability and measurement of the Equipment's capacity.
- Set OEE-value.

## 2 RESPONSIBILITY

HKScan's Project Manager is responsible for this procedure.

## 3 OEE-VALUE

### 3.1 Measurement and calculation of the equipment's availability value

Calculation of availability is based on the following correlations:

The operating time is the measurement period specified in the related requirement specification minus pauses and downtime caused by the Purchaser or other supplier (such as due to material shortage, product shortage and machine stoppage).

Disruption time includes downtime caused by the Supplier for all unplanned disruptions within the operating time.

Using the above concepts, the availability of the Equipment is calculated according to the following formula:

$$\text{Availability} = \frac{\text{Operating time} - \text{Disruption time (caused by supplier)}}{\text{Operating time}}$$

The following is classed as disruption time caused by the Supplier:

- Normal waiting time for the Purchaser's operating and/or maintenance personnel, max. 10 minutes per instance.
- Waiting time for the Supplier's service personnel, when their presence is necessary. If the Supplier can show that the Purchaser's operating and/or maintenance personnel could have remedied the disruption by themselves based on Documentation and training provided by the Supplier or based on general know-how, the waiting time will not be counted as disruption time caused by the Supplier.
- Troubleshooting time.
- Repair time.
- Time for testing and restart.
- Time for correcting handling errors arising due to deficiencies in training or Documentation provided by the Supplier.

### 3.2 Example of calculation of the Equipment's availability value

Ordinary production time for a Production line / Equipment is between 07:00 and 14:00, with a lunch break from 12.00 to 12.45.

Example: Stoppage between 10.00 and 10.15 due to an electrical fault (caused by Supplier).

Division of time is:

Working hours	07.00 – 14.00 = 7 hours
Breaks	12.00 – 12.45 = 0.75 hours
Operating time per day	7 hours – 0.75 hour = 6.25 hours
Disruption time caused by the Supplier	10.00 – 10.15 = 0.25 hours

The Equipment's total availability value for the day is:

$$\frac{6.25 - 0.25}{6.25} = 0.96, \text{ i.e. } 96 \%$$

## 4 MEASUREMENT AND CALCULATION OF THE EQUIPMENT'S CAPACITY VALUE

The calculation is performed at agreed maximum capacity and for Equipment or piece of Equipment during the agreed period as agreed in respective Purchase Contract.

The capacity value from the OEE-calculation can never exceed 100 %.

## 5 MEASUREMENT AND CALCULATION OF THE EQUIPMENT'S QUALITY OUTPUT VALUE

The quality output value is calculated by measuring the number of units and rejects produced during an agreed period, e.g. 1000 units produced, of which 990 units are approved by the Purchaser and 10 are rejects, gives a value of  $(1000 - 10)/1000 = 0.99$ , i.e. 99 %.

## 6 OPERATION LOG

The Purchaser shall, if necessary after take-over, keep accurate notes in an operation log on operating time, disruptions and other factors of significance for calculation of the Equipment's OEE-value.

## 7 EXTENSION OF WARRANTY PERIOD

If the promised OEE-value is not achieved during each of months 22 to 24 (in a 2-year guarantee period) after the take-over, the warranty period for faults will be extended by one month at a time until, through measures by the Supplier, the promised OEE-value is achieved for three successive months. Any such extension of the warranty period may run to a maximum of 6 months.

The average value from the final three months of the extension is used as a measurement of the actual OEE-value.

**8 CONSEQUENCE IF OEE -VALUE IS NOT ACHIEVED**

If the deviation of the OEE-value is not within agreed tolerance levels as stated in the performance guarantee, the Supplier shall promptly repair or replace the failing part in accordance with paragraph 14 in HKScan General Terms and Conditions and the purchaser is entitled to liquidated damages in accordance with paragraph 12.

If the Supplier, by the time of take-over, has not been able to achieve an OEE-value of as specified in the performance guarantee for the Equipment in question, the Purchaser is entitled to terminate the Purchase Contract with cause. The Supplier must then repay the Total Price of the Equipment and pay all costs for dismantling, freight and insurance. The Purchaser has also right to claim damage according to the Agreement.

**9 LIABILITY FOR FAULTS**

The fact that the set OEE-value requirement has been achieved or that a penalty has been paid to the Purchaser does not give rise to any limitation in the Supplier's liability for faults in the Equipment.

**10 MECHANICAL CAUSES OF STOPPAGES**

Stoppages due to mechanical causes shall automatically be generated from the Equipment's own systems.