



Eda High Reach Book

(Eda High Reach Guidelines)

Preface

It is with great pleasure and satisfaction that I can present the EDA High Reach Guide.

We have worked on this project for a long time, and thanks to the dedicated work from our Technical Committee headed by Mr. Stefano Panseri, the result is ready. Throughout the work process the draft guide has been circulated among EDA members for comments and remarks, and it has been available on the EDA web-site during the last year. As a result hereof, the Technical Committee has been able to incorporate comments from both contractors and manufacturers until the very last stage of the final document.

A lot of people have been involved in continuously improving the European Guide on the usage of High Reach equipment. I would like to thank our National Associations, in particular Howard Button from NFDC, as well as our member companies, both contractors and manufacturers, who have all contributed to this important work.

A number of countries have already got their own guide, adjusted to each countries' culture and legislation, though it is my sincere hope that this guide can be helpful to those associations who still need to develop a guide, and in particular help companies in countries without national associations.

Having made this guide doesn't mean that the job is done and we can lean back and relax. As buildings are getting taller, the equipment is continuously developing accordingly, and as a result hereof we have to improve our guide and see that training programmes are developed, hopefully setting a common European standard for best practice.

I hope the guide will help to improve the health & safety on demolition sites using high reach equipment.

Yours sincerely

Yves Canessa
EDA President

Eda High Reach

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1. Introduction

(1. Introduction)

The aim of this document is to catalogue the norms and the best operational techniques which have been gathered by the primary European firms through years of experience in the field and make them available for those operators in this sector who intend to use this type of excavators.







2. Purpose of the guide

(2. Purpose of the guide)

The guide does not replace the instructions provided by the manufacturer or the training camp, but is further support for operators by providing information and guidance of good techniques. The aim of this paper is to achieve and maintain adequate standards of safety working with the high reach demolition machines. The information contained in this document should be considered indicative and should be supplemented by detailed risk assessments and the characteristics of each site.



3. Terms

(3. Terms and definitions)



DEFINITIONS OF THE TERMS USED IN THIS DOCUMENT CAN BE FOUND HERE.

Terms	Definition
Demolition excavator	Demolition excavator designed and fitted with special accessories to make it suitable for demolition work.
Demolition Excavator with high reach arm	Demolition excavator designed and fitted with special accessories to make it suitable for demolition work with operative elevation over 20m.
Tool or implement	Tool or implement mounted on the arm to perform demolition work such as primary crushers, shears for metal, or demolition hammers, subject to OEM approval.
Truck	Truck on the demolition machine composed of crawler tracks and side members.
Base machine	Section of the base demolition machine composed of cabin, fifth wheel and wagon.
Counterweight	Element usually located in the back part of the base machine with the purpose of balancing the weight and the dynamic actions of the arm.
Arms	Mobile elements interconnected with pivots, operated by hydraulic cylinders. Usually made up of multiple units which allow the elevation and use of the final tool.
Operational height of the excavator	With the machine fully extended to its maximum, the height from the tracks to the picot on the last lever before the demolition equipment, as declared by the builder.
Height of demolition	Height of the demolition area with respect to plane of site
Height of the building	Height of building with respect to plane of site
Distance to the building	Measured distance on the ground between the projection of the leaning part of the building and the track of the excavator
FOPS	Falling Object Protective Structure - cabin resistant to shocks due to falling objects, directly connected to the structure of the base machine



4. Normative

(4. Normative references)

The current European legal system doesn't take into account the demolition high reach excavators in a specific way. The construction of new machines is regulated by the European Directives 98/37/CE, 2006/42/CE and the harmonised standards EN 474-1/5.



5. on

(5. Operational applications)

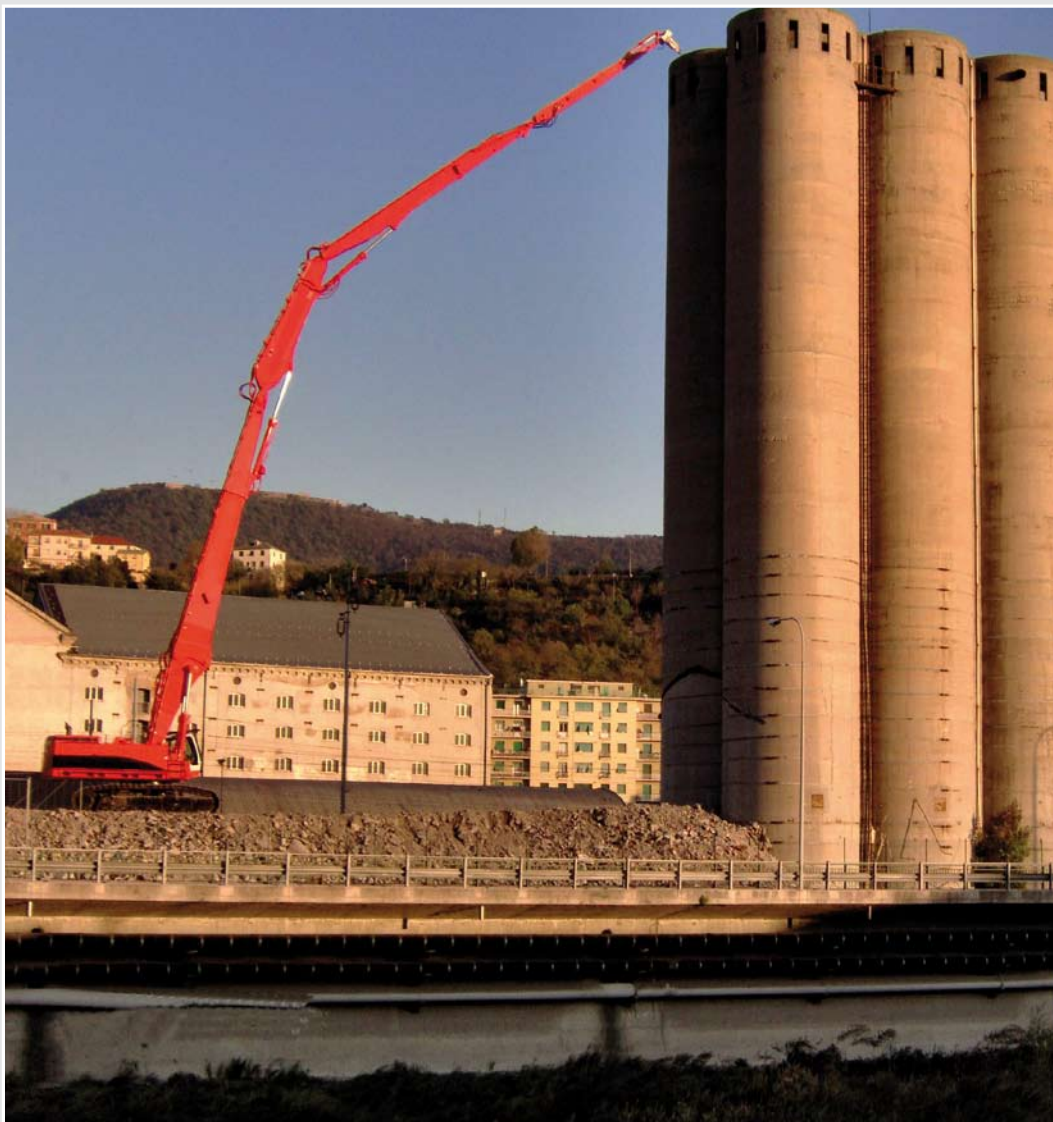
5.1. APPLICATION FIELD

Demolition high reach machinery is constructed to carry out specialised demolitions of artefacts and structures of high elevation.

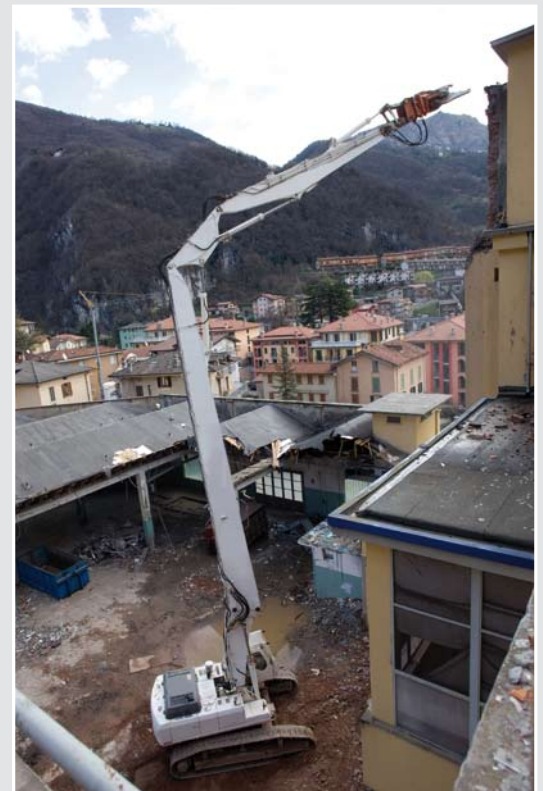
The threshold for defining a high reach demolition machine is when it reaches an operative height of more than 20 metres (as declared by the manufacturer in the owner's use and maintenance manual).

They are generally formed by a machine body (excavator, tank, engine, cabin, counterweights), a demolition arm (high arm consisting of three sections or a telescopic boom), a tool (primary crushers, shears, or hammers, subject to OEM approval).

High reach demolition machines can be equipped with specific tools to make them suitable for executing controlled demolitions of structures made from reinforced concrete, masonry, steel and mixed materials.



The high reach machines are essentially for the primary demolition of the artefact, they are not usually used for secondary demolition operations, the crushing or screening of material as these operations are left to machines with different features. These machines are not used as cranes to lift loads, but are limited to placing on the ground portions of structures which have been cut during the demolition. The operational limits of the machines are determined by the type of structure being demolished, by operative heights related to the building and by the environmental conditions (presence of ramps, etc.). These conditions are described in detail and evaluated in chapter 5.8.



5.2. MAIN COMPONENTS OF THE HIGH REACH DEMOLITION EXCAVATOR

The high reach demolition excavators consist of the following elements:

- *base machine*
- *demolition arms (three-part, telescopic, or multi-part)*



5.3. EQUIPMENT USED ON HIGH REACH DEMOLITION EXCAVATOR

By definition, high reach excavators carry out work at high altitude. Typically, the equipment used to perform these operations is as follows:



Combi-Crusher:

Demolition of mixed concrete/iron structures or in strongly reinforced concrete.



Shear:

Demolition of predominantly metallic structures



Crusher for Primary Demolition:

Primary demolition of structures especially made from concrete or tile



Grapple Crusher:

Primary and secondary demolition of structures made from tile



***Hydraulic Hammer
(subject to OEM approval):***

Primary demolition of structures predominantly made from concrete or very thick tiles



Rotating Pulveriser:

Primary demolition of structures in buildings made of brick with direct demolishment of the debris

EXPERTS ADVISE THAT THE EQUIPMENT SUPPLIED WITH THE ROTATOR (HYDRAULIC OR NEUTRAL) SHOULD BE INSTALLED ON THE HIGH REACH DEMOLITION MACHINES. TAKING SUCH PRECAUTION WHEN WORKING WITH **YIELDING** TOOLS, AVOIDS TORSION OF THE STRUCTURAL ELEMENTS OF THE ARMS.

IN CASES OF WORK ON POORLY ESTABLISHED STRUCTURES, EXPERTS ADVISE CARRYING OUT THE DEMOLITION WITH HYDRAULIC HAMMERS, IF THEY ARE APPROVED BY **OEM** AS THE SHAPE OF THEIR HEADS MAKE THEM BETTER SUITED FOR AVOIDING CONTACT WITH REINFORCED BARS.

5.4. SAFETY ENDOWMENTS

The high reach demolition excavators, as well as being structurally similar to earth movement excavators, are engineered and built differently and endowed with safety systems to make them fit for the demolition jobs.

Such safety devices are not currently obligatory, although their presence is advisable, in relation to the specific conditions of use. The list of the principal safety systems/features is as follows:

Feature/Outfit	Purpose/Function	Security features
Tracks of greater length and width	Stability increment and weight distribution of the machine on the ground	Avoids the risk of rollover and allows greater accuracy of movements due to increased stability
Cabina FOPS (Falling Object Protective Structure)	Cabin with reinforced structure directly connected to the structure of the “base machine” which is resistant to falling objects from above or those projected during the demolition.	Operator is protected from impact of objects which have been projected during the demolition.
Cabin with reinforced glass and steel guards	Improved FOPS features adding reinforcement systems for the glass and the cabin	Operator is protected against machine rollover and objects puncturing the cabin

Special demolition arm	Facilitates high-level access, direct strain during demolition, and provides increased protection to hydraulic components.	Reduces the risk of machine rollover, optimises the safety position of the machine with respect to the artefact for demolition. Prevents structural and system breakages.
Cabin with a 360° visibility (possibly aided by special mirrors)	Ensures total visibility for the operator.	Protects the environment surrounding the machine by reducing the risk of errors during manoeuvring.
CCTV system with a monitor in the cabin and a camera located near the tool and/or in the rear of the machine.	Ensures greater visibility to the operational area in particular, and also to the rear of the machine.	Reduces errors when operating, preventing unexpected collapses of the part of the structure being demolished.
Audible and visual indicator of the stability conditions of the machine.	Information is promptly given to the operator about the stability conditions of the machine.	Prevents rollover situations for the machine.
Additional counterweights system of variable distance from the fulcrum of the machine.	Improve the stability conditions of the machine.	Reduces the risk of machine rollovers.
Dust collector systems installed on the tool or nearby.	Reduces the development of dust during the demolition and improves visibility for the operator	Reduces the risk of errors when manoeuvring. Improves the general environmental conditions.
Tilting cabin.	Improves posture and visibility for the operator.	Prevents operator's fatigue caused by incorrect posture, and improves visibility thus reducing manoeuvring mistakes.
Quick coupling systems among arms and equipment/hydraulic pivots system	Improves the assemblage operation, reducing manpower	Avoids difficult manual operations and personnel proximity to moving machinery.

All high reach machines, as required by the Machinery Directive for the CE mark, must be provided with manuals in which, besides usual instructions, must have the operational limits specified, the compatible equipment and the maximum weight of tools that can be installed. While calculating the maximum weight of tools that can be mounted, the total mass including accessories and fast joints must also be considered. It is prohibited to install tools that exceed the weight limit prescribed in the use and maintenance manual.





5.5. PROCEDURES FOR TRANSPORTING, LOADING AND UNLOADING

High reach machines, as with all machinery, are likely to be moved around frequently in order to operate in different construction sites. The high reach machines are characterised by their dimensions, which in some cases are significantly larger than standard ones. Transportation should be managed following good technical specifications so that all operations are carried out safely. It should be stated that in most cases this type of machine cannot be transported fully assembled, but due to volumes it is obviously necessary to transport the various sections of the machine and reassemble at the site where there is appropriate space for unloading and assembling. Usually, the machines are transported in two or three sections as follows:

- *Base Machine*
- *Demolition Arm*
- *Tools and counterweights (if requested)*

Due to particular constraints of weight or size during transportation, the base machine of large machines can also be disassembled in the turret with the fifth wheel and individual tracks.

The following general rules are to be used during loading, transferring and unloading the machine:



Action	Purpose	Safety
Prefers subassembly transport rather than fully assembled machine transport.	Increases the possibility of manoeuvring, reduces the large overall dimensions to be handled.	Minor risks due to errors in operation, better stability of loads. Avoids overloading the transporting vehicle and possible rollovers.
Performs assembly/disassembly of the sections on an adequate and flat area with enough space for manoeuvring.	Ensures the necessary space and surfaces suitable for carrying out the manoeuvres is available.	Avoids operating mistakes and subsequent rollovers.
Uses appropriate cranes and lifting systems, e.g. the arm. Uses the slinging points specified by the manufacturer in the owner's use and maintenance manual.	Performs manoeuvres correctly estimating adequate safety margins.	Prevents rollovers or instability of the load.
For transporting the arm, use the attached supports provided by the manufacturer.	Performs the transportation while avoiding fluctuations or instability of the load.	Avoids rollovers or instability of the load.
Removes the arm before removing the counterweights.	Keeps the balance of the machine at an optimal level.	Avoids instability and consequent rollovers especially if the operation is performed on uneven ground.
If it is possible to transport the fully assembled excavator, it is forbidden to perform any rotation manoeuvres on the transport platform.	Avoids unbalancing the machine.	Reduces the risk of rollovers.
All components and assemblies must be securely anchored to the vehicle used for the transportation.	Avoids any movement of the load during transportation.	Avoids any movement of the load during transportation.

THE DISMANTLING AND REASSEMBLY PHASE OF THE EXCAVATOR IS USUALLY UNDERESTIMATED; EXPERIENCE SHOWS THAT A PREVIOUS PLANNED PROCEDURE OF THIS PHASE WILL IMPROVE THE SAFETY CONDITIONS. THE ELEMENTS TO BE CONSIDERED DURING THE PLANNING PROCESS ARE: THE MORPHOLOGY OF THE GROUND, THE SPACE AVAILABLE TO OPERATE IN, THE HEIGHTS TO BE REACHED, THE LOADS TO BE MOVED AND THE LIFTING METHOD TO BE EMPLOYED.



5.6. SAFETY CONTROLS

The maintenance procedures and periodic inspections are necessary elements in guaranteeing the efficiency and security of a high reach demolition machine. Such procedures, as applied by national regulations for safety at work, also play an important role for this type of equipment where safety is not only guaranteed by the professionalism of the operator but also by the efficiency of active and passive protection systems which have been installed. Manufacturers set inspections and scheduled maintenance activities according to the specific characteristics of each machine. These inspections and their frequency are described in the use and maintenance manuals, as issued by law. In order to ensure that the machine meets minimum efficiency levels whilst in operation the operator or any suitably qualified person should carry out some simple visual checks before using it:

Type of Control	Check list	Schedule
Visual inspection concerning the general state of the machine.	General state of the machine; the presence of cracks or fissures in the arm, in the connecting pins; oil or liquid leakage from the engine.	Daily
Visual inspection of plates and locking systems.	Verify all the bolts tightening, presence of cracks or fissures, presence of elements with inaccurate coupling.	Daily
Hydraulic links check.	Check hydraulic tubes links, hydraulic cylinders and hydraulic connections for leaks.	Daily
Control of active safety systems (alarm beepers, video camera).	Verify functionality when carrying out scheduled manoeuvres.	Daily
Control of the efficiency of glass surfaces and mirrors of the cabin.	Verify the integrity of the glass surfaces and mirrors ensuring proper cleaning to have the necessary visibility.	Daily
Monitor signs and icons on the machine.	Check the reliability and legibility of the icons and signs installed on the machine.	Daily
Control of the efficiency and the functionality of the utensil	Verify presence of cracks, oil leakage, efficiency of the blades, of the points and of the teeth; effectively run tests of rotation before using the utensil	Daily

In case, during the visual inspection, elements of failure or malfunctioning are found, the use of the machine is prohibited and the Site Manager must be immediately advised.

5.7. ORGANISATION OF THE SITE AND OPERATION AREAS

The use of high reach machines on site requires a specific site organisation who ensure the area is secure and necessary conditions are maintained at all times for the safe developing of demolition activities. The site organisation must take into account the following aspects:

- *Provide pathways and accesses allowing safe loading and unloading of the machinery along with reassembling and general maintenance on site.*
- *The operation area for the machine must be sufficiently spacious to provide the correct relation between building height and distance of the machine.*
- *If it is compulsory to build ramps, make sure there is necessary space available.*
- *A parking place for the machine must be provided, where is it safe to lower the arm to the ground in order to attach the tool.*
- *When surveying the site and operational areas, take into account that physical obstacles and utilities must be safeguarded (e.g. overhead power lines, other buildings which are not subject to demolition, sewages, gas lines, etc.).*
- *It is necessary to estimate the use and demand of materials in order to organise the site and keep the operational area of the high reach machine free from debris.*
- *Extra space area should be allowed for in case of a machine rollover.*





EXPERIENCE SHOWS THAT BESIDES THE STUDY OF THE TECHNICAL DOCUMENTATION (PLANS AND SKETCHES AVAILABLE) IT IS ADVISABLE TO CARRY OUT SOME SURVEYS WITH STANDARD EXCAVATORS TO EXCLUDE THE PRESENCE OF UNDERGROUND PLACES OR BASEMENTS. THE CONSEQUENCES OF AN UNEXPECTED YIELDING OF THE GROUND, ALREADY DIFFICULT FOR A STANDARD EXCAVATOR, BECOME DRAMATIC WHEN HIGH REACH DEMOLITION EXCAVATORS ARE INVOLVED FOR THE FOLLOWINGS REASONS:

- SMALL YIELDING AT TRACKS LEVEL CREATE ELEVATED MOVES TO THE OPERATIONAL QUOTE OF THE ARM;
- THE POSSIBLE ROLLOVER OF THE EXCAVATOR MEANS A VERY WIDE AREA IS CLEARED AND MAKES IT THEREFORE DIFFICULT TO CONTROL.

5.8. CRITERIA FOR DESIGN AND GOOD OPERATIVE PROCEDURES

The main tools to monitor and keep under control the parameters required for safe operation of the high reach machines are found in the technical documentation supplied before starting work. The minimum contents required for these two documents are:

Document	Minimum Contents
Preliminary investigation and risk assessment	<ul style="list-style-type: none">■ characteristics of the land;■ presence of pits or cavities;■ presence of sewages and/or slurry;■ presence of underground conduits;■ overhead power lines;■ rack or overhead lines (specify if in service or not and what kind of product they transport);■ adjacent structures to be preserved and provide information to carry out the execution of the separation cuts;■ static characteristics of the structures to be demolished;■ identification of the areas to be excluded;■ identification of debris storage areas;■ identification of sites for the construction of ramps and embankments;■ influence of weather conditions on the demolition work;■ site plans indicating the operation areas and site services.
Demolition project	<ul style="list-style-type: none">■ identification and characterization of the artefact to be demolished;■ identification of the characteristics of the high reach machine to be used;■ ramps and embankments sizing;■ indication on the debris and dust control systems to be assembled;■ time sequence of events;■ necessary graphic support.

DURING THE PREPARATION OF THE PROJECT DOCUMENTATION, SOME FUNDAMENTAL TECHNICAL ISSUES, DERIVED FROM THE EXPERIENCE OF EMPLOYING HIGH REACH MACHINES ON SITE, SHOULD BE TAKEN INTO ACCOUNT AND WHICH APPLICATION CAN SIGNIFICANTLY INCREASE THE SECURITY LEVEL OF DEMOLITION ACTIVITY.



5.8.1. RELATION BETWEEN HEIGHT OF THE BUILDING AND DISTANCE OF THE MACHINE

The relation between height of building and distance of the operating machine is of great importance to the safety of the operation, the passive and active security systems installed on high reach machines, though very sophisticated, do not guarantee the protection of the operator, especially in cases of sudden collapse or projection of debris at high speed. The occurrence of these events is influenced by several factors including type of building, conservation status, presence of concealed defects, etc., and therefore it is difficult to predict.

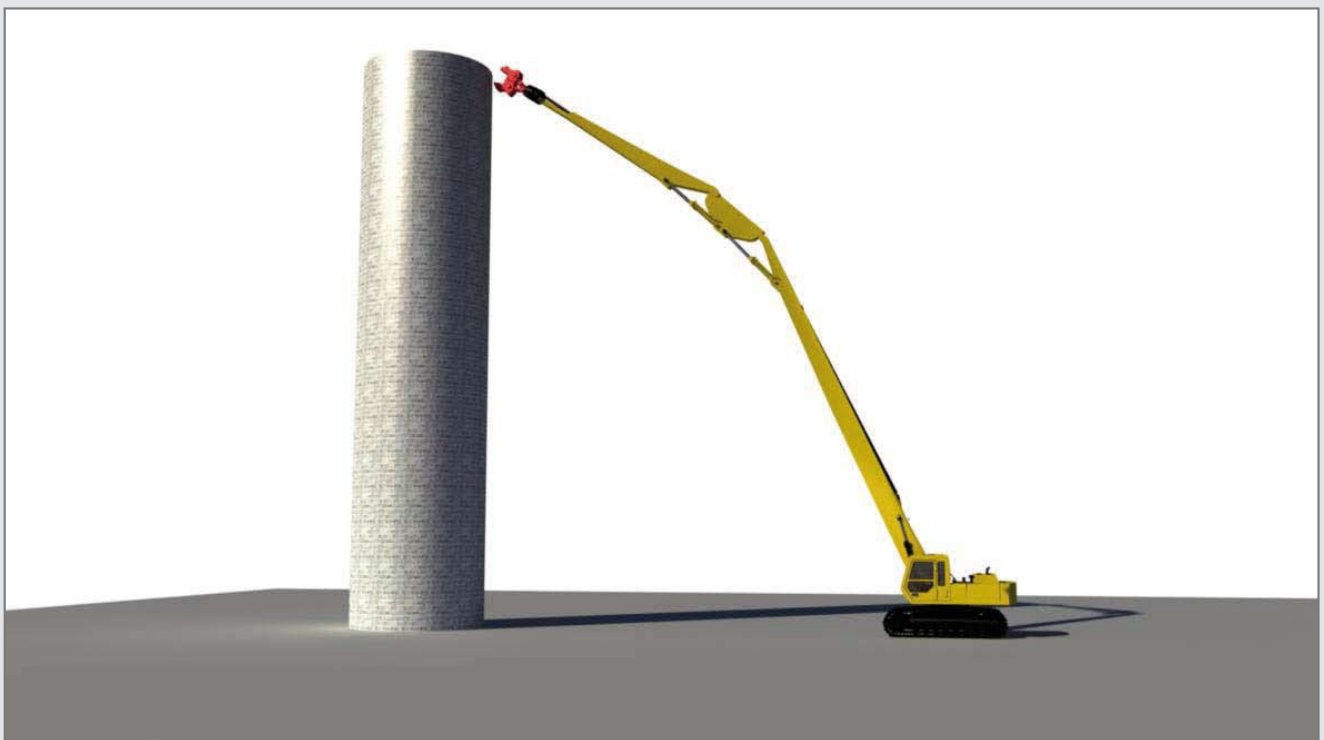
In this sense it is important to establish a minimum distance measured from the base of the excavator (the front of the crawlers) to the base of the manufactured article (or the most prominent element on the ground), in a way to be a suitable margin of safety as dictated by the distance.

THE EXPERIENCE FROM LEADER DEMOLITION COMPANIES SHOWS THAT THE OPTIMAL RATIO BETWEEN THE HEIGHT OF THE BUILDING AND THE DISTANCE FROM THE BUILDING IS CURRENTLY 2:1.

Building Height (m)	Distance from Building (m)
10	5
15	7.5
20	10
25	12.5
30	15
35	17.5
40	20

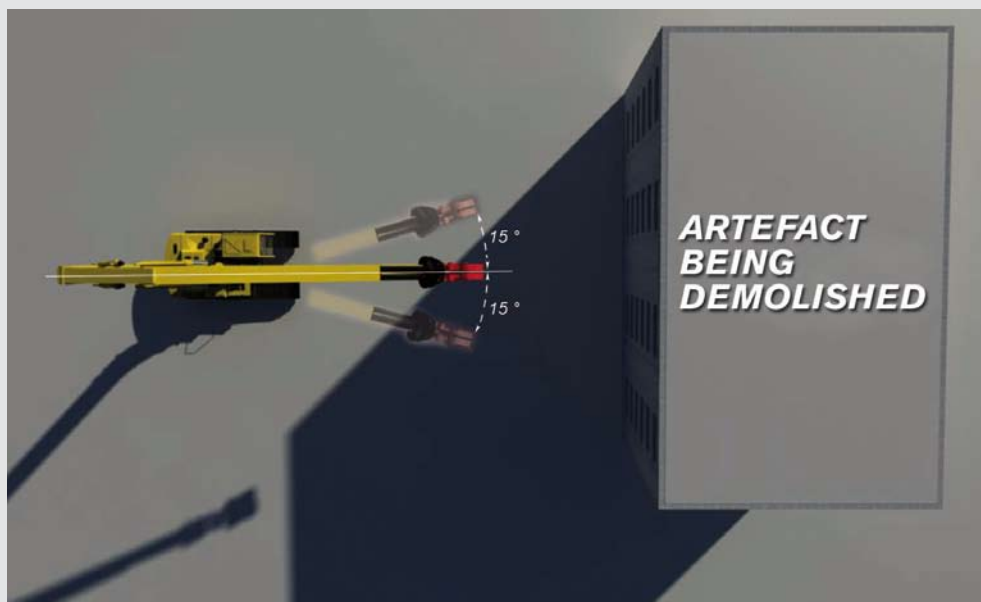
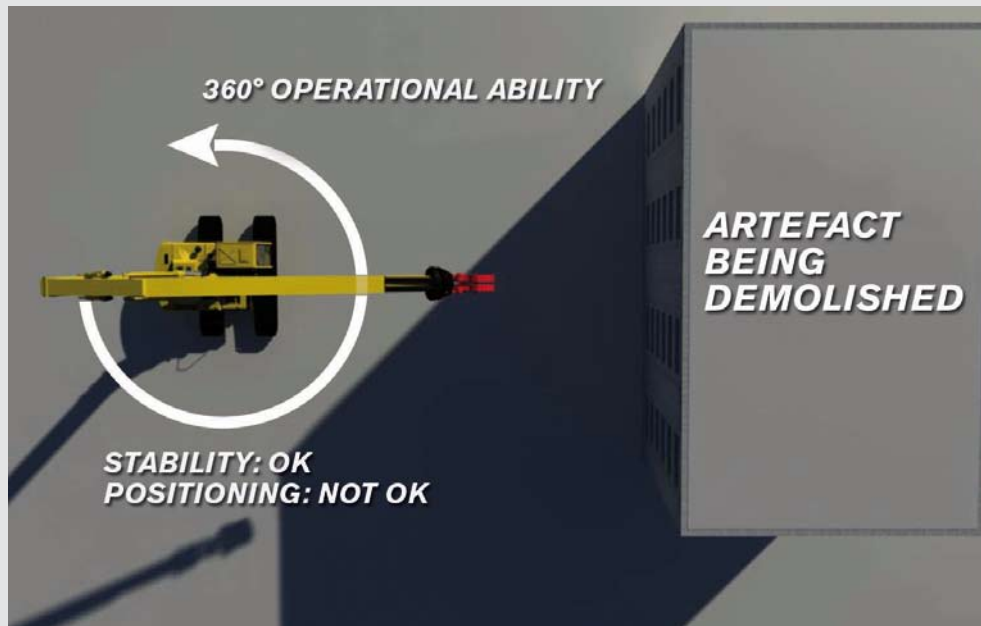
These parameters should be considered indicative and susceptible to change, depending on the result of the evaluation of the risks derived from the investigations carried out on the building and its surroundings.

In particular the 2:1 ratio works fine until the building height reaches 40 metres, as beyond this height the distance may decrease significantly due to the parabolic trajectory of the falling materials.



5.8.2. POSITIONING OF THE MACHINE IN RELATION TO THE STRUCTURE TO BE DEMOLISHED

The proper positioning of the machine in relation to the structure to be demolished is essential in order to ensure operability and the safety of the demolition. The positioning of the machine influences the stability and therefore the necessary safety. It is forbidden to operate high reach machines on uneven or not properly compacted/stabilised ground. For this purpose a preliminary investigation on the site is essential in order to identify any areas which are particularly vulnerable and susceptible to failure. Situations that may lead to the failure of the operation of the machine must be resolved by stabilising/compacting the ground, if this is not, possible the area must be restricted to prevent the transit of the machine. To ensure stability, the operation angle of the arm should be limited. The experience of specialised companies has determined that the maximum amplitude of rotation of the fifth wheel in relation to the truck must not exceed 20° - 30° with a total limit of 10° - 15° per side. These limits should be considered good practice except when differently specified by the manufacturers. The possible EMERGENCY EXPULSION of the machine from the building is carried out by positioning the tracks orthogonally to the front of the demolition with the direction coherent with the commands ("ahead" to move towards the building, "back" to move backwards). Some builders sell machines with 360° operational ability. Such configuration is to guarantee the stability of the machine. However this does not exempt the operator from being placed correctly in correspondence with the building (orthogonal truck and coherence with the sense of run).



5.8.3. POSITIONING OF THE ARM WITH RESPECT TO THE BUILDING TO BE DEMOLISHED

The positioning of the arm is also a fundamental element to achieve safety. It is recommended that the indications of the builder concerning the correct preparation and positioning of the arm are meticulously followed.

The demolition high arms are considered extensions of the base machine, although more fragile in comparison to the excavation arms; their structure makes them particularly sensitive to torsion and traction/compression phenomena. Due to this fact, it is necessary to avoid anomalous solicitations affecting manoeuvres of traction, for instance, thrusts or lifting on the parts of the building in demolition.



5.8.4. USING RAMPS

To increase the operating height of the high reach machine, the construction of ramps is allowed to elevate the machine in relation to the base of the building. The construction of these ramps is subjected to certain specifications, as listed below.

1. The maximum height of the ramp should not exceed 10m from the base of the building to be demolished.
2. The dimension of the ramp must exceed at least 4 metres wider than the machine and 8 metres longer than it.
3. The gradient of the ramp should not exceed 10°.
4. The materials used for the construction of the ramp should have a grain size of between 0 and 200mm. The materials considered suitable for the construction of the ramp are the following:
 - *crumbled concrete*
 - *compacted demolition debris*
 - *crumbled bricks*
5. The high reach machine must be placed on the top, flat part of the embankment at the end of the ramp. It is not possible to work on surfaces of different levels.
6. Mounting the ramp should be performed in forward gear while the descent should be performed in reverse gear.
7. It is possible to continue using the ramp even after removing the high arm, using standard demolition arms.



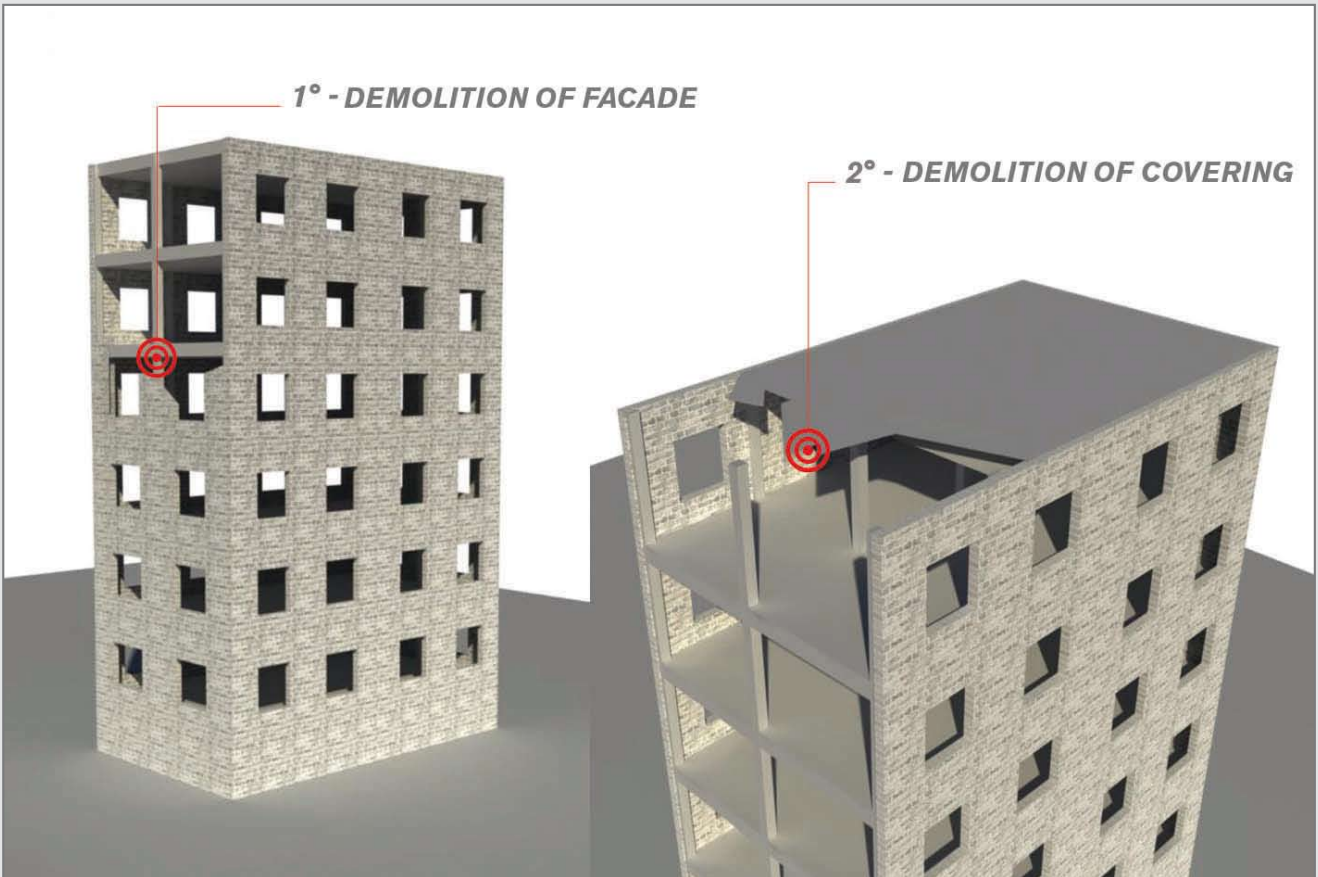
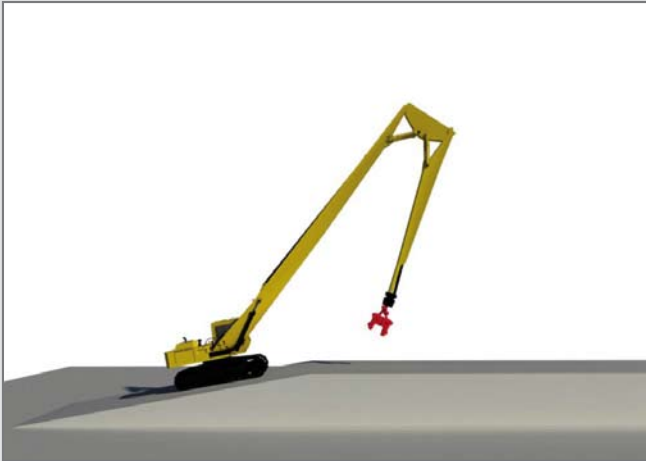
5.8.5. LOGICAL PROGRESS OF THE DEMOLITION PHASE ON MULTI-STOREY BUILDINGS

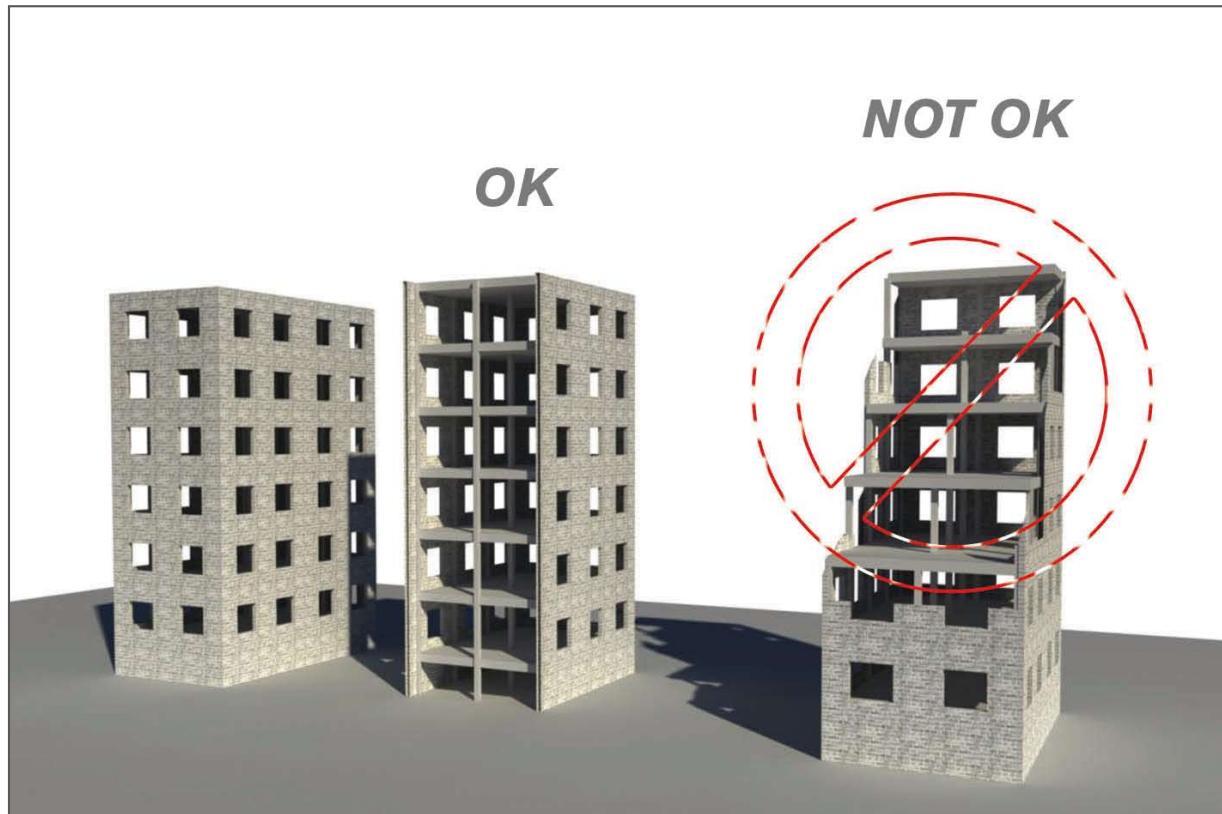
The basic rule for approaching the demolition of a multi-storey concrete building is to attack the structure perpendicular to the floor joists. (see image).

The demolition process begins from the highest floor and proceeds down to the ground floor by spans marked by two pillars.

Typically the multi-storey structures are created with multi-level elements and therefore every floor located between pillars is structurally stable; this allows the demolition of every section while guaranteeing the stability conditions of the adjacent section.

In this sequence of vertical demolition it is necessary to pay a lot of attention to the overload on the joists due to the accumulation of the debris. It is therefore fundamental in avoiding untimely collapses. The attics involved in the demolition must be kept cleared from debris.





5.8.6. SYSTEMS OF CONTAINING DUST AND DEBRIS

Using high reach machines, the development of dust is common matter. Due to the high altitude of the demolition area, the risk from falling debris is also significant. To overcome these drawbacks the ordinary dust systems and debris containment used in demolition standard operations are allowed. Such systems are usually:

- *spraying water through water jets*
- *pressure lances operating from elevated platforms*
- *fog cannons*
- *spray systems attached to demolition arms*



5.8.7. CONTAINMENT OF THE RUBBLE

Due to the elevated height of the demolition area in comparison to the ground, the consequential risk from falling rubble to the ground is substantial. To avoid this risk, the following drawback systems are used:

- *flexible containment systems realised in highly resistant plastic material held up by provisional works (scaffoldings) or cranes*
- *rigid metal containment systems held up by provisional works or cranes*
- *protective scaffoldings, valances, modular elements tunnel, etc.*

Also of great importance to restrict the demolition area are the operational area of the excavator and the area of protrusion of the building; keeping in mind the possible collapses and the fall of rubble, such areas must be delimited and restricted to personnel.

IT IS IMPORTANT TO KEEP THE DEMOLITION AREA CLEAR OF THE HIGH REACH DEMOLITION MACHINE. FOR THIS, IT IS ADVISABLE TO HAVE SUPPORT AVAILABLE SUCH AS A SHOVEL/EXCAVATOR IN ORDER TO REMOVE THE RUBBLE FROM THIS AREA. THE RUBBLE CAN BE ACCUMULATED IN THE DEPOSIT AND/OR TREATMENT AREAS IF PROVIDED FOR, OR PROMPTLY REMOVED FROM THE SITE.



5.8.8. USE OF SUPPORT PERSONNEL

For demolition activities with high arms in reduced or limited visibility conditions, even if provided with additional CCTV systems, it is possible to use an assistant. This is a highly qualified person who is positioned in strategic points with better visibility than the operator, who gives orders, and provides information on issues concerning the demolition operation. As for lifting operations, this is usually done with sign language. In cases of demolition with a high reach excavator, a two-way radio communication system must be used.



5.8.9. REPLACEMENT OF TOOLS AND MAINTENANCE OPERATIONS ON SITE

The execution of maintenance operations and activities necessary for the replacement of tools must be made in safe conditions. It is not advisable to carry out maintenance operations while the excavator is in the demolition area. The specific maintenance operations must be run in a specifically allocated flat area, this area can also be used to park the machine after the work shift. The average space required to easily perform the maintenance operations is approximately 20m x 6m which corresponds to a surface of about 120 square metres. Maintenance operations must be performed by qualified and properly trained personnel; interventions must be performed in accordance with the Use and Maintenance Manual and in accordance with the manufacturer's requirements. The equipment used to perform maintenance activities must be appropriate and in agreement with national laws. It is prohibited to conduct improper manoeuvres with the excavator such as using the arm to keep the tracks raised.

5.8.10. STORAGE OPERATIONS AT THE END OF WORK SHIFT

After the work shift has ended, the high reach machines must be parked in safety. In particular, they should be placed in a specific plane area, the arm must be closed or retracted (in the case of telescopic machines) and the tool grounded.

Unless otherwise indicated, the ignition key must be removed from the command, the machine must be completely locked and, if present, the alarm systems and protection of the cabin must be activated.



6. Training

(6. Training of personnel)

6.1. OPERATORS' PROFESSIONAL REQUIREMENTS

Highly qualified staff are required to operate the high reach machines. The procedure for the qualification of personnel has not yet been ruled in many countries of the European community. Through evaluations of their professional experience and physical and psychological abilities of their operators, employers can determine those who are skilled enough to use a high reach demolition machine. It is highly recommended, anyway, that appropriate training and assistance on site is provided to operators to improve gradually the necessary skills to use this particular type of machine. Manufacturers provide basic training courses, upon delivery of the machine, for operators as well as ordinary maintenance personnel.







6.2. TRAINING, A EUROPEAN PROPOSAL FOR THE FUTURE

The technical commission of E.D.A. is working on theory and practice training which may be useful for obtaining the necessary skills to approach the conduction of high reach demolition machines. It is beneficial for joining the qualification of the personnel with a formation that covers theoretical and practical aspects. It is necessary to understand that this training has to be associated with an accurate physical and psychological ability evaluation on behalf of the employer in order to fully enable an employee to operate this type of machine.

The formation and the information must be continuous and periodically updated, particularly for the aspects concerning the safety and upon the introduction of new technologies. The qualification does not take the place of a suitable formative run “in the field” of the operator with a progressive approach to the demolition machine.

7

(7. Evaluation of the risks)



Every employer must first perform a risk assessment for their activity; this process does not obviously exclude the use of high reach excavators. Risk assessment plays a fundamental role for the prevention of hazardous situations. The following, not exhaustive, table indicates the principal risk factors to consider during the risk evaluation.



Phase of job	Associated risks	Notes
Load and transport	Fallen from the top	During the cargo phases, the operators often access elevated workstations
	Crushing	Activities are planned for lifting and mounting/dismounting components as well as harnessing them to the trailer
	Turnover	Planned activities with cranes for lifting components of significant weight. In case of loading on to trailer with ramps the stability conditions are to be considered a critical factor
	Shocks	Performance of various manoeuvres with either suspended loads or with self-moving components, shock can be caused to the machine and compression to operators
Assembly/dismantlement	Fallen from the top	The assembly operations often foresee the performance of operations at elevated heights superior to those of usual standard excavators
	Crushing	Lifting loads of great importance often with special conformations and associated handling
	Turnover	
	Bumps	
	Errors of assemblage	
Operational use	Material fallen from above	Risks increased by elevated operational units
	Untimely collapses	Risks increased by minor visibility of the operator and by minor precision of movements due to the length of the arm

	Turnover	Risk determined by the average position of centre of gravity of the machine with respect to the standard machines which increases the risk of dragging the arm in case of sudden collapse
	Contact with lines in tension	Less precise movements and less visibility significantly increases this risk
	Dust development	The development of dust at elevated heights is more difficult to control and contain with the spraying water systems
	Investment of things	The rubble fallen from elevated heights is more difficult to control and contain. In case of errors of manoeuvre, the security area of the high reach machine is extended
	Investment of people	The rubble fallen from elevated heights is more difficult to contain and control. In case of manoeuvre errors, the security area of the high reach machine is extended
	Mechanical break-ups	In the case of mechanical break-ups, the effects, above all, of structural yielding, can be more evident than for standard machines
Maintenance	Work at height	Due to the high weight of the machines and the extension of the arms, maintenance is frequently performed at elevated height
	Risks associated with lifting	The high mass motion and the use of lifting equipment, especially on the site, increases the risk of machine rollover.
	Contact with harmful substances	The volumes of hydraulic oil used and the largest number of connections to monitor and maintain them can result in greater exposures than with standard machines.

8. Ad

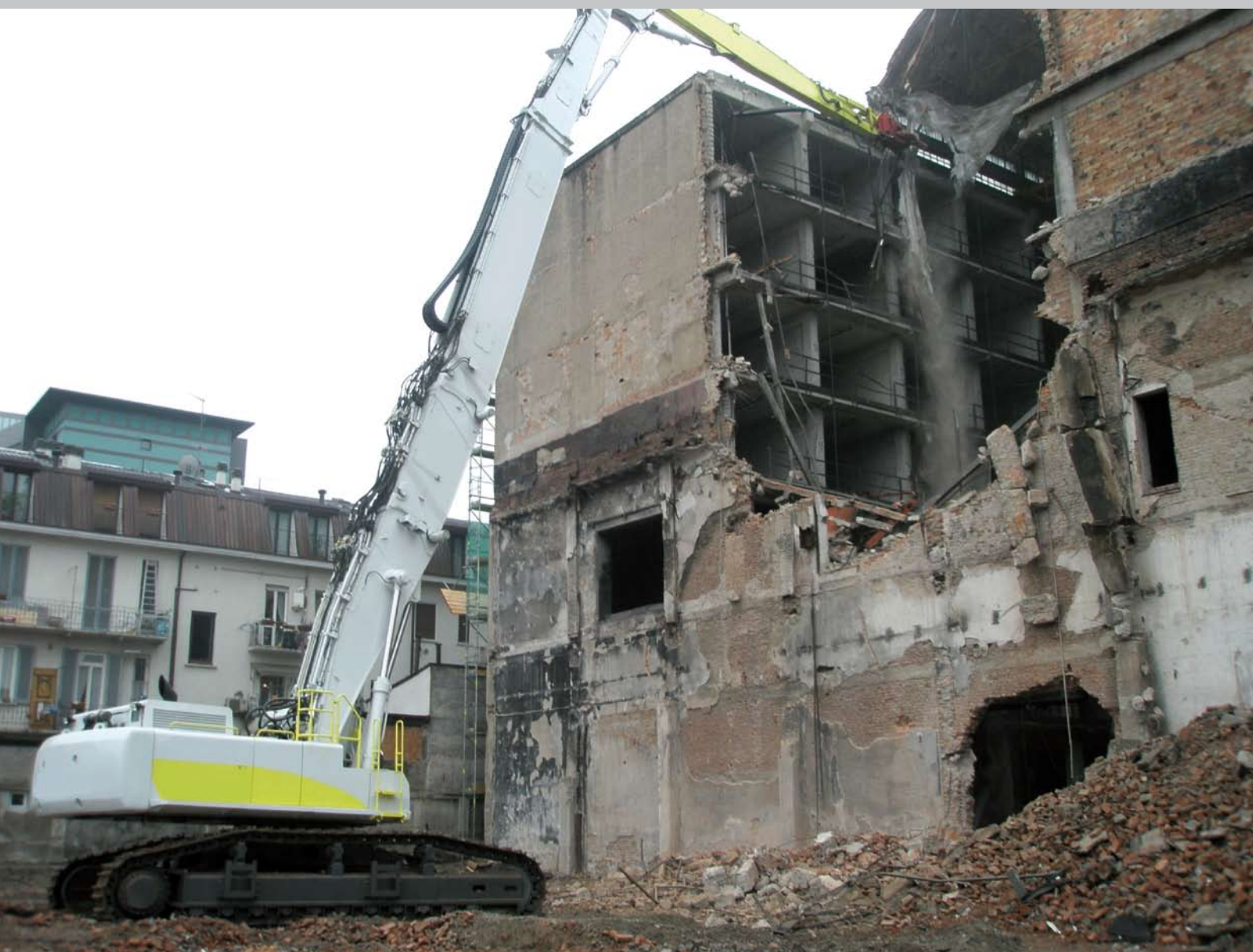
(8. Administrative management)

8.1. INSURANCE PACKAGES

The use of high reach demolition excavators very often requires disclosure to insurance companies or the integration of third party liability. It is important that employers and business owners who use high reach demolition excavators consider the cover for damages resulting from the use of these demolition techniques in their insurance policies.

Consideration should be given to the fact that the operative quotes do not refer to the specifications of the machine, but the possible formation of ramps as access for the demolition of buildings with greater heights should also be considered.





8.2. "BARE HIRE"

If the conduction of high reach excavators is not carried out by highly qualified staff, this can lead to serious consequences for both the operator himself and to the surroundings. It is not advisable to "Bare Hire" demolition excavators equipped with high arms. This is due to one main reason: As mentioned in the introduction, it is closely connected to physical and safety security. Direct feedback from the operators themselves, for the conduction of these excavators is required as is a level of preparation, and a training course, which can only be developed by companies who carry out such activities in a technically appropriate and professional way. This security issue related to the hiring of the high reach excavators will be finally overcome when, at European level, an agreement will be reached concerning the minimum necessary requirements for the operators who run this kind of machines. For the moment, only a few countries have a process of personnel qualification which is recognised by national legislation.

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EDA NATIONAL ASSOCIATIONS

Belgium
FABA/CASO - FEDERATIE DER ALGEMENE BOUWAANNEMERS
www.faba.be

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www.nedbrydningssektionen.dk

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www.syndicatdemolition.fr

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